



# 2012

Environment Report



Boeing is setting new standards for efficiency, environmental performance and noise reduction.

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## Message From Jim McNerney and Kim Smith

At Boeing, we are focused on creating cleaner, more efficient flight. Each new generation of products we bring to the marketplace is quieter, consumes less fuel and is better for the environment.

The 747-8 and 787 Dreamliner — with smaller noise and emissions profiles than airplanes they replace — entered into service last year. We also launched the 737 MAX with a 13 percent smaller carbon footprint than today's Next-Generation 737, which currently is the world's most fuel-efficient single-aisle commercial airplane.

This builds on an enduring legacy of continuously improving the environmental performance of our products and services. Today's commercial airplanes produce 70 percent less carbon dioxide than jetliners that flew during the 1960s.

Boeing led a broad industry effort that, in 2011, won approval for the use of cleaner, sustainable biofuels in commercial and military aviation worldwide. Since then, airlines have used biofuels on more than 1,500 passenger flights. These innovative fuels are derived from plants and other biomass sources that do not adversely affect food and water supplies or impede valuable land use. In fact, they significantly reduce the net carbon dioxide output of flight.

Looking to the future, we will continue devoting a significant portion of our R&D efforts to develop cleaner, more efficient aircraft. First flight of the Phantom Eye — an unmanned, high-altitude aircraft powered by clean-burning hydrogen — occurred in early June. And Boeing engineers are actively studying a new-generation 777 that promises to be even more fuel efficient — with a significantly smaller environmental footprint — than today's market-leading twin-aisle airplane.

In addition to developing innovative and efficient new products, we also are improving the environmental performance of our internal operations.

Last year, we began powering our South Carolina production facility with 100 percent renewable energy generated, in part, by solar panels spanning the 10-acre (4-hectare) roof of the final assembly building where we are producing the 787 Dreamliner and providing thousands of new manufacturing jobs. This, along with our companywide effort to reduce energy use, is among the reasons why we have become an ENERGY STAR Partner of the Year for a second consecutive year.

In 2007, we established aggressive five-year environmental goals for Boeing's internal operations. We committed to reduce greenhouse gas emissions, energy use, hazardous-waste generation and water intake by 1 percent on an absolute

basis. At the time, we anticipated these goals would equate to a 25 percent reduction on a revenue-adjusted basis.

Since then, we have experienced unprecedented growth in our business. We brought two new airplanes to market, increased monthly production of jetliners by more than 25 percent, added well over 1 million square feet (92,903 square meters) of additional manufacturing facilities and created more than 12,000 new jobs. During that time, we steadily reduced our environmental footprint.

While this rapid growth has made our environmental goals more challenging, we remain on track to meet or exceed the targeted absolute reduction on most measures, and we expect our revenue-adjusted improvements will still reach the mid to high teens.

Boeing produces strong results because of our people. Our employees continue to find new and better ways to enhance our environmental performance, which benefits our communities as well as our business. ■



Jim McNerney  
Chairman, President and Chief Executive Officer  
The Boeing Company

Kim Smith  
Vice President  
Boeing Environment, Health and Safety



PHOTO: BOEING

## Performance Targets



Mike Kunce, left, Tom Harmon and the energy management team improved system efficiency and reduced 2011 energy and water usage by more than 12 percent in the main office building at our St. Louis site. The U.S. Environmental Protection Agency recognized the achievement in 2012 by awarding the building an ENERGY STAR.

Boeing set the following targets for the period between 2007 and 2012 at our operations in the United States, where we have our largest manufacturing presence:

	<b>Absolute Reduction</b>	<b>Revenue-Adjusted Reduction</b>
Greenhouse Gas Emissions	1%	25%
Energy Consumption	1%	25%
Water Intake	1%	25%
Hazardous-Waste Generation	1%	25%

In addition, we committed to increasing the amount of solid waste diverted from landfills to 75 percent, measured on an absolute basis, for the same period.

Since adopting these targets, Boeing has announced increases in production rates for all commercial airplane models. We also hired thousands of new employees and added major new manufacturing operations, including the South Carolina 787 production facilities and the PDX facility for painting twin-engine airplanes in Portland, Ore.

For information on performance toward these goals, please see Our Results. ■



## Designing the Future



PHOTO: BOEING

Clean-burning hydrogen fuel means the only emissions will be water from Phantom Eye, a high-altitude, unmanned airborne system, which completed its first flight on June 1, 2012.

In aviation, the most significant environmental improvements occur when they are designed into a product from the beginning. This forward-thinking approach, which we call Design for Environment, includes analyzing a product's environmental footprint over its operational life cycle — from raw materials, through manufacturing, into service and, finally, at the end of use.

### ecoDemonstrator



Over the next several years, Boeing will fly annual demonstrator airplanes to accelerate emerging technologies designed to increase fuel efficiency, reduce noise and assess sustainable materials. Testing in 2012 and 2013 will be conducted in partnership with the U.S. Federal Aviation Administration's CLEEN (Continuous Lower Energy, Emissions and Noise) program.

The first ecoDemonstrator technology suite will be flown in late summer or early fall of 2012 on a Next-Generation 737-800 and

will test a number of innovations. The wings will be fitted with adaptive trailing edges to improve fuel efficiency at takeoff, climb and cruising altitudes, as well as reduce community noise. A regenerative hydrogen fuel cell will provide an alternative source of cabin power while advancing technology toward reducing weight, fuel consumption and carbon emissions. Advanced flight trajectory and in-flight planning will enable more fuel-efficient routes and enable future improvements in air traffic management.

In 2013, a 787 will enter into the eco-Demonstrator program to test and advance additional technologies for possible incorporation on future airplane models.

### Phantom Eye

This unmanned aerial vehicle is fueled with liquid hydrogen, a first for Boeing. The Phantom Eye is a high-altitude, long-endurance vehicle designed to stay airborne for up to four days — with no contributing CO<sub>2</sub> emissions. Boeing internally funded all the research to develop this innovative concept. Powered by two 2.3-liter (0.6-gallon), four-cylinder hydrogen



### A faster takeoff for clean technology

The carbon fiber composite material that has transformed aerospace, resulting in fuel-efficient airplanes such as the 787 Dreamliner, wasn't developed overnight. Research and testing began more than 40 years ago with small composite components on the Boeing 727.

Jeanne Yu would like to help that research and development process move much more quickly.

"Our goal is to get more environmentally progressive technologies on airplanes faster; that is the real environmental strategy. What do we need to do to get there?" asked Yu, director of environmental performance in Boeing Commercial Airplanes.

## Designing the Future

*Designing the Future continued from P5*

engines that provide 150 horsepower each, the Phantom Eye's first flight occurred on June 1, 2012.

### X-48C



Blended Wing Body: The shape of things to come?

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This blended wing body research and test aircraft, designed to advance technologies that will consume less fuel and make less noise, could help to reduce the carbon footprint of aircraft by an additional 20 percent. The Boeing blended wing body design resembles a manta ray with a flat, tailless fuselage. This fuselage blending helps to get additional lift with less drag compared to a circular fuselage. Boeing previously tested the three-engine X-48B and later this year is scheduled to fly the more efficient twin-engine X-48C.

### SUGAR

Boeing's Subsonic Ultra-Green Aircraft Research (SUGAR) team is working to identify future commercial transport concepts for NASA. The team is looking at a number of concepts and technology



SUGAR Volt: Boeing's Hybrid Electric Aircraft

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development for several advanced fuel and energy technology options for the 2030 to 2050 time frame.

These include hybrid battery-gas turbine propulsion, fuel cells, fuel cell-gas turbine hybrid propulsion systems, cryogenic fuels, cryogenically cooled engines and associated technologies, advanced batteries and open rotor/turboprop technologies.

One concept, called SUGAR Volt, shows potential to meet NASA's environmental goals for 2030 to 2035. With a hybrid propulsion system, using both jet fuel and batteries, a greater wingspan and open-rotor engines, the SUGAR Volt is designed to emit 60 percent less carbon dioxide and 80 percent less nitrogen oxide than aircraft that operate today.

### Energy

We are focused on developing smart, secure energy solutions for the U.S. military that lower operational costs and increase



energy efficiency at military installations around the country. The team is also developing advanced technologies in areas such as renewable energy, energy

storage and carbon capture.

In August 2011, Boeing and Siemens announced an alliance to improve energy access and security for the U.S. Department of Defense, the largest energy consumer in the federal government. ■

### *A faster takeoff continued from P5*

One answer can be found in the eco-Demonstrator, a program that takes flight in 2012. Using a Boeing Next-Generation 737, the ecoDemonstrator aims to accelerate technology through testing of several advanced technologies designed to improve aircraft efficiency, reduce noise and cut emissions.

Yu said the lengthy development process for carbon fiber composite material highlights the role of a research accelerator like the ecoDemonstrator. "Composite testing began on the 727 in the 1970s. Carbon fiber components played an increasingly bigger role over time on the 747, 767 and 777 before taking a big leap on the 787 Dreamliner."

