



THE BOEING COMPANY
2019 GLOBAL ENVIRONMENT REPORT

THE FUTURE IS BUILT HERE

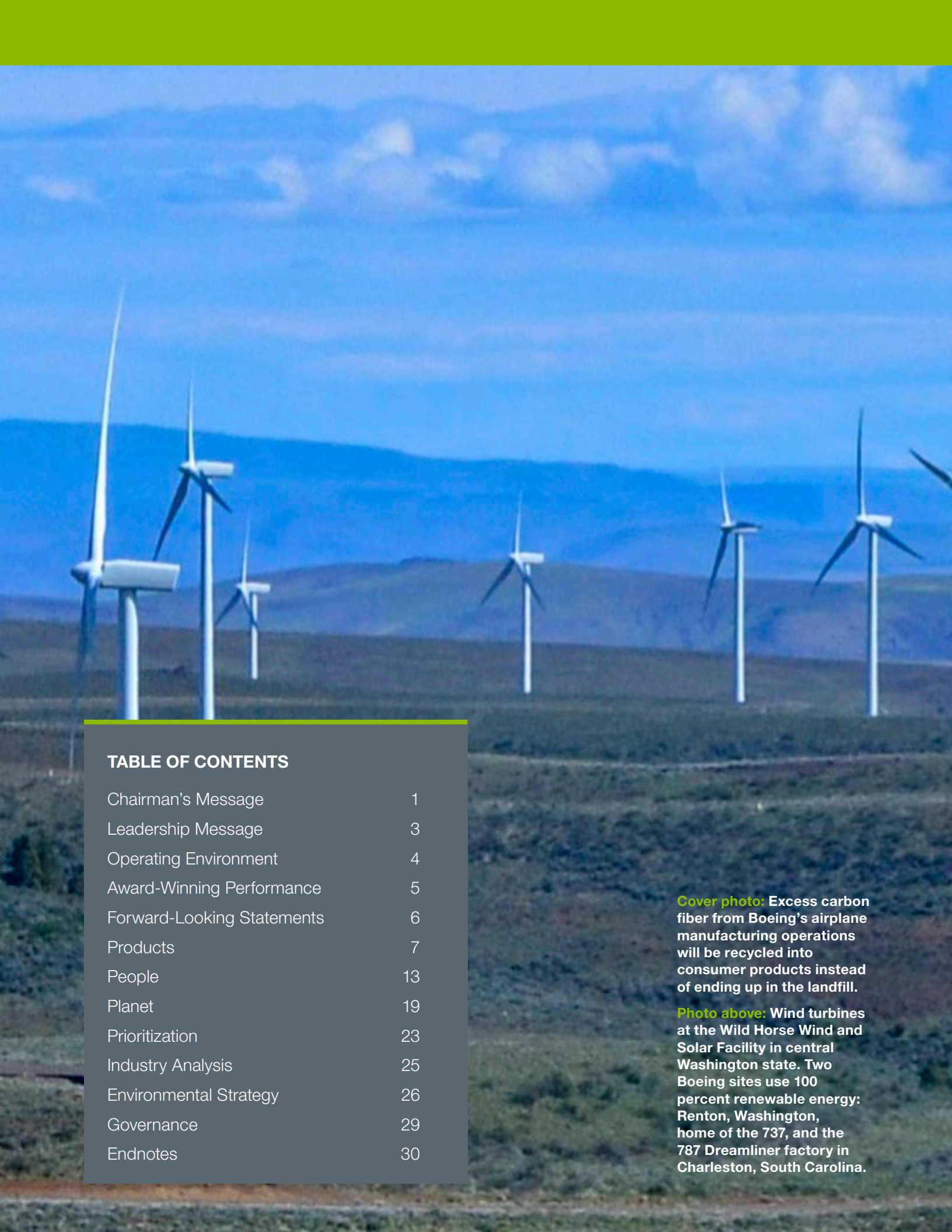


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Cover photo: Excess carbon fiber from Boeing's airplane manufacturing operations will be recycled into consumer products instead of ending up in the landfill.

Photo above: Wind turbines at the Wild Horse Wind and Solar Facility in central Washington state. Two Boeing sites use 100 percent renewable energy: Renton, Washington, home of the 737, and the 787 Dreamliner factory in Charleston, South Carolina.

A portrait of Dennis Muilenburg, Chairman, President and Chief Executive Officer, wearing a dark suit jacket over a light blue button-down shirt. He is looking directly at the camera with a slight smile. The background is a blurred green landscape with sunlight filtering through the trees.

Dennis Muilenburg
Chairman, President and
Chief Executive Officer

With a bold approach and continuous improvement in design, manufacturing and operations, we're making strides in elevating our environmental performance.

In just over a decade, we've reduced greenhouse gas emissions in our production facilities by 28 percent while increasing aircraft deliveries 66 percent.

We're pushing further with new technologies that will improve aerospace efficiency and reduce emissions and the environmental footprint of our products. You can see this demonstrated in our 787 Dreamliner, which uses 20 percent less fuel, and our 777X, which will be the world's largest and most fuel-efficient twin-aisle airplane when it takes to the skies. This is also evident in our

KC-46A Pegasus tanker, whose quieter engines and fuel-efficient design enable lower operating costs than the former KC-135 Stratotanker. Looking to the future of mobility, our electric-powered, fully autonomous passenger air vehicle prototype started test flights this year. With a range of up to 50 miles (81 km), it has the potential to shape the future of air travel and transport.

We're also making strides in developing sustainable business solutions, such as biofuel. Last year, our teams worked with key partners to support the world's first



passenger flight powered by plant-based fuel, flown by a 787. Starting this year, our customers can choose sustainable fuel for their new deliveries.

With our ongoing ecoDemonstrator program, we're developing additional environmental technologies. Last year's 777 Freighter tested nearly 40 new innovations, including flight deck updates that enable pilots to more effectively manage their routes to save fuel, reduce emissions and arrive earlier.

Across our sites, we're finding ways to reduce waste. For example, we identified a fluid used in CST-100 Starliner command module testing that's useful as a general cleaning agent in our factories instead of being discarded as waste. Separately, our defense team in Kent, Washington, found ways to reallocate equipment that the location no longer needed, resulting in a 48 percent reduction in solid waste for the site.

Additionally, we're collaborating with and investing in companies that share our goal of a more sustainable future. This includes a partnership that will reduce

solid waste by about two million pounds (907,185 kg) annually by turning excess carbon fiber into products such as laptop cases, car parts and more. Through our Boeing HorizonX innovation cell, we're making investments that will advance use of cleaner technologies and revolutionary manufacturing methods.

Our environmental focus truly extends to the communities where we live and work. Through direct grants, community partnerships and our people's time, Boeing supports projects that protect stormwater, restore habitats and promote sustainable use of our natural resources.

We're all responsible for caring for the Earth and encouraging others to do the same. Together, let's build a brighter, more sustainable future for generations to come.

Handwritten signature of Dennis Muilenburg in blue ink.

Dennis Muilenburg
Chairman, President and
Chief Executive Officer

As Boeing looks to the future, we do so with a bolder, more visionary strategy for improved environmental performance of our products and services; a higher standard of environmental leadership within our operations and focused investments in our people and communities.

The marketplace continues to demand increasing levels of environmental excellence and transparency. We understand and embrace the opportunity to be a positive force for global change.

With innovation at the heart of everything we do, our greatest resources remain our people — our employees, suppliers and community partners whose leadership, creativity and dedication continually demonstrate how talent and innovation come together for a more sustainable future.

**Jenette Ramos, Senior Vice President,
Manufacturing, Supply Chain &
Operations**



Across multiple functions, we all make environmental leadership happen.



Our products and technologies connect the globe, protect freedom and advance scientific discovery around the world, from the depths of the oceans to Mars and beyond. Boeing leaders are a key voice helping shape and advance global policy, thought leadership, collaboration and action for environmental issues within the aviation industry.

We are committed to cleaner water, air and land. At Boeing, we do more than think about the future. We engineer it, we solve its problems and we build it every day.

**Bryan Scott, Vice President,
Environment, Health & Safety**



Aviation is an integral part of modern life. It links people, communities, cultures and countries around the globe.

Aviation also affects the planet and our shared global environment.

The air transport industry today supports an estimated 62.7 million jobs and \$2.7 trillion in global gross domestic product (GDP), according to the Air Transport Action Group.

As the industry continues to grow, Boeing recognizes that pollution, natural resource scarcity and climate change are serious issues that require credible actions and global solutions.

The United Nations estimates that the world's population hit 7.6 billion in mid-2017 and adds another 83 million people every year. By 2030, the population will reach 8.6 billion and increase to nearly 10 billion people by 2050.

A growing population and urbanization will further boost global demand for transportation, with the industry being challenged to meet the demand without a corresponding growth of emissions, community noise or other potentially harmful environmental effects.

Boeing's environmental leadership and efforts to create a more sustainable future were recognized with significant national awards and honors.

The U.S. National Safety Council's Robert W. Campbell Award honors one company annually for integrating the highest standards of environment, health and safety (EHS) performance into all levels of business operations. Boeing won the 2018 Campbell Award for achievements in improving its environmental performance and was cited for its "innovative approaches to EHS excellence."