"A new technology's application has to grow and expand based on our confidence and ability to learn and produce it more effectively," Yu said. "That's where the eco-Demonstrator comes in."

"The test platform enables product developers to gain experience with the technology and how it integrates with the airplane," Yu said. The program's deadlines and flight schedules also help focus their efforts. "In essence it's really about stretching people's imagination into the practicality of application."

The ecoDemonstrator program will test new environmentally progressive technologies on a different airplane platform each year, a schedule which adds other benefits. "We develop a whole new airplane only once every 10 years. That's a long time in between airplanes," Yu said. "The eco-Demonstrator will help the product development team keep our learning ability fresh every year."

PHOTO: BOEING. Bill Norby, left, propulsion and fuel team leader, and Brad Shaw, chief engineer, are part of the team that is demonstrating the performance, environmental benefits and potential use of hydrogen fuel as part of the Phantom Eye high-altitude, unmanned aerial vehicle.

Inspiring the Industry



PHOTO: BOEING

Boeing is working with a number of organizations and research and development projects throughout the world dedicated to advancing the development of sustainable aviation biofuels.

Boeing is bringing together customers, suppliers, academic institutions and government organizations around the globe to work at the leading edge of today's most promising technologies for continued environmental efficiencies.

## Biofuels



Biofuels: Renewable jet fuel

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Our commercial and military customers are looking for innovative ways to improve the environmental performance of aerospace, reduce the dependence on petroleum and secure a clean-energy future. That is why Boeing is taking a leading role

in accelerating the development of sustainable biofuels that can be used as a "drop-in" replacement for jet fuel while not competing with food, water or land-use resources.

With a number of initiatives around the world, from Brazil, to the U.S., Australia, the UAE and China, Boeing is working to enable the development and commercialization of sustainable aviation biofuels.

Major milestones were achieved last year as Boeing-led industry efforts won approval from ASTM International for aviation biofuels. This organization, which establishes fuel standards for commercial and military aviation around the globe, approved use of these innovative fuels without requiring modifications to aircraft or engines.

Since these fuels were approved, more than 1,500 commercial airline flights have successfully flown using biofuels. The U.S. Navy has certified all their aircraft for biofuels flight, and most of the U.S. Air Force aircraft have received similar approvals.

In addition to the regularly scheduled commercial flights in 2011, Boeing took a leading role in two pioneering biofuels flights.



## Flight deck technology leads to "Greener Skies"

A key part of the strategy to create a more efficient global air traffic management (ATM) system is to take better advantage of technology that is readily available and already on board most aircraft.

"Boeing airplanes have been equipped with highly capable flight management systems for a long time," said Sheila Conway, senior engineer in Avionics, Air Traffic Management.

"Part of our job is to demonstrate to the airlines, the industry and air traffic controllers how we can leverage the advanced capabilities and functions already available on the flight deck." Conway said it's also important to show



## Inspiring the Industry

*Inspiring the Industry continued from P7*

In June 2011, a 747-8 Freighter made its international air show debut flying across the Atlantic Ocean to the Paris Air Show using renewable aviation jet fuel — the world's first transatlantic crossing of a commercial jetliner using biofuels.

And, in April 2012, Boeing delivered a 787 Dreamliner to Japan's ANA powered in part by sustainable biofuels. The delivery flight between Boeing's Delivery Center in Everett, Wash., and Tokyo was the first transpacific biofuels flight.

### ATM

Improving the efficiency of the global transportation system, which is based on 1950s-era technology, will provide significant environmental benefits. The Civil Air Navigation Services Organization (CANSO), of which Boeing is a member, estimates that the current worldwide air traffic management system fuel efficiency is between 92 and 94 percent and is working toward a goal of 95 to 98 percent by 2050. At the same time, Boeing is collaborating globally to research and develop longer-term systems and solutions to modernize and transform air travel.

In October 2011, Boeing received a U.S. Federal Aviation Administration contract — called Greener Skies Initiative 2 — to evaluate current navigation procedures and analyze new ones with the potential to reduce the carbon footprint of air travel. This initiative will expand and build on the success of the Greener Skies Over Seattle project, which demonstrated Alaska Airlines' ability to cut fuel consumption and reduce emissions by 35 percent using new techniques Boeing developed for the descent and landing phases of flight.

In August 2011, Boeing and Indonesia's Lion Air completed validation flights to test precision navigation technology in South Asia. Using GPS-based technology to fly precisely defined flight paths will reduce flight miles and improve descents, saving fuel, reducing emissions and noise, and enhancing safety.

Boeing is offering services to help airlines save fuel and increase environmental performance. The use of old, inaccurate

and limited weather data can prevent airplanes from operating at peak efficiency. A new service, called "Wind Updates," provides flight crews with real-time wind, temperature and weather information that can save hundreds of gallons of fuel on a typical flight.

### Supply Chain

In 2011, Boeing took a leadership role in an effort to bring together the aerospace industry and address the need for common environmental standards in the global supply chain. The International Aerospace Environmental Group (IAEG) is working to develop a standardized approach for a wide range of environmental issues including identifying the chemical components in aerospace parts produced around the world and greenhouse gas data collection and reporting.

Founding members include Airbus and EADS, Boeing, Bombardier Aerospace, Dassault Aviation, Embraer, GE Aviation, Northrop Grumman, Rolls-Royce, SAFRAN, United Technologies Corporation and Zodiac Aerospace. Since then, membership has nearly doubled.

Our hope is that these efforts will lead to increased efficiency in aerospace operations and enable reductions in environmental pollution.

### Global Approach to Aviation Emissions

Since aviation is a global industry, with airplanes crossing international borders every day, Boeing believes that a global system is needed to address aviation emissions. We advocate that a global emissions framework for aviation can best be achieved under the auspices of the International Civil Aviation Organization (ICAO), a United Nations organization.

Working through ICAO, aviation was the first industry to present a clear plan to the United Nations' ongoing climate change negotiations. ICAO calls for global guidelines including the development of a CO<sub>2</sub> standard for aircraft, improvements in air traffic control systems to cut air travel-related emissions by up to 12 percent and

*Flight deck continued from P7*

how airborne components, such as airplane flight management systems and ground-based air traffic control systems, can work together to optimize flight operations and improve aviation environmental performance.

Conway leads the "Greener Skies Initiative 2," a research project funded by the U.S. Federal Aviation Administration to expand the use of flight deck and air traffic control capabilities across the country. Launched in 2011, Greener Skies will evaluate precision navigation procedures that can improve air traffic management efficiency.

The advanced navigation procedures are supported by new, GPS-based technology that allows airplanes to follow precise approaches while landing at busy airports where the runways are very close together. The result is more efficient departures and landings that use less fuel and reduce emissions and noise.

"This technology is a good example of what is already available on the flight deck to improve air traffic management," Conway said.

The procedures will be tested through 2013 at Seattle-Tacoma International Airport for future implementation at capacity-constrained airports across the United States.

Conway said ongoing ATM advances will have a significant impact on global aviation. "This is a real opportunity to help the environment and to benefit aircraft operators. It's not 'pie in the sky'; it's real and can start making a difference in the very near future," she said. ■

PHOTO: BOEING. Senior Engineer Sheila Conway can test new air traffic management procedures on a full-scale mock-up of a 777 flight deck at the Integrated Aircraft Systems Laboratory in Seattle, Wash. Conway leads "Greener Skies Initiative 2," which evaluates navigation procedures that can improve air traffic efficiency.



## Inspiring the Industry

*Inspiring the Industry continued from P8*

continued efforts to promote the commercialization of sustainable alternative fuels — all with the aim of achieving carbon-neutral growth across commercial aviation by 2020 and reducing the footprint after that.

The aviation industry promoted this approach at the UN climate change conferences over the last three years. Boeing fully



Using wind to save fuel

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supports the ICAO position on controlling aviation emissions and, along with the rest of the aviation industry, we are working toward meeting these commitments.

Boeing does not believe that isolated regional or national programs to regulate aviation emissions will achieve the desired environmental, economic and social results. Localized approaches could result in competitive distortions and delay of investments in aviation emissions reductions through technology. ■



## Carbon fiber gets a second life

When Bill Carberry thinks of the scrap carbon fiber that's left over from manufacturing a 787 Dreamliner, he doesn't see industrial waste headed to a landfill — he sees the makings of new, high-value aerospace products bound for continued life on new airplanes.

"Our research has shown that recycled carbon fiber composite material is comparable in strength and quality to new fiber," said Carberry, leader of the airplane and composite recycling program.

According to Carberry, recycled carbon fiber is ideal for nonstructural aircraft components from arm rests to smaller parts, such as electronics casings, brackets and hose clamps. In 2011, Carberry's group built a proof-of-concept galley door from carbon fiber manufacturing scrap collected at Boeing's 787 factory in Charleston, S.C.

In addition to the research Boeing is doing at its own factories from Charleston to the Seattle area, the company is working with leading academic institutions around the world — including the University of Nottingham in the U.K. — to develop aerospace uses for recycled composites.

"Recycled carbon fiber components still need to meet the aircraft's design requirements and mission; they can't increase the cost or weight of the part," Carberry said.

"It's a challenge, but the benefits are worth it if we can reuse our composite scrap and put it back into new manufacturing."

The Aircraft Fleet Recycling Association estimates recycling carbon fiber uses 95 percent less electricity and is 30 percent less expensive than making new composite material.

Finding new ways to reuse and recycle carbon fiber will take on greater environmental and financial significance in coming years as the number of largely composite 787s rolling out of factories in Charleston and Everett, Wash., continues to increase, along with military aircraft, like the V-22 produced in Philadelphia, Pa.

Carberry said the industry now faces the challenge of creating a market for recycled fiber. "I'm confident that that by the time the first Dreamliners begin to retire from service, they will be easier to recycle than aluminum aircraft."

"Three years ago, if I had told somebody we were going to make galley doors out of recycled carbon fiber scrap, they would have laughed at me. But we can do that today," he said. ■

PHOTO: BOEING. Ashley Stewart and Brad Strange, Environment, Health and Safety operations specialists, collect scraps of carbon fiber for recycling at the North Charleston, S.C., 787 factory. The reclaimed composite material can be recycled into high-value industrial products, reducing the amount of manufacturing waste sent to landfills.

## Cleaner Products



PHOTO: BOEING

The 737 MAX reduces carbon emissions for better environmental performance. And the noise footprint is 40 percent smaller than today's single-aisle airplanes.



747-8: A new lift in performance

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Continuously improving product performance is part of our DNA. Environmental improvements only enhance the exceptional performance our customers expect from Boeing. The 747-8 and 787 Dreamliner have established new standards among jetliners for efficiency, environmental performance and noise reduction.

The technology that shapes the environmental performance of the 787 Dreamliner and 747-8 Intercontinental includes advanced materials, more fuel-efficient engines, new wing designs and improved aerodynamics. And efficient new

airplanes — such as the 737 MAX — are on the way.

### 747-8

The 747-8 Intercontinental carries more passengers for a longer distance while being cleaner, quieter and more fuel efficient than any previous 747, while the 747-8 Freighter brings improved economic and environmental performance to the global cargo market. These new additions to the 747 family give double-digit improvements in fuel economy and carbon emissions with a 30 percent smaller noise footprint.

### 787 Dreamliner

With a composite fuselage and wings, the 787 Dreamliner is 20 percent more fuel-efficient than other airplanes of comparable size and proves to be more environmentally progressive throughout the product life cycle. The airplane is manufactured using fewer hazardous materials, consumes less fuel and produces fewer emissions. The Dreamliner is also quieter for airport communities than any previous airplane.



### Clean getaway

Forgoing a fuel-filter change on a jetliner as big as the 777 may, by itself, seem to be a small step in reducing waste and helping the environment.

Yet a team of environmentally engaged employees, which has combined this small step with nine other actions, is having a big impact in making 777 flight tests and deliveries cleaner, quieter and easier on the environment.

"We wanted to reduce the environmental impact of the 777 preflight and delivery process, which includes activities such as painting and engine testing," explained Carolyn Barnes, 777 Operations support.

## Cleaner Products

*Cleaner Products continued from P10*

### 737 MAX

Boeing launched the 737 MAX in 2011, continuing the legacy by making the world's best-selling jetliner even more environmentally efficient. Airlines operating the 737 MAX will realize a 13 percent reduction in fuel consumption — with a corresponding reduction in CO<sub>2</sub> emissions — over today's most fuel-efficient single-aisle airplane, the Next-Generation 737. Recent design updates, including the Advanced Technology winglet, will result in less drag and will further optimize the new engine variant's performance, especially at longer-range missions. The 737 MAX will also incorporate the latest in quiet engine technology, substantially reducing noise relative to current aircraft.

### 777

The 777 is the most fuel-efficient airplane flying today in the 300- to 400-seat market. It is 20 percent lighter and produces 25 percent less CO<sub>2</sub> than its closest flying competitor. In 2011, the 777 received type-design approval from the U.S. Federal Aviation Administration for up to 330-minute extended operations (ETOPS), which allows the 777 to fly more direct routes between city pairs, resulting in up to 16 percent less fuel burned and less carbon dioxide emitted into the atmosphere. And, with 777X, we are currently working with customers and suppliers to study additional options for further improvements to the jetliner.



Delivering a more environmentally sustainable 777

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### Spectrolab

Spectrolab, the world's leading manufacturer of solar cells and panels, powers everything from satellites to renewable solar energy projects in high-sunlight areas around the world. Spectrolab, which has manufactured space products for more than 50 years, produced its three millionth space-based solar cell in 2010 and expects to surpass four million this year.

Technology used to power satellites in space also has applications here on Earth, converting sunlight into clean electricity. Spectrolab production solar cells convert sunlight into electricity more than twice as efficiently as any silicon solar cell. The company manufactured more than seven million terrestrial cells in 2011, producing about 100 megawatts of electricity — enough to power approximately 2,000 average homes. In March 2011, Spectrolab began manufacturing its fourth-generation solar cell, which converts 40 percent of sunlight into electricity.

Spectrolab is nearing completion of a major manufacturing upgrade project that will reduce costs, increase annual terrestrial manufacturing capacity to about 250 megawatts, and launch a new space solar panel design that will ensure continued leadership in the space market. ■

### *Clean getaway continued from P10*

The team last fall designed 10 environmental initiatives that are reducing fuel use by 300,000 gallons (1.14 million liters) and carbon dioxide output by 5.5 million pounds (2.5 million kilograms) annually on 777 deliveries, along with achieving other environmental improvements.

The environmental initiatives include

- Using chrome-free paint primer, cutting down on hazardous materials and boosting the safety of crews.
- Eliminating redundant engine testing and reducing community noise and emissions.
- Retaining the hydraulic and engine fuel filters used in flight test. Engineers demonstrated that the filters did not need to be changed before aircraft delivery, reducing the amount of hazardous waste generated.
- Recycling left-over jet fuel used in flight tests.
- Improving flight-test planning, boosting efficiency and reducing flight times and fuel consumption.
- Using electric instead of gas-powered vehicles on the flight line.
- Reducing the amount of potable water needed in flight test.
- Promoting greater flight line and paint hangar recycling.

The team chose a "pilot" 777-300ER (Extended Range) to test all of the initiatives together and received permission from customer Air New Zealand to implement all the initiatives in the preflight and delivery process. Now, most of these steps are routinely implemented during all 777 deliveries with the use of chrome-free primer, a customer option. ■

PHOTO: BOEING. Carolyn Barnes, from left, Operations support, Cindy Chan, environmental engineer, and Stephanie Wong, Operations support, check a fuel "bowser," or tanker, for recycling leftover jet fuel used in flight tests.



## Cleaner Factories



PHOTO: BOEING

18,000 solar panels cover the final assembly building at our South Carolina facility. Spanning 10 acres (4 hectares), it is one of the largest thin-film rooftop solar installations in the southeastern United States.

As part of our commitment to reduce our environmental footprint, Boeing is working to improve the environmental performance of our factories and office locations.

Through conservation projects implemented over the last eight years, Boeing has saved nearly 114 million kilowatt-hours of energy — enough to power 9,940 average homes in the United States.

Our facility in Long Beach, Calif., was awarded the ENERGY STAR Challenge for Industry by reducing its energy intensity by 10 percent within one year. The Long Beach site is the first in the nation to receive this recognition three times. In total, 10 buildings have been ENERGY STAR-certified including sites in California, Illinois, Missouri, Texas and Washington state. As a result, Boeing was named an ENERGY STAR Partner of the Year for the second consecutive year.

### South Carolina

One of the largest thin-film rooftop solar installations in the southeastern United States, as measured by production capacity, can be found atop Boeing's newest final

assembly building at the North Charleston facility. And, at 10 acres (4 hectares), it's one of the largest in the nation.

This solar system, generating 2.6 megawatts at peak production from 18,000 solar panels or enough electricity to power approximately 250 residential homes, doubled the current solar generation in the state of South Carolina when it went online in October 2011. The solar system provides up to 20 percent of the power needed for this 100 percent renewable energy site. The remainder of the site's energy requirements will be met with renewable energy from the local utility biomass generation facilities, coupled with renewable energy certificates.

### LEED

All new construction and major renovation projects are designed to a LEED Silver rating or higher. LEED, or Leadership in Energy and Environmental Design, provides a rating system based on multiple factors including the energy and water efficiency of a building, improved indoor environmental quality and the use of sustainable sources during construction.



### “Zero” waste is just a start

When Boeing South Carolina became one of just a handful of company sites to reach the zero-waste-to-landfill milestone, Tony Soto saw the achievement not as the end of their efforts to reduce waste, but as the beginning.