For the ninth consecutive year, the U.S. Environmental Protection Agency honored Boeing's achievement in conserving energy with the 2019 ENERGY STAR Partner of the Year—Sustained Excellence Award.

The Wildlife Habitat Council recognized Boeing's efforts to restore and preserve critical wetlands and wildlife habitat at company sites across the United States, including the Santa Susana Field Laboratory in Simi Valley, California, the Lower Duwamish Waterway in Seattle (pictured below), and Boeing South Carolina in North Charleston.

Energy-saving projects at Boeing's Huntsville, Alabama, site earned the city's 2018 air pollution control award for helping reduce emissions and clear the air. Upgraded heating, ventilation and air conditioning chillers improved the site's energy efficiency by 17 percent.





This report contains “forward-looking statements” within the meaning of the Private Securities Litigation Reform Act of 1995. Words such as “may,” “should,” “expects,” “intends,” “projects,” “plans,” “believes,” “estimates,” “targets,” “anticipates” and similar expressions are used to identify these forward-looking statements.

Examples of forward-looking statements include those relating to our future financial condition and operating results, as well as any other statement that does not directly relate to any historical or current fact. Forward-looking statements are based on our current expectations and assumptions, which may not prove to be accurate.

These statements are not guarantees and are subject to risks, uncertainties and changes in circumstances that are

difficult to predict. Many factors could cause actual results to differ materially and adversely from these forward-looking statements.

Additional information concerning these and other factors can be found in our filings with the Securities and Exchange Commission, including our most recent Annual Report on Form 10-K, Quarterly Reports on Form 10-Q and Current Reports on Form 8-K.

Any forward-looking statement speaks only as of the date on which it is made, and we assume no obligation to update or revise any forward-looking statement, whether as a result of new information, future events or otherwise, except as required by law.

Designing-in product efficiencies, accelerating the use of alternative fuels and managing chemicals are some of the ways we build a more sustainable future.

PRODUCTS

A SOLAR-POWERED JOURNEY

In 2018, Boeing subsidiary Aurora Flight Sciences introduced Odysseus, a solar-powered unmanned aircraft designed to stay aloft for months at a time. With a wingspan larger than a Boeing 777X airplane, Odysseus weighs less than a Smart car. It uses advanced solar cells to store power during the day while relying on batteries to remain aloft at night, creating zero emissions.

Boeing sees the combination of payload and time-on-station as suited for a variety of missions — weather and climate research; broadband connectivity in underserved areas; disaster response imaging and more — all while powered by clean, renewable energy.





CUTTING-EDGE RECYCLING PROGRAM

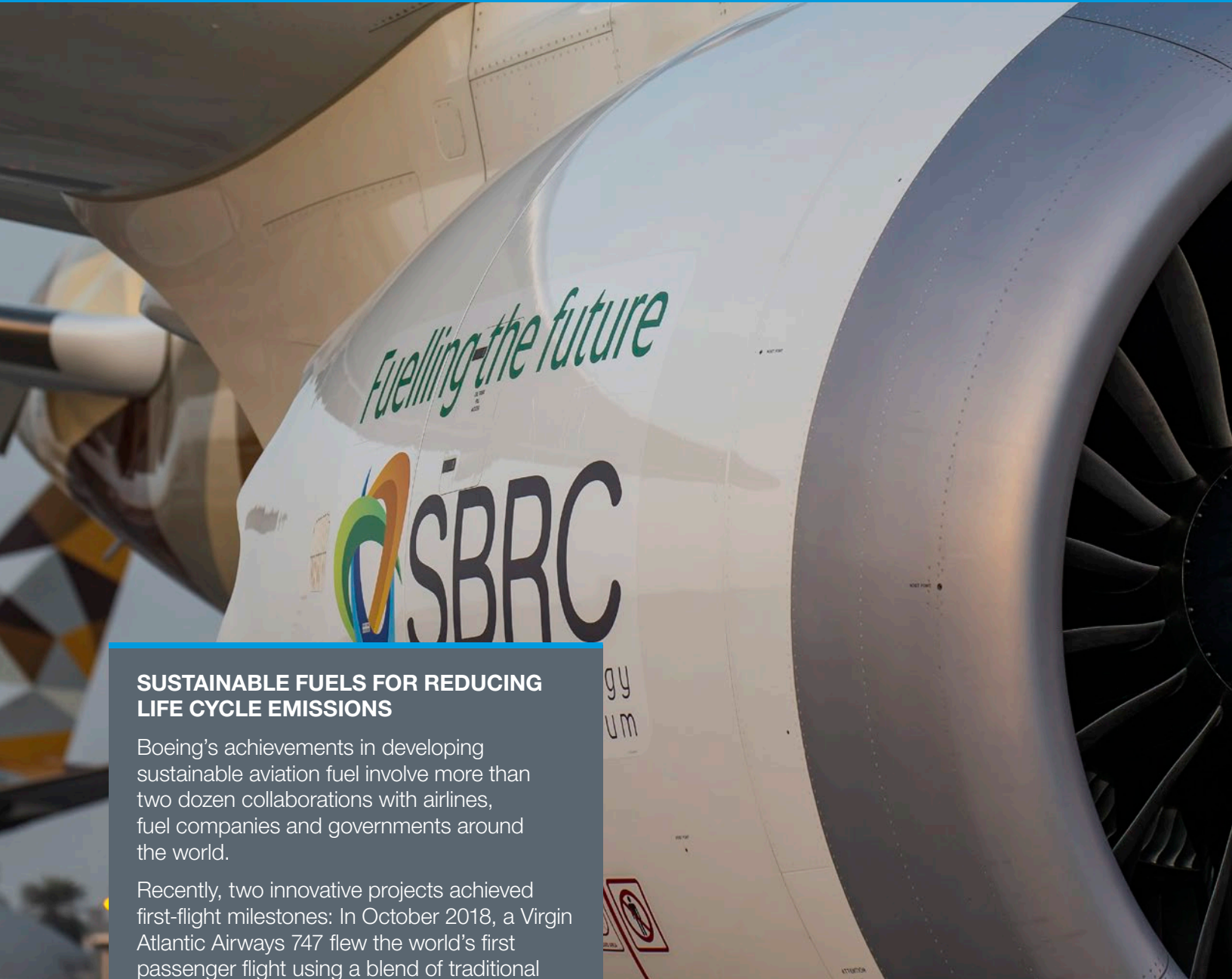
More than one million pounds (454,000 kg) of excess carbon fiber annually from 11 Boeing factories, including the 777X Composite Wing Center, will stay out of landfills thanks to recycling innovations. In a groundbreaking new partnership, Boeing will provide United Kingdom-based recycler ELG Carbon Fibre with excess material. In turn, the material will be recycled and supplied to global manufacturers for products such as car parts and computer cases.

This innovative reuse of excess carbon fiber is one way Boeing is making its manufacturing processes more sustainable. Composite recycling will also help Boeing meet its target of reducing solid waste sent to landfills 20 percent by 2025.

EFFICIENCIES AND INNOVATION WITH 777

Boeing tested 37 developing technologies aboard a 777 Freighter in 2018 as part of its ecoDemonstrator program, including the world’s first commercial flight fueled by 100 percent sustainable aviation fuel (made from residual animal fats and plant oils). Other technologies included a compact thrust reverser that improves fuel efficiency, designed and built at Boeing South Carolina. A laser system that can detect clear air turbulence, enabling pilots to warn passengers and cabin crew beforehand, shows promise. Plans are in development for ecoDemonstrators in 2019 and beyond.

Boeing’s new 777X, the latest iteration in the line, will begin flight testing in 2019. The 777X family will be the most efficient twin-aisle airplanes in service when they deliver in 2020.



SUSTAINABLE FUELS FOR REDUCING LIFE CYCLE EMISSIONS

Boeing’s achievements in developing sustainable aviation fuel involve more than two dozen collaborations with airlines, fuel companies and governments around the world.

Recently, two innovative projects achieved first-flight milestones: In October 2018, a Virgin Atlantic Airways 747 flew the world’s first passenger flight using a blend of traditional fuel and biofuel made from steel mill waste gases. Three months later in January 2019, an Etihad Airways 787 flew the world’s first passenger flight powered partly with biofuel made from seawater-irrigated desert plants.

Each of these collaborations represents Boeing’s work with international stakeholders to develop scalable biofuel supplies that are cost-competitive with traditional fuel.

Additionally, in March 2019, Boeing announced that customers will be offered the option of using biofuel on their delivery flights from its Renton and Everett airplane delivery centers in Washington State. Those flights will use fuel produced by World Energy and delivered by EPIC Aviation.





BOEING DATA CENTER POWERED BY GREEN ELECTRICITY

Boeing is one of the earliest adopters across the nation to offset carbon emissions consumed at its primary data center, by using wind power. The action will save the equivalent electricity used by more than 4,100 homes for one year as part of the Iron Mountain Green Power Pass Program.

Digital-driven data has enabled faster and more agile results for consumers. But all that data must be stored in a climate-controlled space that consumes vast amounts of energy. This offset agreement with Iron Mountain helps Boeing progress toward the goal to reduce greenhouse gas emissions 25% by 2025.