“Getting the designation isn't an endpoint or goal; ‘zero-waste’ is an ongoing journey of continuous improvement,” said Soto, Environment, Health and Safety senior manager. “We've already identified ways we can get better.”

The North Charleston site became the first major Boeing Commercial Airplanes production facility to achieve zero waste to landfill in 2011. Zero waste means none of the waste materials and by-products

## Cleaner Factories

*Cleaner Factories continued from P12*

Boeing has LEED-certified buildings located in California, South Carolina, Texas and Washington state. Additionally, certifications are under way at several other Boeing sites, including our new joint venture composite manufacturing building in Tianjin, China.

### Zero Waste to Landfill

Four Boeing manufacturing sites — our 787 manufacturing facility in South Carolina, our helicopter manufacturing facility in Philadelphia, our commercial fabrication site in Salt Lake City and our defense systems site in Huntsville, Ala. — currently send no solid waste to landfills. Boeing defines “zero waste to landfill” to include, at a minimum, all solid waste generated by operations. It does not include waste generated during construction and remodeling, nor does it include hazardous waste, which is handled in accordance with applicable regulations.

With a zero-waste-to-landfill goal, all sites look for continuous waste-reduction opportunities, such as recycling efforts and eliminating unnecessary materials used in offices and on the shop floor.

### ISO 14001

Certification to the internationally recognized ISO 14001 environmental management standard has strengthened our companywide focus on continuous improvement and enabled a common way of managing environmental processes across the company.

Sites in the following locations are certified to the ISO 14001 standard, and Boeing China, the PDX facility used to paint commercial airplanes in Portland, Ore., South Carolina, and Williamstown, Australia, are expected to earn certification in 2012:

U.S. Locations:

**Alabama:** Huntsville

**Arizona:** Mesa

**California:** Anaheim, Cypress, El Segundo, Huntington Beach, Long Beach, Palmdale, Rancho Cucamonga, Seal Beach, Sylmar, San Diego, Taft and Torrance

**Florida:** Kennedy Space Center

**Georgia:** Macon

**Illinois:** St. Clair

**Kansas:** Wichita

**Missouri:** St. Charles and St. Louis

**Oregon:** Portland

**Pennsylvania:** Philadelphia

**Texas:** El Paso, Houston and San Antonio

**Utah:** Salt Lake City

**Washington:** Auburn, Bellevue, Everett, Frederickson, Kent, Renton, Seattle and Tukwila

International Locations:

**Australia:** Amberley, Bankstown, Brisbane, and Fishermans Bend

**Canada:** Winnipeg

**United Kingdom:** Bristol, Knaresborough and Welwyn Garden City

Related Links: ISO 14001, LEED. ■

### “Zero” waste continued from P12

generated at the site reaches a landfill. Waste is recycled, reused or otherwise repurposed.

The site’s waste management plan includes comprehensive recycling with recycling centers located throughout the facility; composting; and a waste-to-energy strategy, which means material that can’t be recycled is collected by a contractor and taken to a facility that burns waste to create energy.

Soto figures their waste-reduction efforts in 2011 diverted approximately 1,400 tons of material away from landfills. Since the North Charleston site already sends no waste to landfills, how can it improve on “zero”?

“There is a lot of room for improvement. Part of our push this year is to get more material out of the waste-to-energy stream and into true recycling, where it can be put to beneficial use, such as becoming part of another product,” Soto said.

Another solution Soto cited was to reduce the amount of waste that comes into the site by using more containers that go back to the supplier. The containers are replenished with parts or other material and come back to the site in a closed loop.

“The Boeing site’s waste reduction program is getting a lot of attention from other South Carolina companies,” Soto said. “It’s great to know we’re being benchmarked as the standard in reducing, reusing and recycling waste. We want the community to see Boeing as a good environmental steward.” ■

PHOTO: BOEING. Tony Soto leads the recycling and waste-reduction program at our South Carolina facility, which is one of four Boeing manufacturing sites currently sending zero waste to landfills.

## Remediation



Cleanup work at the Chemical Commodities, Inc. Superfund site near Kansas City was completed a full year ahead of schedule. Over the next few years, Boeing will continue to monitor the site to verify the remedy is operating as planned.

As part of our annual \$100 million commitment to cleaning up sites affected by past business practices, Boeing recently completed work at a U.S. EPA Superfund site a full year ahead of schedule.

Remediation work is largely performed at former manufacturing facilities and sites where Boeing, or companies we have acquired, shipped chemicals and other waste for treatment, storage or disposal. In many cases, waste-processing facilities that used treatment methods that were considered best practices in the past are being cleaned up to meet or exceed current environmental standards.

Working with national, state and local regulatory agencies, we strive for an open exchange of information with community members, government representatives and other stakeholders as we progress through these cleanups.

### Chemical Commodities, Inc.

Over the last 15 years, Boeing has been working with the U.S. Environmental Protection Agency and the local community, and on behalf of a dozen other parties, to advance cleanup progress at the Chemical

Commodities Inc. (CCI) Superfund site in Olathe, Kan.

This 1.5-acre (0.6-hectare) site near Kansas City was operated as a chemical brokerage and recycling facility. During its 38 years of operation, CCI bought chemicals from dozens of companies and government agencies. Rocketdyne, which was briefly part of Boeing, shipped wastes to the site for recycling for a short time during the 1960s.

Over time, contamination from chemicals shipped by multiple companies to CCI for treatment entered in the soil and groundwater, requiring a comprehensive remediation program.

An important milestone was achieved in the summer of 2011 with construction completed at the site and the final cleanup remedy put in place. By doing this, Boeing accomplished all of the cleanup requirements set forth by the EPA. Over the next few years, we will continue to monitor the site to verify the remedy is operating as planned. Studies are underway to use the new parkland to attract migratory butterflies, bees and other pollinators.



### Teaming for success

Cleaning up soil and groundwater contamination is no small feat, but teaming with a diverse group of stakeholders produced significant results.

"From the beginning, our goal was to build a good relationship and work as a team with the community and the government agencies involved to resolve any technical challenges and expedite the cleanup process," said Joe Flaherty, Boeing Remediation project manager.

Activities at Chemical Commodities, Inc. (CCI) in Olathe, Kansas contaminated soil and groundwater during its 38 years of operation as a chemical recycling and brokerage facility. During that time, CCI accepted chemicals from dozens of com-



## Remediation

Remediation continued from P14

### Duwamish



A unique restoration project

▶ [Click to launch video on the website](#)

The shoreline along the Duwamish Waterway in Seattle, Wash., looks very different today than it did one year ago. In September 2011, Plant 2, a 35-acre (14-hectare) facility, was demolished to make way for a habitat restoration project. More than 85 percent of the World War II-era building materials, including steel and wood beams, copper wiring, concrete and other metals, were recycled or reused.

Additional cleanup work was completed at Slip 4, also along the Duwamish, which included building a state-of-the-art treatment system to clean storm water runoff to stringent levels protective of marine water quality.

Starting in the fall of 2012, Boeing will begin dredging the waterway to remove more than 200,000 cubic yards (152,911 cubic meters) of contaminated sediment and replace it with clean sand. A planned 5-acre (2-hectare) wetland and habitat project will provide an important ecological resource to improve Puget Sound fish runs.

### Santa Susana

Boeing is making consistent progress in its efforts to clean up Santa Susana and preserve it as open space, connecting a critical wildlife corridor near Los Angeles. A former federal government rocket engine and nuclear energy testing site, Santa Susana cleanup efforts are directed by a number of federal, state and local regulatory agencies that oversee soil, surface water and groundwater cleanup programs.

Since acquiring a portion of the site in 1996 as part of the defense and space businesses of Rockwell International, Boeing's team of geologists, engineers and experts in surface water, ground water and radiation have been working to clean up this 2,850-acre (1,153-hectare) site.

Progress in 2011 included demolishing and removing 16 structures and test facilities totaling 39,000 square feet (3,623 square meters). In addition, Boeing completed construction of two state-of-the-art storm water treatment systems that collect storm water runoff in tanks before treating it with chemicals and advanced filters. As remediation efforts continue, Boeing is planting native vegetation and working with several organizations — including the San Fernando Valley Audubon Society and the nonprofit Pollinator Partnership — to enhance the site for wildlife. ■

### Teaming continued from P14

panies, including Rocketdyne, a rocket engine manufacturer that Boeing owned briefly.

Over the last 15 years, Flaherty and a team of Boeing experts in ground water and soil cleanup technologies have been working to clean up the U.S. EPA Superfund site.

Extensive involvement from the community and state and federal agencies is one of the reasons cited for several better-than-expected project milestones.

"The cleanup at the Chemical Commodities, Inc. site is a great example of the hard work and effort demonstrated by Boeing, the Olathe community and federal, state and local partnerships, to address hazardous waste at the site," said U.S. EPA Region 7 Administrator Karl Brooks.

"The goal of the Superfund Program is to protect human health and the environment from hazardous contamination. The CCI site has been cleaned up and is now ready for reuse. I commend Boeing, the Olathe community and all others involved in the cleanup for their part in making this project a success."

"Construction of the final cleanup remedy was completed a full year ahead of schedule and significantly under budget," said Flaherty. "Much of the credit for the progress we have experienced can be traced directly to the solid team at EPA and the engaged community of Olathe."

In addition, the team did not receive a single complaint about noise, dust or traffic from nearby residents during construction activities. The EPA now includes lessons learned from the CCI project in presentations to its managers about how other sites can implement similar strategies.

Flaherty said the remediation team has learned valuable lessons of its own. "Working closely with all of the stakeholders, listening to their concerns and real teamwork are what resulted in the ultimate success of the project." ■

PHOTO: BOEING. Joe Flaherty is the Remediation project manager for cleanup of the Chemical Commodities, Inc. Superfund site near Kansas City. The project team worked with the community and government agencies to complete construction of the cleanup remedy ahead of schedule and under budget.

## Performance

### Summary of Environmental Performance (2007–2011)

	2007	2008	2009	2010	2011	Improvement Absolute % (2007–2011)
<b>Revenue</b> (U.S. dollars in millions)	\$66,387	\$60,909	\$60,281	\$64,306	\$68,735	
<b>Employment</b> (year end)	159,313	162,191	157,073	160,537	171,715	
<b>Deliveries</b> (commercial airplanes and defense new-build production aircraft)	552	474	602	577	592	
<b>Energy consumption</b> (in millions of MMBTUs or trillions of British Thermal Units)	12.97	12.71	12.67	12.27	12.87	1%
<b>CO<sub>2</sub> emissions</b> (in millions of metric tons)	1.29	1.25	1.25	1.21	1.24	3%
<b>Water intake</b> (in billions of U.S. gallons)	1.83	1.81	1.71	1.63	1.66	9%
<b>Hazardous waste</b> (in thousands of U.S. tons generated)	8.99	7.71	8.15	6.94	7.50	17%
<b>Solid waste diverted from landfills</b> (as a percentage of total nonhazardous solid waste generated)	58%	64%	68%	73%	76%	31%
<b>Environmental fines</b> (U.S. dollars in millions)	\$0.472	\$0.024	\$0.028	\$0.647	\$0.226	

\* 2007–2010 ENERGY AND CO<sub>2</sub> VALUES have been restated to reflect the addition of PDX (Portland), Ore.

\* 2007–2010 CO<sub>2</sub> emission numbers are adjusted to reflect the use of U.S. EPA regional 2010 eGRID factors.

Boeing has reduced its environmental footprint at a time of significant business growth. We continue to work toward our five-year goal to reduce greenhouse gas emissions, energy use, hazardous-waste generation and water intake by 25 percent on a revenue-adjusted basis and by 1 percent on an absolute basis. While our unprecedented increases in airplane production have made these goals more challenging, we remain on track to achieve the targeted absolute reduction on most measures and expect our revenue-adjusted improvements will still reach the mid to high teens.

On an absolute basis, Boeing has reduced CO<sub>2</sub> emissions by 3 percent, energy use by 1 percent, hazardous waste by 17 percent and water intake by 9 percent since 2007.

On a revenue-adjusted basis, Boeing has reduced CO<sub>2</sub> emissions by 7 percent, energy use by 4 percent, hazardous waste by 19 percent and water intake by 12 percent since 2007. In 2011, 76 percent of the solid waste we generated was diverted from landfills — a 31 percent improvement since 2007.

Data reported in this section reflects environmental performance at the following sites, which represent the vast majority of Boeing's operations in the United States:

**Alabama:** Huntsville  
**Arizona:** Mesa  
**California:** Anaheim; El Segundo; Huntington Beach; and Boeing Defense, Space & Security operations in Long Beach  
**Kansas:** Wichita  
**Missouri:** St. Charles and St. Louis  
**Oregon:** Portland  
**Pennsylvania:** Philadelphia  
**Texas:** Houston and San Antonio  
**Washington:** Auburn, Developmental Center, Everett, Frederickson, Kent Space Center, Moses Lake, North Boeing Field, Plant 2, Renton and Thompson

In some cases, data from additional sites and office locations are included. When that occurs, it is indicated in the footnotes accompanying data tables and graphs.

The graphs in this section are labeled with information rounded to the nearest decimal place. However, graphs throughout this Environment Report are calculated using whole values. Consequently, some slight variation may occur for the purpose of creating visual presentations.

## Performance

*Performance continued from P16*

During the past year, Boeing began tracking the environmental footprint at our new manufacturing complex in North Charleston, S.C. In 2011, we tracked carbon dioxide emissions, energy consumption, water intake, hazardous-waste generation at several — but not all — of our facilities in South Carolina, including the 787 final assembly building and the airplane delivery center. Where data from South Carolina is included in this report, it is noted in the footnotes. We anticipate that our 2013 Environment Report will include data for all of our South Carolina operations. ■



### Small actions build big results

When an employee switches on a light in Building 270 at Boeing's site in St. Louis, energy managers want him or her to know how that simple action could have a big impact on energy use.

"Part of the education about energy use was to tell employees that if a person came to work on Saturday and turned on the lights, it turned on the lights and the heating or air-conditioning system for the entire floor," said Bryan Kury, senior manager for Boeing's conservation efforts. "One person working eight hours on a Saturday could use enough energy to power 250 homes."

Kury believes helping employees see the connection between their behavior and a building's energy profile and costs is a big reason for the success of the initiative, which reduced energy consumption in the building by more than 12 percent in 2011 and reduced utility costs by \$100,000. The 520,000-square-foot (48,310-square-meter) office building has more than 2,000 occupants.

The U.S. Environmental Protection Agency recognized the achievement in 2012 by awarding Building 270 the first ENERGY STAR certification at the St. Louis site.

The building's energy management team and an Employee Involvement team worked together to design a plan to reduce electricity and water consumption by, in part, adjusting employee, maintenance, housekeeping and system schedules, including:

- Automatically turning off lights and the heating, ventilation and air-conditioning systems at 6:30 p.m. weeknights and all day Saturday and Sunday.
- Directing employees working on site after-

hours to hoteling stations.

- Rescheduling housekeeping tasks that previously happened in the evening, such as restroom cleaning, to daytime hours.

The energy plan includes separating the building's energy management systems by zones and sections to improve overall efficiency.

"The initiative works in part because we have helped make energy consumption more visible," said Christopher Van Gels, a senior manager for site operations. "People who work later hours or want to work weekends see the changes; the building's lights and air go off at a certain time. It's not behind-the-scenes maintenance."

Kury agrees and said employee feedback has been positive. "I think our communication and education efforts have helped people understand that turning off a light not in use can help us cut costs and be more competitive, while helping the environment. It's a big part of the program's ongoing success." ■

PHOTO: BOEING. Christopher Van Gels, left, Bryan Kury, and Pam Tanner, energy conservation leaders at Boeing's St. Louis site, believe helping employees see the connection between their behavior and energy use is a big reason for the success of the "building 270 energy initiative," which reduced energy consumption by more than 12 percent in 2011.