Iron Mountain powers its data centers with 100% renewable energy secured through virtual power purchase agreements. It uses transparent reporting and is in line with Renewable Energy 100, Science Based Carbon Targets, and CDP reporting.

“Data centers are known for using a lot of energy, which presents unique challenges,” said Drew Bryck, Energy and Conservation Specialist. “Working with partners who help us clear the hurdles of securing renewable energy contracts in a leased space is incredibly valuable.”

Data centers in the U.S. are projected to consume approximately 73 billion kWh by 2020, enough energy to power more than six million homes for a year.



HALON BE GONE!

It took dedication by engineers and scientists at Boeing, but a safe and effective replacement for halon in hand-held fire extinguishers is finding its way onboard commercial airplanes. What’s more, Boeing researchers widely shared the results of their innovation to benefit the entire aviation industry.

Although highly effective, the common chemical agent in hand-held extinguishers was banned from production in the mid-1990s by the Montreal Protocol, an international treaty restricting ozone-depleting substances.

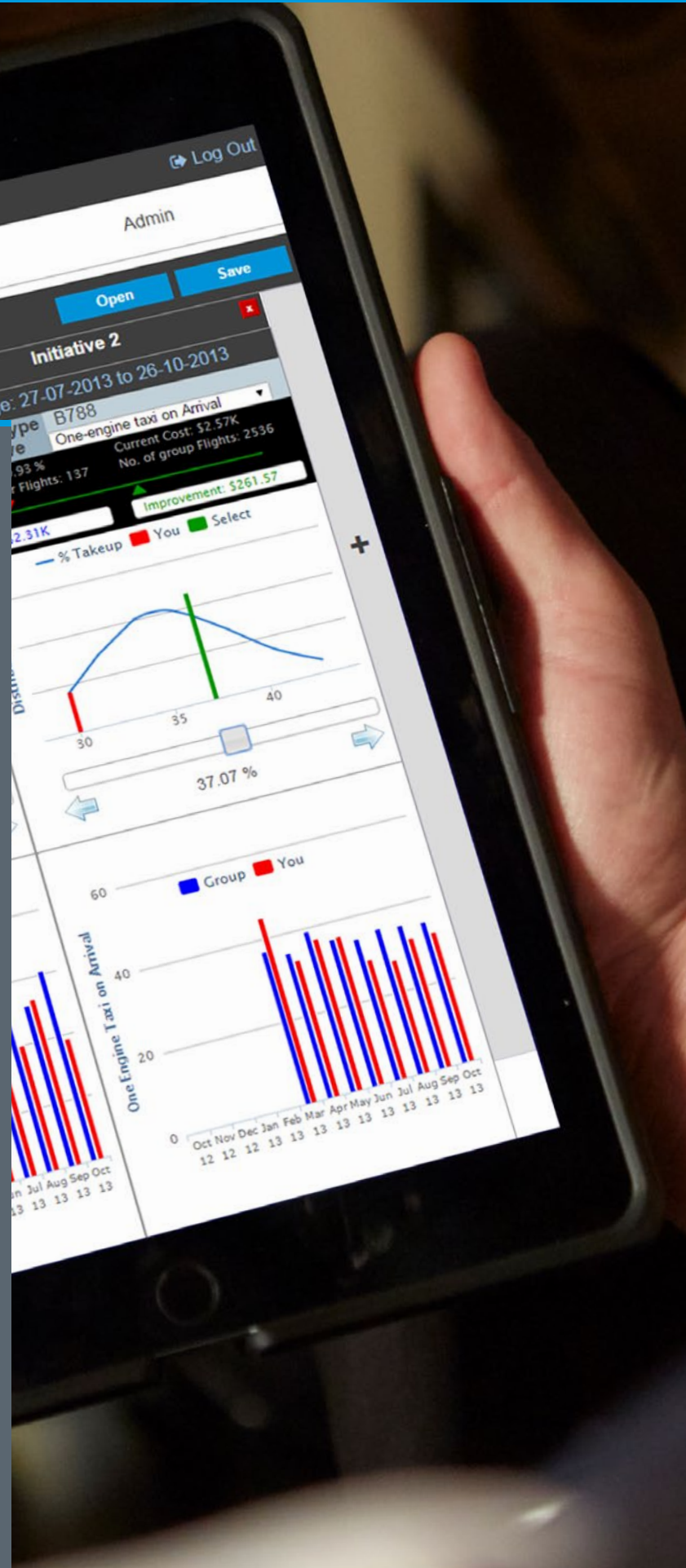
It wasn’t easy finding an environmentally preferred alternative for halon. A team of Boeing engineers worked closely with the aerospace industry for 14 years to develop, test and acquire approval of a replacement chemical for halon. Since 2017, halon-free handheld cabin fire extinguishers are now available for new production deliveries.

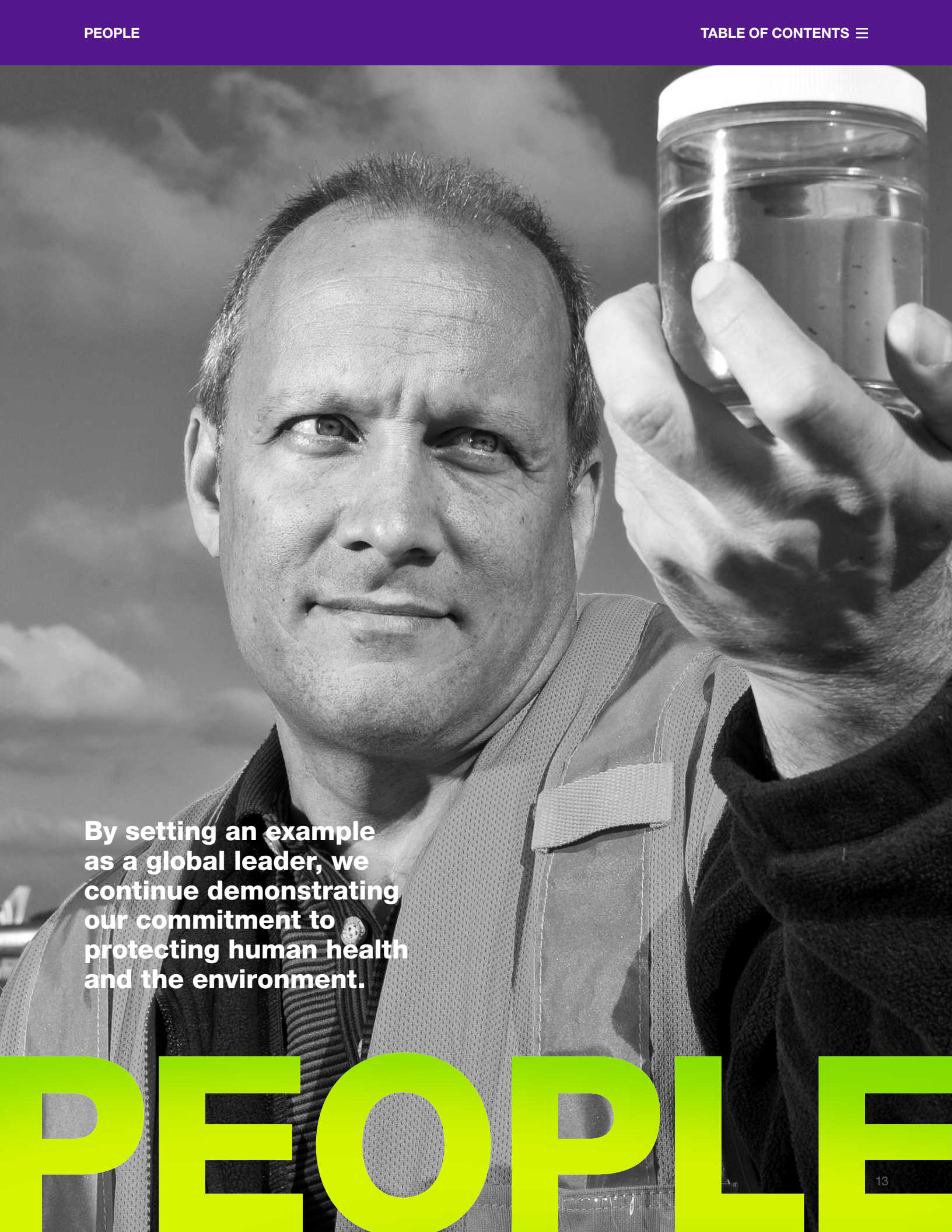
**EFFICIENCY?
THERE'S AN APP FOR THAT**

In 2017, Boeing launched a third business unit, Boeing Global Services, to provide agile, cost-competitive services to our customers worldwide. With a focus on complete, innovative solutions, Global Services continues investing in new avenues that drive efficiencies, optimize operations and improve environmental performance.

Over the last 10 years, Boeing has reduced printing services by 80 percent by enhancing digital offerings for aeronautical charting. Software and data analytics–powered tools help airlines navigate and operate more efficiently, reduce fuel consumption, optimize crew utilization, minimize disruption impact and increase asset availability.

Fuel accounts for up to 40 percent of an airline’s operating cost. Finding ways to reduce that cost has become critical to every airline’s success. Tools such as Boeing subsidiary Jeppesen’s enhanced Fuel Dashboard and its companion Pilot Insight application address that need by enabling pilots to make informed decisions on discretionary fuel and fuel savings in just a few seconds, which helps reduce fuel use by an average of 1 to 2 percent. This visibility enables better decision-making to reduce fuel use, operating costs and carbon emissions. Additionally, Boeing’s FliteDeck Pro mobile airline charting application has been enhanced with a new weather layer feature that provides increased situational awareness for efficient flight planning, scheduling and operations management.





**By setting an example
as a global leader, we
continue demonstrating
our commitment to
protecting human health
and the environment.**

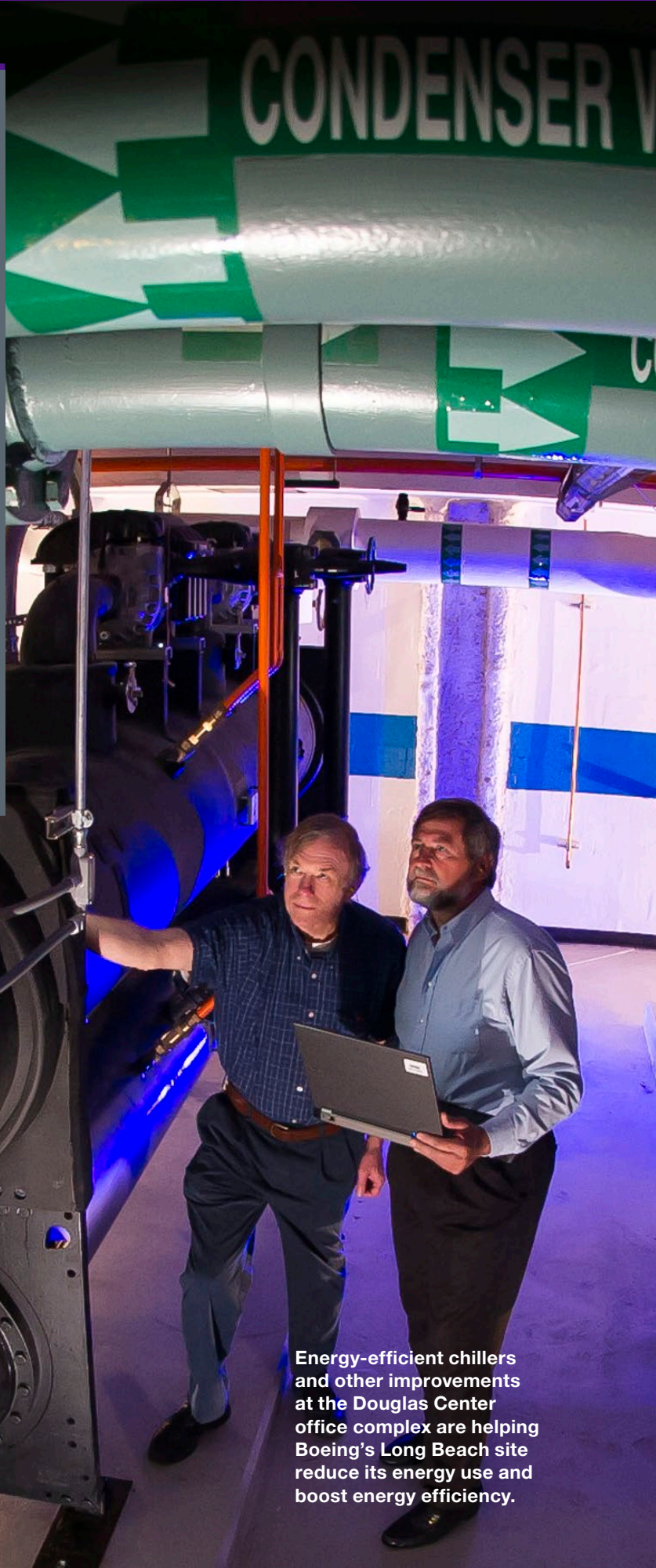
PEOPLE

MAKING A DIFFERENCE FOR PROGRESS

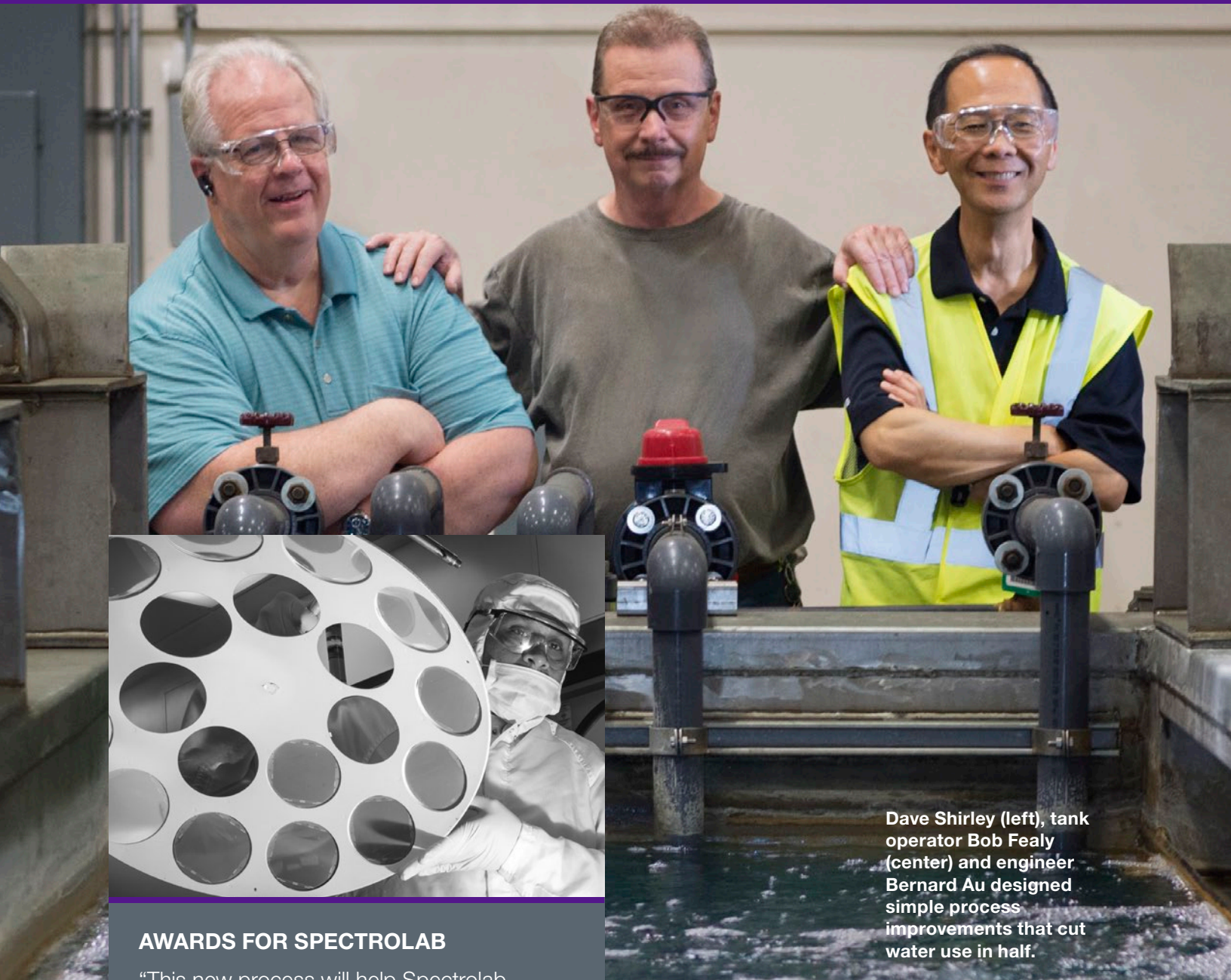
Creative ideas from Boeing employees make a difference by reducing waste, conserving resources and improving environmental performance.

The ideas, energy and action of a single person or team — real leadership — can make a big difference in helping Boeing meet its ambitious environmental strategy and performance targets. Boeing encourages employees' creativity and actions to improve the company's environmental footprint with its Environmental Leadership Awards.

The recognition spotlights innovative projects and ideas across the company that are reducing waste and saving energy while cutting costs. The awards also provide visibility for projects that can be replicated by other teams at other sites. 2018 winning projects include major LED lighting retrofits, heating and cooling system upgrades, water conservation and reductions in solid waste sent to landfill.



Energy-efficient chillers and other improvements at the Douglas Center office complex are helping Boeing's Long Beach site reduce its energy use and boost energy efficiency.



Dave Shirley (left), tank operator Bob Fealy (center) and engineer Bernard Au designed simple process improvements that cut water use in half.

AWARDS FOR SPECTROLAB

“This new process will help Spectrolab significantly reduce energy use and costs,” said Spectrolab President Tony Mueller.

Spectrolab, a Boeing company in Sylmar, California, earned a 2018 Environmental Leadership Award for the work of its Chilled Water Cutover team in developing a new process to reduce energy and increase cost savings for air-conditioned production and office space. The new method uses a more reliable central plant system, greatly increasing efficiency and uptime.