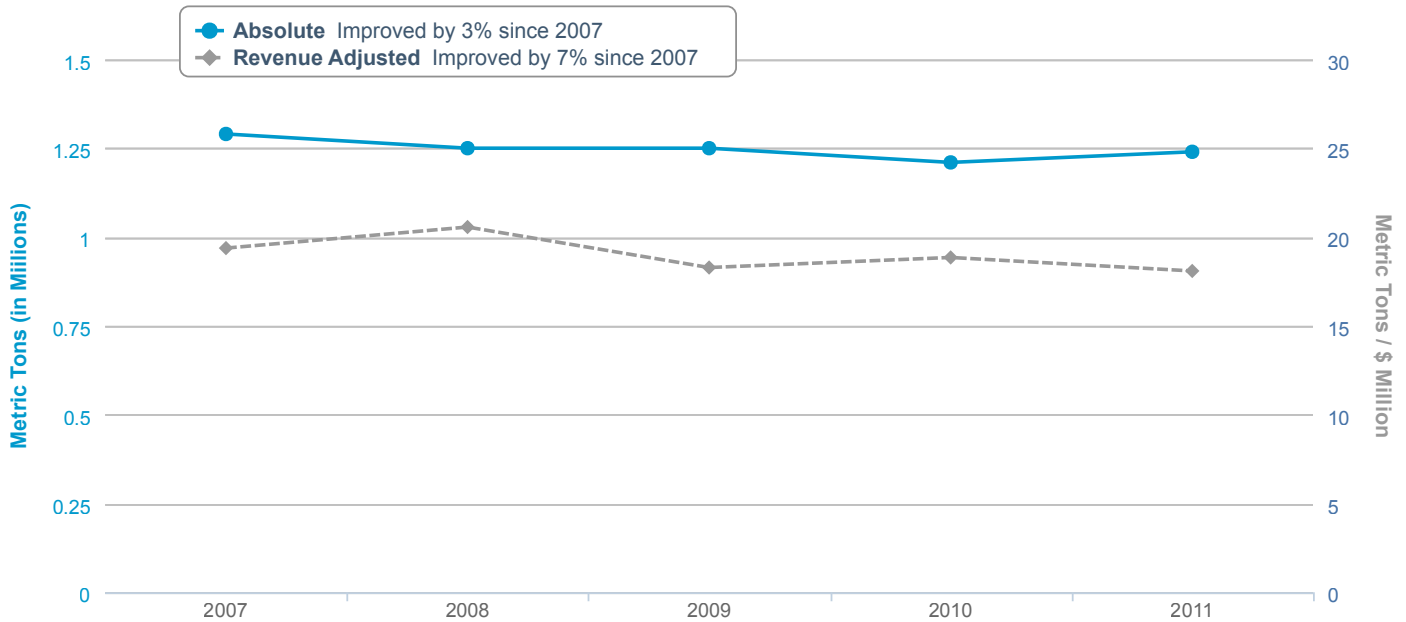
## Carbon Dioxide Emissions

Since 2007, Boeing's absolute CO<sub>2</sub> emissions have decreased by 3 percent. On a revenue-adjusted basis, Boeing has reduced CO<sub>2</sub> emissions by 7 percent since 2007.

Boeing's absolute CO<sub>2</sub> emissions increased by 3 percent in 2011 compared with the previous year. This increase is largely a result of increased production rates of commercial airplanes.

This year, Boeing contracted with the international consulting firm of Det Norske Veritas to provide third-party verification. Det Norske Veritas provided limited assurance of the greenhouse gas emissions data Boeing submitted to the Carbon Disclosure Project using the guidance provided in ISO 14064. ■

**Carbon Dioxide Emissions**



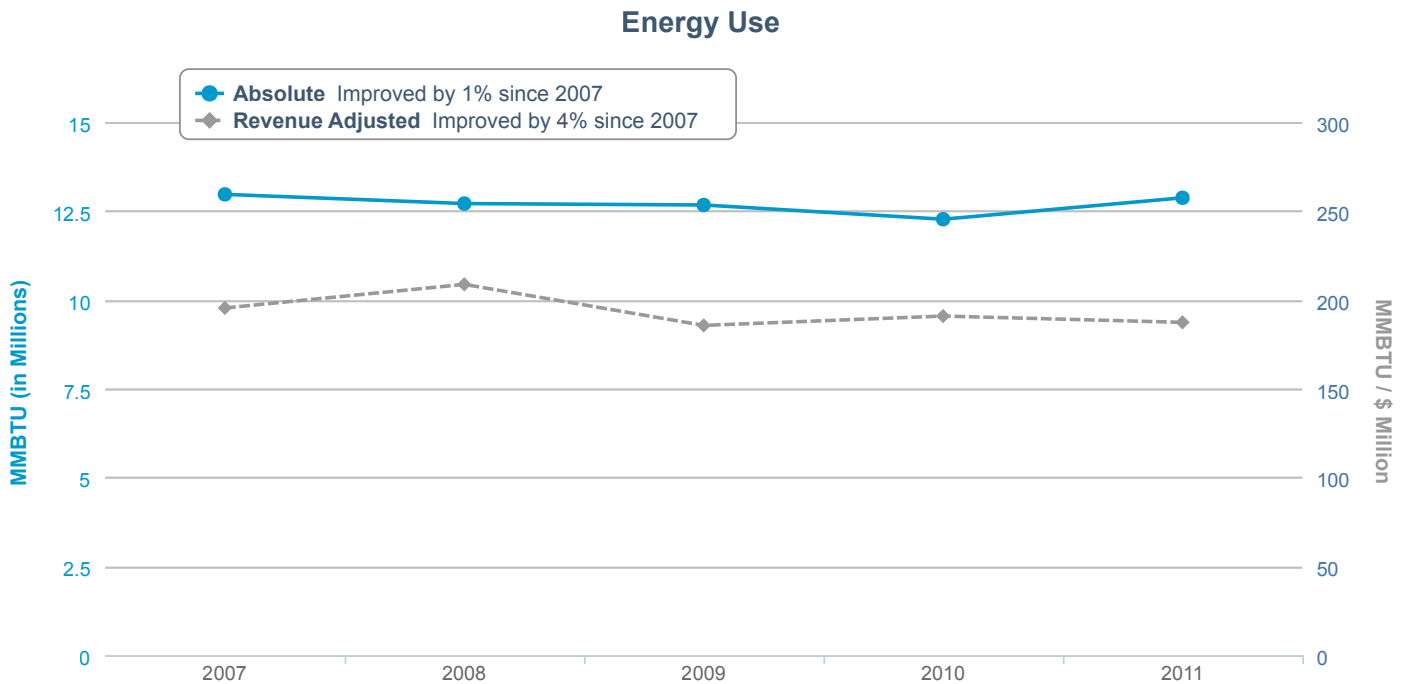
- Also includes data from Bellevue, Wash., South Park, Wash., Longacres Park, Wash., Spares Distribution Center, Wash., Duwamish Office Park, Wash., Chicago Corporate Headquarters, Boeing Commercial Airplanes operations in Long Beach, Calif., Seal Beach, Calif., West Hills, Calif., PDX (Portland), Ore., and North Charleston, S.C.
- 1 metric ton = approximately 2,204.62 pounds.
- CO<sub>2</sub> emissions are calculated based on consumption of electricity, natural gas and fuel oil. Our facility in Philadelphia is the only major U.S. site that uses fuel oil for heating. Consumption of other fuels is not represented.
- 2011 emissions from purchased electricity are calculated using regional 2010 U.S. EPA regional eGRID electricity CO<sub>2</sub> factors (representing energy profile).
- 2007–2010 CO<sub>2</sub> totals have been adjusted to reflect the use of 2010 U.S. EPA regional eGRID factors.
- 2007–2010 data has been restated to reflect the addition of the PDX (Portland), Ore., site.
- The facility in North Charleston, S.C., has made arrangements to purchase Renewable Energy Credits and is considered a zero-emission site for electricity. Accounting methodology for CO<sub>2</sub> emissions from its natural gas consumption is consistent with other Boeing sites.

## Energy Use

Since 2007, Boeing's absolute energy use has decreased by 1 percent. On a revenue-adjusted basis, Boeing has reduced energy use by 4 percent since 2007.

Boeing's absolute energy consumption increased by 5 percent

in 2011 compared with the previous year. This increase is attributable to increased production rates of commercial airplanes and the addition of new facilities in Portland, Ore. and South Carolina. ■



- Also includes data from Bellevue, Wash., South Park, Wash., Longacres Park, Wash., Spares Distribution Center, Wash., Duwamish Office Park, Wash., Chicago Corporate Headquarters, Boeing Commercial Airplanes operations in Long Beach, Calif., Seal Beach, Calif., West Hills, Calif., PDX (Portland), Ore., and North Charleston, S.C.
- Energy use is calculated from consumption of electricity, natural gas and fuel oil. Our facility in Philadelphia is the only major U.S. site that uses fuel oil for energy. Consumption of other fuels is not represented.
- 2007-2010 data has been restated to reflect the addition of the PDX (Portland), Ore., site.

## Hazardous Waste

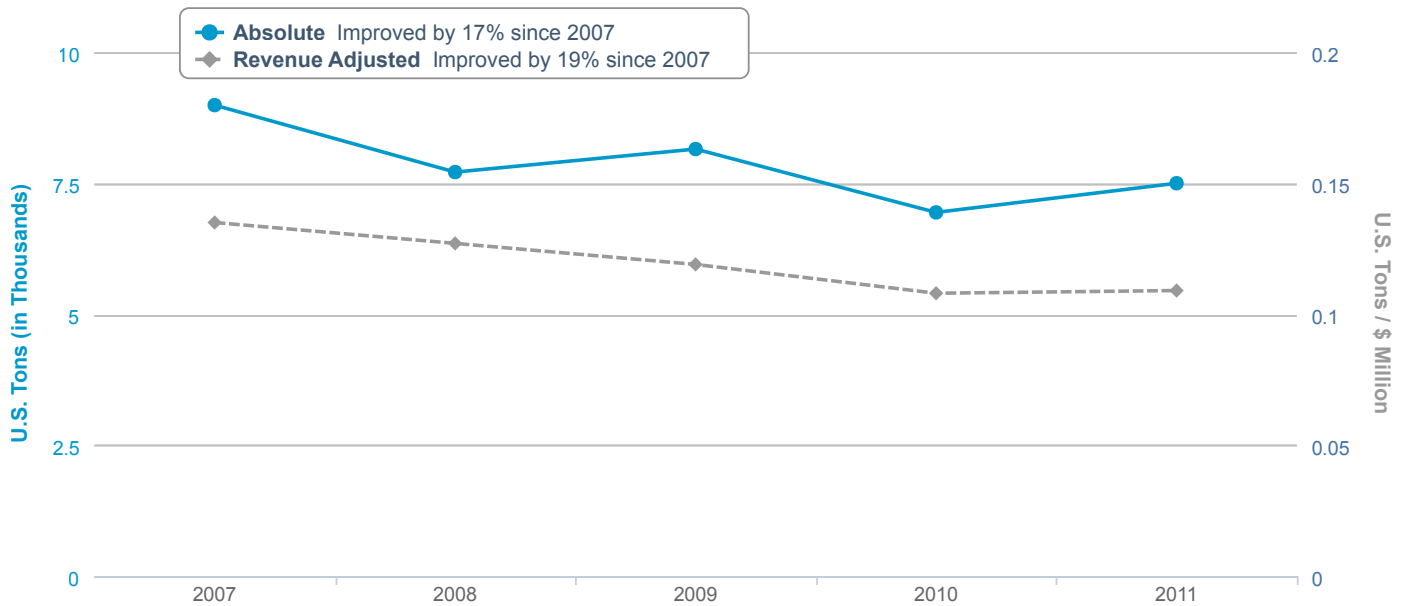
Since 2007, Boeing has reduced absolute hazardous waste generation by 17 percent. On a revenue-adjusted basis, Boeing has reduced operational hazardous waste by 19 percent since 2007.