SMALL CHANGE, BIG SAVINGS

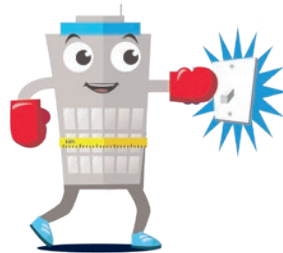
“Our success was in being able to see the work we do every day with a new set of eyes,” said Dave Shirley, chemical process manager. “The volume of water we were using didn’t make sense and we wanted to improve the process.”

A small change in tank-line operations at Boeing’s Auburn, Washington, site cut water use in half, saving 26 million gallons (98 million liters) a year, while also winning the project a 2018 Environmental Leadership Award.



EVERYONE WINS IN BATTLE OF THE BUILDINGS

A little friendly competition can go a long way. Boeing employees at 47 Boeing sites in six countries took part in the company’s first large-scale competition in 2018 to see which site could reduce energy use the most. Boeing was the big winner: all participating sites cut their electricity use — several by double digits.



This year, the same competition — Battle of the Buildings (BoB) — focused on solid waste, reminding employees to Reduce, Reuse, Recycle and Rethink.

One of Boeing’s 2025 environmental targets is to reduce solid waste to landfill by 20 percent from the 2017 baseline. To get there, Boeing will need more innovative approaches, including collaborating with suppliers to reduce — or even eliminate — packaging materials. Employees will find more creative, and fun, ways to continue increasing recycling and composting.



BIG SITE, BIG PROGRESS

The 40,000 employees at Boeing’s largest manufacturing site in Everett, Washington, had the power to reduce energy use and solid waste to landfill in 2018. The facility — home to the commercial widebody jetliner factory, the world’s largest building by volume — saved enough energy to power about 3,000 U.S. homes, exceeding last year’s goal threefold. The site reduced solid waste sent to landfills by 1,000 tons (907 metric tons), equal to the trash produced by 1,300 people per year.

Energy-saving projects include retrofitting factory lighting with 5,700 LED lights, the energy equivalent of powering about 300 U.S. homes.



NATURE MEETS INDUSTRY

As Boeing's first delivery center outside of the United States, this facility in Zhoushan, China, is designed to showcase the company's world-class technology while expressing its respect for the Chinese culture, people and environment.

The facility is a balance of nature and industry, with tranquil garden grounds at the Delivery Center on one side and an active hangar and airplane operation on the other.

The Delivery Center site is located on a nearly 28-square-mile (72 square kilometer) island where rain water conservation is a priority. The onsite stormwater reclamation system collects and treats rain water for re-use in the cooling tower, landscape irrigation and freshwater retention pond.



FIRST EUROPEAN FACTORY OPENS

Officially opening in October 2018, Boeing Sheffield is the company's first manufacturing site in Europe. Boeing Sheffield is on target to achieve an "excellent" BREEAM rating — the highest degree of building sustainability. The factory design features efficiencies like photovoltaic solar to power the factory, a smart building management system to control heating and cooling, LED lights that respond to motion or CO₂ levels, and a complex metering system that monitors electricity consumption.

In an additional commitment to operate responsibly both locally and globally, the site has set a goal to achieve zero waste to landfill.

Boeing is applying the same environmental principles to the design and construction of its new hangar at Gatwick Airport in London and the new facility at RAF Lossiemouth in Scotland.



Dr. Tia Benson Tolle, director of Materials & Fabrication for Commercial Airplanes, and Kevin Bartelton, senior director, 777 Wings Operations, help discover ways to use excess carbon fiber.

NEW INDUSTRY, NEW LIFE FOR EXCESS CARBON FIBER

“Boeing’s product development looks decades into the future,” said Dr. Tia Benson Tolle, director of Commercial Airplanes Materials & Fabrication. “We need the best possible portfolio of materials, near and long term, for our products’ continued success in delivering value to our customers.”

Benson Tolle said a good example of this development is composite material made with carbon fiber, which has enabled generations of new Boeing aircraft that are lighter, more efficient and emit fewer emissions.

Expanded use of composites presents the challenge of finding suitable methods of handling tons of excess carbon fiber produced in manufacturing. A new partnership between Boeing and ELG Carbon Fibre will keep more than one million pounds (454,000 kg) of carbon fiber out of landfills each year, which contributes to our target to reduce solid waste to landfill 20 percent by 2025.

“Five years from now, I want to look back and say we did the right thing,” Benson Tolle said. “As we look to the future and the demands humans are placing on natural resources, we need to think carefully about our products and the materials we use to make them.”



PRIMING THE WAY TO SAFETY

“It’s very gratifying to know I am helping both people and the environment with my research to find safer primers for Boeing aircraft.”

Roland Stone, a chemical technology engineer, develops paint primers that help keep Boeing 737s shiny and corrosion-free. Primers have traditionally contained hexavalent chromium, which can be harmful if inhaled during the painting process and also creates chemical waste. Stone is dedicated to finding paint primers without hexavalent chromium that effectively prevent corrosion and won’t harm people or the environment.

The people behind Boeing's strategy for building a more sustainable future further partnerships and projects that make differences in communities worldwide.



PLANET



Jimmy Pelaez, senior manager of Supply Chain for Boeing Italy, helps Grottaglie school kids plant flowers in a public garden, giving new life to green areas and parks.

TEACHING INSPIRATION BOOSTS GLOBAL SUSTAINABILITY

School Cleaning Days is an educational program promoted by Boeing in Italy. The program inspires primary school students to adopt ecological models of behavior and raise their awareness of sustainable development and environmental protection. The program, launched in 2011, helps children be more aware of environmental sustainability and understand how everyday behaviors can have a crucial impact on the environment.

In its seventh year, School Cleaning Days reached nearly 5,000 students, 86 primary schools and more than 14,000 families all over the country. Boeing employees actively help educate school kids about the growing need for sustainable development through hands-on activities aimed at restyling and renovating schools across Italy.



POWERFUL PRESERVATION PARTNERSHIPS

In 2018, Boeing made several investments in forest restoration efforts.

The Nature Conservancy in Washington and Oregon received \$1.5 million — \$1 million for Washington, \$500,000 for Oregon. Funding is used for planting trees in urban areas around Puget Sound and Portland and in forests in Central Washington damaged in the Jolly Mountain Fire.

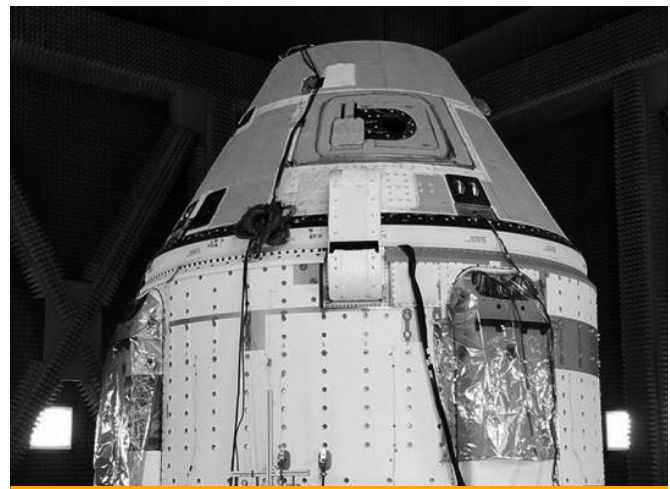
Boeing also granted \$1 million to TreePeople in California to support the new Forest Aid campaign. Forest Aid is working to restore forests in fire-ravaged areas to minimize future fire risks and other environmental threats while fostering healthy ecosystems.



AND THE WINNER IS ...

Reducing environmental impact and improving worker safety are two things achieved by Boeing's 2018 Supplier of the Year Environment Award winner, the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The Australia-based national science research agency has worked with Boeing for 30 years to advance space sciences, manufacturing materials and other innovations for numerous aerospace products.

To find a more environmentally conscious method of recoating aircraft skin to preserve its integrity, CSIRO and Boeing developed Paintbond, a chemical process used in painting that allows fresh topcoat to bond to previously painted layers. Not only does this process eliminate the need for sanding (and any associated worker fatigue issues), it also reduces airborne particulates.



SPACE-BOUND SEEDS

In 1971, Stu Roosa took with him on the Apollo 14 mission 500 seeds from five tree species on Earth. His special cargo included 100 seeds each of loblolly pine, sycamore, sweetgum, redwood and Douglas fir. When they were brought back to Earth, the U.S. Forest Service germinated the seeds and sent them around the country to be planted, eventually becoming "moon trees." In honor of those first space trees, Boeing's CST-100 Starliner will carry the same mix of seeds on its maiden flight test to low Earth orbit: up to one pound (0.45 kg) of each seed type. When they return, they'll be distributed to Boeing sites, suppliers and other stakeholders across the country, growing the first generation of Starliner trees.

BUILDING BETTER ECONOMIES WITH BIOFUEL AND BUSINESS

Boeing actively supports the growth and development of sustainable aviation fuel resources, markets and small businesses around the world.

From 2016–2018, Boeing Global Engagement provided three years of grants to South Africa’s micro-, small- and medium-sized businesses to help them participate in the emerging green economy and build a local, sustainable aviation fuel market.

These grants were also awarded to the World Wildlife Fund in South Africa and the Roundtable for Sustainable Biomaterials in Geneva, Switzerland, to help them evaluate the impacts of sustainable fuel feedstocks and engage with small farmers to build capacity and integrate sustainability into their operations.

The funding led to a better understanding of the most promising African locations for additional biomass to support the production of sustainable aviation fuel. It also laid the foundation for scaling up sustainable aviation fuel production.



Boeing's environmental strategy is guided by a comprehensive review and assessment of the most significant environmental challenges and risks facing the company.

The analysis includes direct input and perspectives on industry best practices and community requirements from diverse stakeholders, such as customers, environment-focused non-governmental organizations (NGO) and the company's global leadership.

The information helps Boeing identify and update our understanding of current and emerging sustainability issues that are critical to the company and our stakeholders. It also informs our next-generation environmental strategy and targets.

Most Significant Environmental Risks and Opportunities

The assessment analyzed and prioritized diverse viewpoints and environmental risks as identified by Boeing and its external stakeholders. The risks relate to products, operations and a variety of other issues. Boeing and the stakeholders named the following risks and opportunities as our highest priorities:

- **Products** Greenhouse gas (GHG) emissions; fuel efficiency; operational efficiency; sustainable aviation fuel.
- **Operations** GHG emissions; energy conservation; water management; solid waste management/waste to landfill.

Boeing included additional high-priority risks and opportunities, such as managing hazardous materials over the product life cycle in our operations, managing chemicals in aircraft production, pursuing innovations in alternative materials and designing environmentally progressive buildings.

External stakeholders added supply chain practices, such as reporting and mitigating product noise, as high environmental priorities.

The relative ranking of environmental risks helps shape priorities of all identified issues in our global environmental strategy.

Global Environmental Trends

The assessment reports current and emerging global trends that may affect Boeing's business, including climate change, resource scarcity, rapid urbanization, regional collaboration on environmental regulations and rapid innovation in new technology.

Environmental Leadership

Boeing's Enterprise Risk Management process reviews other potential climate related risks, including (but not limited to) changes in reputation, changing consumer behavior, business continuity and uncertainty.



Boeing has restored a one-mile stretch of the lower Duwamish waterway near Seattle to support wetlands and healthy habitat for salmon.

Internal and external stakeholders help shape Boeing’s most significant environmental priorities. The results are shown below, in order of importance and influence on business strategy.

Stakeholder Environmental Priorities

- | | |
|---|---|
| <ul style="list-style-type: none"> • CO₂ emissions in products <ul style="list-style-type: none"> – Fuel efficiency – Operational efficiency – Sustainable aviation fuel • Operations greenhouse gas emissions <ul style="list-style-type: none"> – Energy conservation • Climate adaptation • Operations water management • Operations solid waste management and landfill • Chemicals and hazardous material management • Materials innovation and sustainable building | <ul style="list-style-type: none"> • Supply chain environmental standards, practices and reporting • Airplane community noise • Remediation and restoration • Transparency in reporting • Product end-of-service disassembly and disposal • Non-greenhouse gas emissions • Biodiversity • Impact of transportation infrastructure |
|---|---|

We lead the industry in producing fuel-efficient commercial airplanes and reducing carbon emissions.

Progress continues on implementing a key component of aviation's strategy to address global climate change. In 2018, all airlines worldwide flying international routes began formal monitoring and reporting of their emissions as part of the historic Carbon Offset and Reduction Scheme for International Aviation (CORSA), adopted by the United Nations' International Civil Aviation Organization (ICAO) in 2016.

CORSA will help aviation meet its commitment to stop carbon emissions growth from 2020 and halve total carbon emissions by 2050 (see chart).

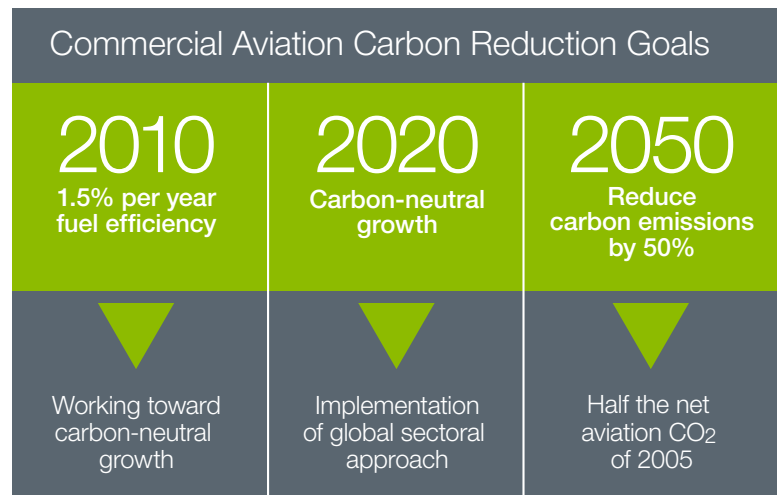
Environmental Regulation

The numbers of regulations and environmental concerns affecting the aerospace industry are increasing and include the following:

- Greenhouse gas (GHG) emissions
- Airplane community noise
- Local air-quality emissions for products and factory operations
- Chemical restrictions in manufacturing operations and product content
- Water quality issues, such as stormwater
- Hazardous waste
- Energy consumption and the use of renewable energy in operations

Chemicals and Regulatory Restrictions

Global regulation of chemical substances continues to grow. To illustrate, regulations expanded 50 percent per year from 2003 to 2013 — more than 50 times overall. That trend continues as efforts to reduce chemical exposure from consumer products affect more industries, including aerospace.



Commercial Aviation and Climate Change

Aviation accounts for approximately 2 percent of global CO₂ emissions, according to the U.N.'s Intergovernmental Panel on Climate Change. New global agreements reached in 2016 support achieving the industry-established goals and a global sectoral approach to controlling emissions:

- A fuel-efficiency performance commitment for aircraft
- A global market-based measure system, CORSA

Implementation of these agreements into regulatory frameworks around the world is underway.

Customer Requirements

The aviation industry's business goal of providing safe, cost-efficient travel and environmental goal of reducing CO₂ emissions are both achieved by constantly improving airplane fuel efficiency. Reducing emissions is aligned to our customers' strategic desire to decrease fuel use.

We are building a more sustainable future for our industry and our planet.

Aviation contributes to a more sustainable planet by facilitating tourism and trade, generating economic growth, providing jobs and improving living standards for people around the world. An economic growth engine like this requires responsibility — one that Boeing and the aviation industry have proactively taken


on by setting and implementing ambitious goals to sustainably grow the industry. From the beginning, Boeing has supported the goals established through the Air Transport Action Group, and Boeing’s market-leading, fuel-efficient airplanes continue to help the industry stay on track.

Commercial Aviation Carbon Reduction Goals	
Goal	Progress Details
<p>2010 1.5% per year fuel efficiency Working toward carbon-neutral growth</p>	<p>Commercial aviation industry is ahead of goal, exceeding 2 percent fuel efficiency improvement per year since 2009. Our newest airplane models, like the 777-9, ensure fuel efficiency improvements can continue into the future across the global air transport system. The ecoDemonstrator program continued its success in 2018, completing a test program of 37 technologies on a FedEx 777 Freighter, including a compact thrust reverser design to support Boeing’s future airplane programs.</p>
<p>2020 Carbon-neutral growth Implementation of global sectoral approach</p>	<p>Progress continues on implementing a key component of aviation’s strategy to address global climate change. In January this year, all airlines worldwide flying international routes began formal monitoring and reporting of their emissions as part of the historic Carbon Offset and Reduction Scheme for International Aviation (CORSIA), adopted by the United Nations’ International Civil Aviation Organization (ICAO) in 2016. With CORSIA in place, the industry expects to offset 75 percent of the growth in global aviation CO₂ emissions from 2020. Boeing supports the program, including tools and services from Boeing Global Services to help our customers with their CORSIA reporting needs.</p>
<p>2050 Reduce carbon emissions by 50% Half the net aviation CO₂ of 2005</p>	<p>Achieving this long-term goal requires research and development efforts in all areas of an airplane and its operation: from innovative new airframes, engines and materials technology for airplanes of the future — including hybrid and electric-powered airplanes — to researching new pathways and scaling up sustainable aviation fuel production. Boeing continues making technology and innovation investments and working in collaborative partnerships across the globe in all of these areas to enable the airplanes of the 2050 global fleet to operate with lower life-cycle emissions.</p>

Environmental leadership is crucial to our being the best in aerospace and a global industrial champion. Stopping climate change requires credible actions and solutions.

After launching our new Global 2025 Environment Strategy in June 2018, we made progress by advancing environmental initiatives on many fronts.

Our environment strategy addresses risks and opportunities through its three-part focus on product innovation, sustainable operations and global collaboration.