Boeing's absolute operational hazardous waste increased by

8 percent in 2011 compared with the previous year. This increase is attributable to increased production rates of commercial air-planes.

Hazardous waste data does not include waste derived from construction or remediation activities. ■

**Hazardous Waste**



- Also includes data from El Paso, Tex., Heath, Ohio, Macon, Ga., Salt Lake City, Utah, Palmdale, Calif., Sylmar, Calif., PDX (Portland), Ore., and North Charleston, S.C.
- 1 U.S. ton = 2,000 pounds.



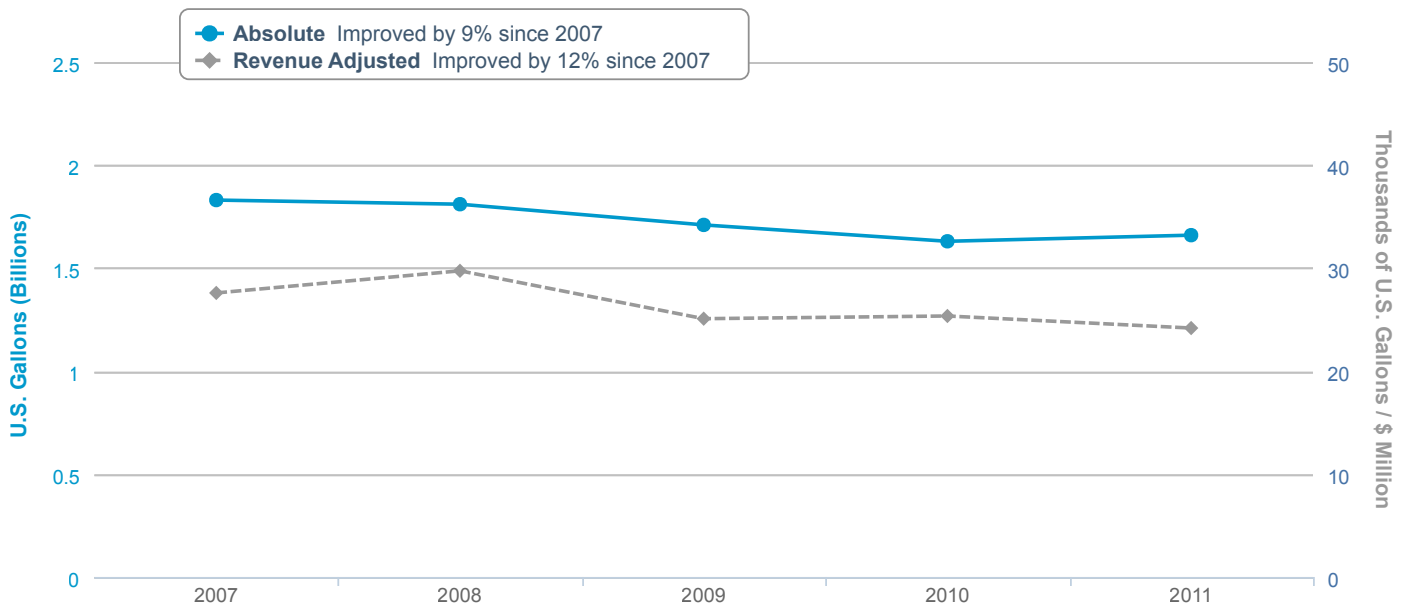
## Water Intake

Since 2007, Boeing has reduced absolute water intake by 9 percent. On a revenue-adjusted basis, Boeing has reduced water intake by 12 percent since 2007.

Boeing's absolute water intake increased by 2 percent in 2011

compared with the previous year. This increase is attributable to increased production rates of commercial airplanes and facility growth, including a 7 percent growth in employment. ■

**Water Intake**



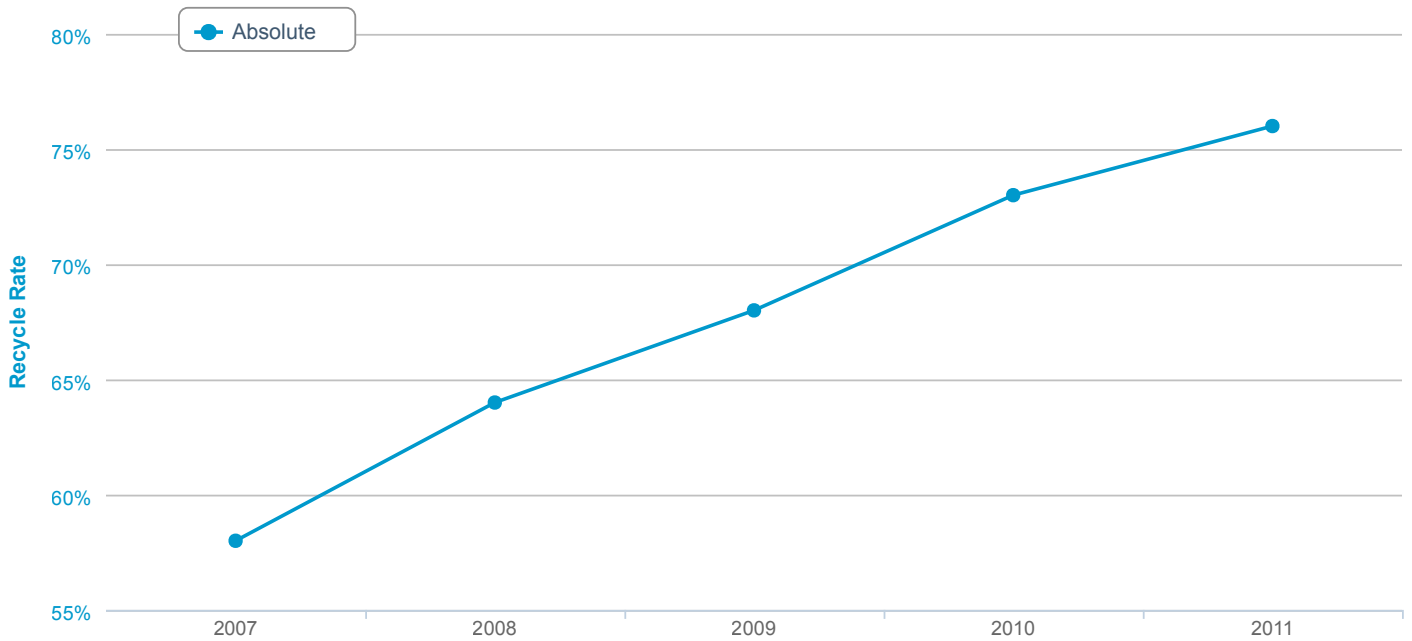
- Also includes data from Bellevue, Wash., South Park, Wash., Longacres Park, Wash., Spares Distribution Center, Wash., Duwamish Office Park, Wash., Chicago Corporate Headquarters, Boeing Commercial Airplanes operations in Long Beach, Calif., Seal Beach, Calif., West Hills, Calif., PDX (Portland), Ore., and North Charleston, S.C.
- 1 U.S. gallon = approximately 3.79 liters.

## Solid Waste Diverted From Landfills

In 2011, 76 percent of the solid waste we generated was diverted from landfills, up from 73 percent the previous year. Boeing has improved this measure by 31 percent since 2007. Waste is diverted from landfills through a combination of recycling, composting and energy recovery programs.