Global 2025 Strategy for Environmental Leadership – 2018		
Strategy Pillar	Progress	Progress Details
Innovate for Performance 	➔	<p>Innovation is crucial throughout Boeing, from design and manufacturing to operations and services. Addressing our environmental footprint from the beginning to the end of service is important for environmentally responsible manufacturing solutions, including energy efficiencies, while also working toward eliminating hazardous chemicals in production.</p> <p>In 2018, Boeing’s investments in research and development were essential for advancing technology and launching ventures like Boeing NeXt, which explores possibilities for future efficiencies.</p>
Excellence in Sustainability 	—	<p>Boeing factories finished 2018 1 to 7 percent better than plan toward the 2025 goals for greenhouse gas emissions, energy use and solid waste to landfill. Water and hazardous waste reductions remain challenging, however, requiring increased initiatives, innovations and research.</p> <p>The CDP (formerly called the Carbon Disclosure Project), the industry standard for environmental reporting, recognized Boeing with an A– rating for our CO₂ emissions reduction and transparent reporting.</p>
Inspire Global Collaboration 	➔	<p>Building on previous efforts between Boeing and organizations like The Nature Conservancy, Southern California’s TreePeople and the Lowcountry Land Trust in South Carolina, 2018 saw progress in promoting habitat restoration, advancing green stormwater infrastructure, improving the science associated with waterway cleanups and bettering communities around the world.</p>

Employees are making big strides in conservation, but water and hazardous waste remain challenging.

Employee conservation efforts hit an all-time high in 2018 as the company removed barriers to enable environment-forward conservation behaviors. Boeing continues to work at reducing water consumption and hazardous waste. The company is exploring innovative ways to cut water use, even as airplane production increases.

Due to an increased work scope in 2018, Boeing did not meet our challenging hazardous waste reduction goals. However, our teams are researching innovations to make great strides and redouble 2019 efforts to stay on track for future goals.

Progress Toward 2025 Goals (From 2017 Baseline)	
2025 Reduction Goals	Progress Details
 <p>Reduce greenhouse gas emissions by 25%</p>	2.5 percent better for full year 2018
 <p>Reduce water consumption by 20%</p>	1.3 percent behind for full year 2018
 <p>Reduce solid waste to landfill by 20%</p>	7.3 percent better for full year 2018
 <p>Reduce energy consumption by 10%</p>	1.2 percent better for full year 2018
 <p>Reduce hazardous waste by 5%</p>	1.9 percent behind for full year 2018

Our company's environmental strategy and policies are guided by the Environment, Health & Safety (EHS) Policy Council, composed of Boeing's Executive Council and led by the chairman, president and chief executive officer.

The Policy Council ensures that strategy and performance targets are set and monitored. A team of 20 executives across our businesses and product lines meets twice a month to advance our strategy and plan.

Reviews by the EHS Policy Council and a functional review with the chairman, president and chief executive officer are conducted twice a year. Progress and status are reported through each of these venues in addition to other internal executive reviews across the company.

One Policy Council meeting each year is focused on setting targets that are aligned with corporate long-range business planning; another annual meeting focuses on detailed planning and reviewing the company's environmental and safety performance.

Environmental initiatives are embedded into every organization and function within Boeing. The EHS organization comprises functions focused on workplace safety and health, environmental performance and regulatory compliance. The EHS team also works with our business unit and operational leaders to drive an integrated, enterprisewide strategy that addresses our products, services, processes, operations, contractors and employees.

This highly integrated and coordinated approach drives continuous improvement in the environmental performance of our products and operations around the world.



Plants, shrubs and other natural vegetation are part of a bioswale that helps filter and clean stormwater runoff at Boeing's Plant 2 site near Seattle, Washington.

Endnotes for General Text

✂ Page 16: The Battle of the Buildings graphic is used with the permission of the U.S. Environmental Protection Agency.

Endnotes for Performance Summary Chart

✂ Data reported in this chart for the greenhouse gas emissions, hazardous waste, water intake and solid waste to landfill reflect environmental performance at the following sites from a baseline set on 2017 values. These sites (known as Core Metric Sites) represent the vast majority of Boeing’s operations and are identified by the city in which the Boeing operation resides. For each metric, additional facilities and office buildings also have been included where information is available.

- Alabama: Huntsville
- Arizona: Mesa
- California: El Segundo, Huntington Beach, Long Beach, Seal Beach, Palmdale
- Illinois: Chicago
- Indiana: Gary
- Missouri: St. Charles, St. Louis
- Ohio: Heath
- Oregon: Gresham
- Pennsylvania: Ridley Park
- South Carolina: Charleston, Ladson
- Texas: Houston, San Antonio
- Utah: Salt Lake City, West Jordan
- Washington: Auburn, Bellevue, Tukwila (Developmental Center), Everett, Frederickson, Kent (Space Center), Seattle (North Boeing Field, Plant 2, Thompson, South Park), Renton (737 Assembly, Longacres), SeaTac (Spares Distribution Center)
- Canada: Winnipeg
- Australia: Fishermans Bend
- Site changes: Wichita, Kansas (reduced scope in 2015, now reports only hazardous waste).

Endnotes for Greenhouse Gas Emissions

✂ In addition to data from Boeing’s Core Metric Sites, Portland, OR (PDX Paint Hangar); Oklahoma City, OK; Moses Lake, WA; Arizona Data Center and Washington Data Center are also included.

✂ Carbon dioxide equivalent, or CO₂e, means the number of metric tons of CO₂ emissions with the same global warming potential as one metric ton of another greenhouse gas (in accordance with EPA 40 CFR Part 98, Mandatory Greenhouse Gas Reporting).

✂ GHG 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 No. 6 and other fuel oils for heating and curtailment backup.) Consumption of other fuels is not represented.

✂ For U.S. sites, Scope 1 emissions from natural gas, fuel oil and on-site generated electricity are calculated using the emission factors provided in U.S. EPA GHG Mandatory Reporting Rule. Scope 2 emissions from purchased electricity are calculated using the market-based method and eGRID subregion factors, since residual mix is not available in the U.S. For the Canada site, Scope 1 emissions are calculated using the emission factors provided in U.S. EPA GHG Mandatory Reporting Rule; Scope 2 emissions are calculated using the market-based method and the supplier-specific emission factor. For the Australia sites, Scope 1 emissions are calculated using the emission factors provided in the National Greenhouse and Energy Reporting (NGER) Scheme, and Scope 2 emissions are calculated using market-based method and the emission factors provided in the National Greenhouse and Energy Reporting (NGER) Scheme, since residual mix is not available in Australia. Emissions calculated with location-based method are: 1,230,000 tons (1,116,000 metric tons) CO₂e (2018). Emissions calculated with market-based method are: 1,080,000 tons (980,000 metric tons) CO₂e (2018).

✂ Renewable Energy Certificates (REC) were applied to the GHG calculation for the following locations: North Charleston, SC; Portland, OR; Phoenix, AZ; and six Puget Sound locations in Washington. In 2018, these Boeing locations made arrangements to purchase RECs to offset around 149,000 tons (135,000 metric tons) of GHG emissions.

Endnotes for Water Intake

✂ In addition to data from Boeing’s Core Metric Sites, data from Oklahoma City, OK, and Portland, OR (PDX Paint Hangar), also included.

Endnotes for Energy Use

✂ In addition to data from Boeing’s Core Metric Sites, data from Portland, OR (PDX Paint Hangar); Oklahoma City, OK; Moses Lake, WA; Arizona Data Center and Washington Data Center are included.

✂ 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 heating.) Consumption of other fuels is not represented.

Endnotes for Solid Waste to Landfill

✂ Includes data from Boeing’s Core Metric Sites.

✂ Solid waste numbers represent values determined from scale-weighted containers as well as calculated weights.

Endnotes for Hazardous Waste Generation

✂ Hazardous wastes are determined from U.S. EPA hazardous manifest or equivalent government shipping documents.

✂ In addition to data from Boeing’s Core Metric Sites, data from Portland, OR (PDX Paint Hangar); Jacksonville, FL (Cecil Field); El Paso, TX; Wichita, KS; and Sylmar, CA, are included.

Endnotes for Global Reporting

Australia National Greenhouse and Energy Reporting endnote: This comprehensive report must be completed by registered corporations that meet specified energy use and greenhouse gas emission thresholds. For the 2015–2016 reporting period, the Australian government’s Clean Energy Regulator released data for companies emitting more than 55,000 tons (about 50,000 metric tons) of equivalent carbon dioxide (CO₂e).

United Kingdom Carbon Reduction Commitment endnote: Boeing U.K. operations consist of multiple units and subsidiaries. Boeing U.K. Training and Flight Services Ltd. operates flight simulators for training on Boeing aircraft at several locations throughout the U.K. Boeing Defense U.K. Ltd. has employees located at multiple locations throughout the U.K., supporting Ministry of Defense and U.S. military programs. Additionally, CO₂ emissions from Boeing subsidiary Jeppesen U.K. Ltd. and Aviall U.K. Inc. are included in the Boeing U.K. CRC report.

Endnotes for Greenhouse Gas Corporate Inventory

✂ The greenhouse gas (GHG) emissions reported represent 1,655 buildings in 41 countries where Boeing has operational control. Refer to the Site Listing Footnotes for the Corporate GHG Inventory Chart for cities included.

✂ Scope 3 emissions only includes emissions from business travel.

✂ Scope 1 “other gas types” include CH₄, N₂O, NF₃ and PFCs emissions.