Boeing measures nonhazardous solid waste generated by our operations. This includes waste streams such as metals, wood, paper, cardboard, plastics and organic materials. It does not include hazardous waste, construction waste, remediation waste or asbestos abatement activities. ■

**Solid Waste Diverted From Landfills**



- Also includes data from Bellevue, Wash., South Park, Wash., Longacres Park, Wash., Spares Distribution Center, Wash., Duwamish Office Park, Wash., Boeing Commercial Airplanes operations in Long Beach, Calif., and Seal Beach, Calif.
- 1 U.S. ton = 2,000 pounds.
- Recycling rate is calculated by dividing the amount of nonhazardous solid waste recycled by the total amount of nonhazardous solid waste generated.

## Toxic Release Inventory/National Pollutant Release Inventory

Boeing reports toxic releases to both the U.S. Toxic Release Inventory (TRI) and to Canada's National Pollutant Release Inventory (NPRI), an inventory of pollutant releases and recycling, on an annual basis.

Total releases have remained steady since 2007, while overall transfers of chemicals to off-site facilities have decreased 89 percent during the same period. Transfers peaked in 2007, largely as

a result of a transfer of old tooling and scrap metal to a recycler from our Wichita facility.

Data for 2011 will be submitted to the U.S. and Canadian governments after the publication of this report and will be included in Boeing's 2013 Environment Report. ■

	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
Releases	(U.S. & Canada)	(U.S. & Canada)	(U.S. & Canada)	(U.S. & Canada)
<b>Total release (millions of lb)</b>	0.25	0.21	0.24	0.26
Percentage change	0.0%	-17.8%	-4.4%	0.4%
<b>Normalized to revenue (lb/million \$ rev.)</b>	3.8	3.4	3.6	4.0
Percentage change from normalized	0%	-10%	-7%	4%
<b>Transfer</b>				
<b>Total transfers (millions of lb)</b>	24.07	2.57	2.74	2.60
Percentage change	0%	-89%	-89%	-89%
<b>Normalized to revenue (lb/million \$ rev.)</b>	363	42	40	41
Percentage change from normalized	0%	-88%	-89%	-89%
<b>Total release and transfers (millions of lb)</b>	24.32	2.78	2.98	2.86
Percentage change	804%	3%	11%	-88%
<b>Normalized to revenue (lb/millions \$ rev.)</b>	366	46	44	44
Percentage change from normalized	0%	-629%	-88%	-88%

- 2011 data will be submitted to the U.S. and Canadian governments after the publication of this report. Boeing will provide 2011 data in its next Environment Report.
- 14 sites report TRI and NPRI releases and transfers: Auburn, Wash., El Paso, Texas, El Segundo, Calif., Everett, Wash., Frederickson, Wash., North Boeing Field, Wash., Palmdale, Calif., Plant 2, Wash., Portland, Ore., Renton, Wash., St. Louis, Mo., Sylmar, Calif., Wichita, Kan., and Winnipeg, Canada.

## International



Royal Australian Air Force F/A-18F Super Hornets from RAAF Base Amberley fly over Queensland, Australia. Boeing is the founding member of the Defence Industry Sustainability Forum, which acts as a single point of contact for defense contractors, regulators and partners on environmental projects such as recycling and energy reduction on defense bases.

Boeing employees work on every continent, with 18 international offices around the globe. Our largest operations outside the United States are based in Australia, Canada and the United Kingdom.

### Australia

In October 2011, Boeing filed its third National Greenhouse and Energy Report with the Australian Department of Climate Change. This report, which details greenhouse gas emissions, energy consumption and energy production data, must be completed by registered corporations that meet specified energy use and greenhouse gas emission thresholds.

For the 2010–2011 reporting period, the Australian government’s Clean Energy Regulator released data for companies emitting more than 50,000 metric tons (55,116 tons) of equivalent carbon dioxide (CO<sub>2</sub>-e). Boeing Australia’s CO<sub>2</sub>-e emissions were calculated at 89,926 metric tons (99,126 tons).

Overall, Boeing Australia has achieved a 9 percent reduction in CO<sub>2</sub>-e emissions since the first reporting period (2008–2009), while simultaneously increasing production rates of aerospace components.

### Canada

Boeing reports to Canada’s National Pollutant Release Inventory (NPRI), an inventory of pollutant releases, off-site disposal and treatment, on an annual basis. Since 2007, NPRI reporting increased significantly because of an increase in airplane production rates, resulting in the triggering of additional threshold reporting requirements. For more information, see the TRI/NPRI page in this Environment Report.

### United Kingdom

The Carbon Reduction Commitment Energy Efficiency Scheme (CRC), under the U.K. Department of Energy and Climate Change, is a mandatory emissions trading scheme aimed at reducing CO<sub>2</sub> emissions

in the United Kingdom. The CRC aims to raise awareness of energy use and incentivize energy efficient operations.

For the first reporting period, April 1, 2010, through March 31, 2011, Boeing’s total footprint emissions were 4,037 metric tons (4,450 tons) of CO<sub>2</sub>, and CRC-regulated emissions were 3,895 metric tons (4,293 tons) of CO<sub>2</sub>. Boeing operations in the U.K. consist of multiple units and subsidiaries. Boeing U.K. Training and Flight Services Ltd. operate flight simulators for training on Boeing aircraft at several locations throughout the U.K. Boeing Defence U.K. Ltd. has employees located at multiple locations throughout the U.K. supporting Ministry of Defence and U.S. military programs.

Additionally, CO<sub>2</sub> emissions from Boeing subsidiaries Aviall U.K. Ltd., Continental DataGraphics Ltd., Jeppesen U.K. Ltd., and Narus U.K. Ltd. throughout the U.K. are also included in the Boeing U.K. CRC report. ■



## Recognition



PHOTO: BOEING

Boeing has participated in the Carbon Disclosure Project since 2006. For the third consecutive year, Boeing was named to the 2011 Carbon Disclosure Leadership Index. Boeing's 2011 submittal is available [here](#), or read the [2011 Report](#). We will post our 2012 data after the information is submitted to the Carbon Disclosure Project.

Boeing received environment awards and recognition from a number of local, national and international organizations in 2011. These included the following:

- S&P 500 and Global 500 Leadership Indexes from the [Carbon Disclosure Project](#).
- Climate Innovation Index Leader from [Maplecroft](#).
- [ENERGY STAR](#) Partner of the Year from the U.S. Environmental Protection Agency.
- National Top 50 Partner from the U.S. Environmental Protection Agency [Green Power Partnership](#) for Boeing South Carolina.
- U.S. Newsweek Green Ranking: 1 for Capital Goods/Manufacturing, 36 overall.
- Local water quality awards presented by water treatment districts in multiple locations including El Paso, Texas, El Segundo, Calif., Kent, Wash., Long Beach, Calif., Portland, Ore., Seattle, Wash., St. Louis, Mo., and Wichita, Kan.



### Plugging in for a cleaner drive

It started when the owner of one electric Nissan Leaf at Boeing's site in El Segundo left a note on the windshield of another electric Leaf. Before long, that grew into a small network of electric vehicle (EV) owners who began to rally support for an on-site EV charging station.

"Suddenly there were six or seven of us who thought we should get together and take steps to become more self-reliant and not have to worry about charging our cars at a different location," explained Erik Daehler, senior manager at the Boeing satellite plant in Southern California.

Their efforts paid off when El Segundo was chosen as one of four Boeing locations included in a year-long pilot project of on-site charging stations for employee-owned EVs.

Each station can charge up to four vehicles at a time, and a typical EV battery

needs five to six hours to fully recharge. Daehler said the station is often full, but EV owners support each other. "One day you get an email that says, 'Hey, I'm in a pinch and need to borrow one of the stations.' Somebody runs out and moves their car for another owner to come in."

Currently, Boeing has a small pilot project in four states — Arizona, California, Oregon and Washington — to assess employee interest in recharging their EVs while at work. The recharging station in El Segundo is the most-used site in the pilot, which doesn't surprise Daehler.

"I think it's partly because the people who work in the satellite group in El Segundo tend to embrace technology and be early adopters. Our commute also is perfectly suited for an EV, which can drive up to 60 miles on a full charge," he said.

The EV owners also believe the charging stations are important signs of Boeing's commitment to the environment and to be a technology leader. "Other high-tech companies like Google encourage their employees to drive EVs. It's important for Boeing to be seen as a forward-leaning technology company," said Leo Chan, system test engineer and an EV owner. ■

PHOTO: BOEING. Boeing has installed EV charging stations at four locations as part of a year-long pilot project of on-site charging facilities for employee-owned EVs. The program will be reviewed in late 2012 and possibly expanded to other sites.

# More Info

For more information about The Boeing Company, visit [www.boeing.com](http://www.boeing.com) and the sites below:



**2012 Environment Report**  
[www.boeing.com/environment](http://www.boeing.com/environment)



**2011 Corporate Citizenship Report**  
[www.boeing.com/companyoffices/aboutus/community/2011\\_report/](http://www.boeing.com/companyoffices/aboutus/community/2011_report/)



**2011 Boeing Annual Report**  
[www.boeing.com/companyoffices/financial](http://www.boeing.com/companyoffices/financial)

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