✂ Scope 1 “other fossil fuels” include No. 6 fuel oil, gasoline, aviation gasoline, propane and LPG.

✂ 1 metric ton = 2,204.62 pounds.

- ✈ Carbon dioxide equivalent, or CO₂e, means the number of metric tons of CO₂ emissions with the same global warming potential as one metric ton of another greenhouse gas. (In accordance with EPA 40 CFR 98 Mandatory Greenhouse Gas Reporting.)
- ✈ Accounting protocol: This GHG inventory is prepared using the following protocols:
 - The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)
 - The Scope 2 Guidance
 - GHG Reporting Guidance for the Aerospace Industry
 - The Australia National Greenhouse and Energy Reporting Act
 - The United Kingdom’s CRC Energy Efficiency Scheme
- ✈ Scope 2 emissions are calculated using the market-based method. Location-based method calculated emissions are 983,000 tons (892,000 metric tons) CO₂e. Residual mix is only available in EU countries; therefore, other grid average emissions factors are used in all other countries. In the market-based methodology, RECs were applied to the GHG calculation for the following locations: North Charleston, SC; six Puget Sound locations in Washington; Portland, OR; and Phoenix, AZ. In 2018, these Boeing locations made arrangements to purchase RECs to offset around 149,000 tons (135,000 metric tons) of GHG emissions.
- ✈ Other calculation factors: Data source of global warming potentials (GWP) is U.S. 40 CFR 98 subpart A, table A-1. For GHG inventory in North America, emission factors for combustion sources come from U.S. 40 CFR 98, subpart C, table C-1. For GHG inventory in the U.K., emission factors from the CRC Energy Efficiency Scheme are used. For GHG inventory in Australia, emission factors from the National Greenhouse and Energy Reporting Act are used. For GHG inventory in locations where energy data are not accessible, 2012 CBECs factors are used to estimate the energy consumption and emission factors from the International Energy Agency’s “CO₂ Emissions From Fuel Combustion Highlights 2013.” “2006 IPCC Guidelines for National Greenhouse Gas Inventories” is used to calculate the emissions.

Site Listing Endnotes for Corporate GHG Inventory Chart

Country	Location
Australia	Australian Capital Territory Canberra
	New South Wales Bankstown Sydney Williamstown
	Queensland Alderley Archerfield Brisbane Cairns Coominya St. Lucia
	South Australia Adelaide
	Victoria Melbourne Port Melbourne Tullamarine
	Western Australia Jandakot
Belgium	Brussels
Brazil	São Paulo Sao José dos Campos
Canada	Alberta Calgary
	British Columbia Richmond Vancouver
	Manitoba Winnipeg
	Ontario Mississauga Ottawa
	Quebec Mirabel Montreal
China	Beijing Hong Kong Putuo District Shanghai
Denmark	Copenhagen
Egypt	Cairo
Ethiopia	Addis Ababa
France	Blagnac Paris
Germany	Berlin
	Bavaria Munich
	Hesse Neu-Isenberg
	North Rhine-Westphalia Cologne

Country	Location
Hungary	Papa
India	Andhra Pradesh Hyderabad
	Karnataka Bangalore
	National Capital New Delhi
	Tamil Nadu Chennai
Ireland	Belfast Cork Shannon
	Leinster Dublin
Israel	Tel Aviv
Italy	Rome
Japan	Chubu Nagoya Tokoname
	Kanto Yokohama
	Tokyo Tokyo
Kazakhstan	Almaty
Kenya	Nairobi
Kuwait	Kuwait City
Luxemburg	Luxemburg
Malaysia	Kuala Lumpur
Mexico	Mexico City
Netherlands	Amsterdam Nieuw Vennepeg
New Zealand	Auckland
Oman	Muscat
Poland	Gdańsk Warsaw
Qatar	Doha
Russia	Moscow Skolkovo Tyumen
Saudi Arabia	Riyadh
Singapore	Singapore
South Africa	Johannesburg
South Korea	Seoul Yeongcheon-si
Spain	Madrid
Sweden	Göteborg
Switzerland	Lucerne
Taiwan	Taipei
Turkey	Ankara Istanbul

Site Listing Endnotes for Corporate GHG Inventory Chart

Country	Location
Ukraine	Kiev
United Arab Emirates	Abu Dhabi Dubai
United Kingdom	England Bristol Camberley Corsham Crawley Farnborough Feltham Fleet Gatwick Gosport Knaresborough London Milton Keynes Oxford Welwyn Garden City Yeovil Scotland Perth
United States	Alabama Daleville Huntsville Madison Alaska Anchorage Arizona Chandler Mesa Phoenix California Costa Mesa El Segundo Huntington Beach Long Beach Menlo Park Mountain View Palmdale Pleasanton Rancho Cucamonga Sacramento San Diego San Jose San Luis Obispo San Mateo Santa Susana Seal Beach Sunnyvale Sylmar Taft Torrance Van Nuys Ventura Victorville Colorado Aurora Centennial Colorado Springs Englewood

Country	Location
United States	Connecticut East Windsor Florida Cape Canaveral Davie Fort Walton Beach Jacksonville Kennedy Space Center Miami Orlando Tampa Titusville Georgia Atlanta College Park Peachtree Warner Robins Hawaii Honolulu Kamuela Waimea Kihei Illinois Chicago Fairview Heights Mascoutah Rolling Meadows St. Charles Schaumburg Swansea Indiana Crown Point Gary Kansas Kansas City Wichita Louisiana Bossier City Lafayette Maryland Aberdeen Proving Ground Annapolis Junction California Germantown Patuxent River Massachusetts Cambridge Lexington Michigan Waterford Minnesota Eagan Mississippi Columbus AFB Starkville Missouri Berkeley Earth City Florissant Fort Leonard Wood Hazelwood Maryland Heights Portage Des Sioux

Country	Location
United States	Missouri Saint Charles St. Louis Montana Glasgow Helena Nebraska Omaha Nevada Las Vegas New Jersey Berkeley Heights Parsippany New Mexico Albuquerque New York New York City North Carolina Fayetteville Havelock Kings Mountain Morrisville Ohio Brookpark Cincinnati Dayton Fairborn Heath Oklahoma Oklahoma City Stillwater Oregon Arlington Boardman Gresham Hood River Portland The Dalles Wilsonville Pennsylvania Eddystone Lemont Furnace Pittsburgh Ridley Park Smithfield South Carolina Ladson North Charleston Tennessee Cordova Memphis Texas Austin Dallas Dyess AFB El Paso Houston Irving Plano Richardson San Antonio Universal City

Site Listing Endnotes for Corporate GHG Inventory Chart

Country	Location
United States	Utah Hill AFB Layton Salt Lake City West Jordan
	Virginia Arlington Chantilly Fairfax Herndon Leesburg Manassas Newington Newport News Virginia Beach

Country	Location
United States	Washington Auburn Bellevue Bingen Bothell Enumclaw Everett Issaquah Kent Moses Lake Mukilteo Olympia Puyallup Quincy Renton SeaTac Seattle Tukwila

Country	Location
United States	Washington Vancouver White Salmon
	West Virginia Bridgeport

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Photo by Paul Gordon



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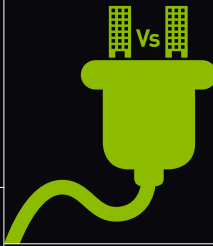


Boeing's newest twin-aisle airplane, the 777X, is designed to be **the most efficient twin-engine jet in the world.**



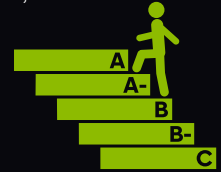
Boeing is designing for the environment in its new airplanes, including recommendations for **environmental efficiencies in supply chain, manufacturing and aircraft performance.**

Boeing opened its first European manufacturing site in 2018 and is on target to receive an "excellent" BREEAM rating, the **highest degree of building sustainability.**



Boeing's 2018 Battle of the Buildings at 47 sites in six countries resulted in **sites cutting electricity use**—several by double-digits.

The CDP, the largest global carbon disclosure platform, recognized Boeing with an **A- rating** for the company's greenhouse gas emissions management, reduction and transparent reporting.



In 2018, Boeing donated **\$2.5 million** for West Coast reforestation efforts.



When the 777X enters service in 2020 it will be the **largest and most fuel efficient twin-engine jet in the world.**



The commercial aviation industry is ahead of the goal to **improve fuel efficiency by 1.5% per year by 2020.**



In 2018, Boeing's ecoDemonstrator 777 Freighter was the first commercial flight fueled by **100% sustainable aviation fuel.**

Each new airplane we develop is **15 to 20% more efficient** than the aircraft it replaces.



Starting in 2019, Boeing customers can **choose sustainable fuel** for their new deliveries.



In 2019, an Etihad Airways 787 flew the world's first passenger flight powered partly with **biofuel made from desert plants irrigated with seawater.**



Boeing finished 2018 better against **zero-growth targets** for greenhouse gas emissions, energy use and solid waste to landfill.



More than one million pounds (454,000 kg) of excess carbon fiber will stay out of the landfill thanks to a new partnership with U.K.-based ELG Carbon Fibre.