Message from Dave Calhoun

Dave Calhoun, President and CEO

The aerospace manufacturing and aviation industries play a profound role in our world. Safety will always be our top priority. Sustainability represents an opportunity for us to define our next chapter together, with a focus on reducing carbon emissions and enabling people everywhere to travel and fly responsibly. These efforts make it possible for the next generation of aerospace workers to continue to enjoy rewarding careers, strengthen the fabric of the communities where we operate, and collaborate within our industry for environmental stewardship (E), social progress (S) and transparent governance (G).

Boeing's mission is to protect, connect and explore our world and beyond. Every day, we are dedicated to carrying out our mission — safely and sustainably. Boeing is pursuing sustainable aerospace together because we know it is an imperative and because our teammates are committed to making the world better for future generations.

Throughout Boeing's long history, we have looked for ways to enhance sustainability in everything we do. This commitment to innovate is deeply rooted in our core values, where we continue to reinforce safety as our top priority, strive for first-time quality and hold ourselves to the highest ethical standards to support a more sustainable future.

By 2050, our industry sees a world where air travel will carry over 10 billion passengers a year, support 180 million jobs and generate nearly $9 trillion in economic activity, all while furthering our goal of minimizing the impact on our planet and striving to achieve the commercial aviation industry's ambition of net-zero carbon emissions. Aerospace also continues to be essential to national security, humanitarian and peacekeeping efforts around the globe. We are committed to preserving the societal, security and economic benefits of our industry, safely and sustainably.

Advancing the future of flight and improving the world for future generations requires a multi-faceted approach. Our focus on ESG is embedded in our culture and our stakeholders' expectations, including our current and future employees, customers, regulators, suppliers, communities and investors.

Environmental Stewardship

To address climate change, Boeing continues to collaborate with partners across the globe on innovation and clean technology to get commercial aviation to net-zero carbon emissions. We're finding more efficient ways for our commercial and defense customers to operate their fleets, and we're investing heavily in sustainable aviation fuels, considered the safest and most measurable solution to reduce aviation carbon emissions over the next 20 to 30 years. We continue to test the latest technologies to cut emissions, reduce noise and enhance safety with our ecoDemonstrator program, which celebrates its 10th anniversary this year, while investing in and demonstrating alternative fuel solutions to inform the future of flight. We are committed to maintaining net-zero carbon emissions within our operations as we advance the design-for-environment view of our defense and commercial products and build sustainability into every step of our product life cycle.

Social Progress

Our people are our most important asset. Employee safety and well-being is our priority. We have taken steps to create open, candid and respectful environments for all our teammates — not just within our four walls, but within the communities where we live and work. Boeing's Seek, Speak & Listen habits are foundational to a culture of integrity and inclusion. We're committed to increasing the representation of women and underrepresented racial and ethnic minorities at every level of our company. And we continue to invest in our future through technical and educational organizations that inspire the next generation of aerospace innovators.

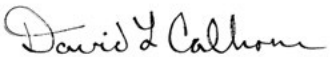
Global Engagement

Most recently, our focus has been on our employees affected by the war in Ukraine. As a global company with over a century in flight and a long legacy of advancing human freedom, Boeing has continuously navigated challenging and shifting geopolitical dynamics and we will continue to do so in this case, guided by our values. We have taken action and will continue to follow the lead of the U.S. Government and focus on strictly adhering to the export controls and restrictions that have been announced governing work in Russia as a baseline, while also taking additional actions. As always, our first priority is safety and the safety of our employees in Ukraine has our total focus. We also announced a significant humanitarian assistance package to support the Ukrainian people affected by the ongoing conflict. I am incredibly proud of our teammates who have made their own donations in support of Ukrainian humanitarian relief, which the company is matching through our Boeing Gift Match Program.

Transparent Governance

Our Board of Directors works closely with Boeing leaders to ensure we hold ourselves to the highest standards in our work, ethical conduct and information protection. We all sign a Code of Conduct annually and commit to prioritizing safety, quality and integrity and holding one another accountable. Through the Board's Governance & Public Policy Committee, we have enhanced our practices and policies and formalized oversight of public policy, political advocacy and corporate sustainability practices — including matters related to environmental stewardship and climate change, and to diversity, equity and inclusion.

Opportunity lies before us as we advance safe and sustainable aerospace, which is critical to our commercial and defense customers and to our communities at large. I am proud of our teams as they explore innovative ways to help us continue to take meaningful steps toward a more sustainable future. I invite you to join us on our journey as we advance the future of flight together, safely and sustainably.



David L. Calhoun
President and CEO

Our Values

How We Operate

Start with engineering excellence

Be accountable — from beginning to end

Apply Lean principles

Eliminate traveled work

Reward predictability and stability — everywhere in our business

How We Act

Lead on safety, quality, integrity and sustainability

Foster a Just Culture grounded in humility, inclusion and transparency

Import best leadership practices

Earn stakeholder trust and preference

Respect one another and advance a global, diverse team

Innovate and operate to make the world better

Reflecting on Progress, Defining the Future of Flight

Chris Raymond, Chief Sustainability Officer

Boeing's purpose is to protect, connect and explore our world and beyond. We have a responsibility to do it safely, with quality, integrity and sustainability. We strive to earn trust and ideally preference with our stakeholders through collaboration, humility, inclusion, transparency and learning. Above all else is safety. As air travel resumes around the globe and workplaces change, health and safety are always our top priority. We will continue working across the industry to enhance employee health and global aerospace safety; and you will see that addressed throughout this report.

Boeing established its first Chief Sustainability Officer role and formed a Global Enterprise Sustainability organization in September 2020, but that was not the beginning of our focus on sustainability. Many environmental, social and governance (ESG) elements have been part of Boeing's fabric throughout our 106-year aerospace history, and we must always learn and continuously improve. In 1929, Bill Boeing said, "Our job is to keep everlastingly at research and experiment, to adapt our laboratories to production as soon as practicable…to let no new improvement in flying equipment pass us by." This philosophy endures today as we move forward and pursue sustainable aerospace with our stakeholders across Boeing's commercial, defense and services businesses.

Through collaboration with our stakeholders, we learned a lot in 2021 and we see exciting opportunity going forward. While we still have more to learn, the following are a few reflections on the journey.

Our stakeholders increasingly value sustainability.

ESG efforts are increasingly important to our current and future employees, our customers, our suppliers, our regulators, our communities and our financial stakeholders. We must continue to engage and listen to them about what's important, bring the outside in and collaborate on solutions. Last year, we described six sustainability goals that will define sustainability progress for Boeing and its stakeholders. This year we added several waypoints and metrics to measure progress (see Page 12). We also explicitly included sustainability in our enterprise values and strategic objectives to further embed the importance and the opportunity and, for the first time, Boeing is including compensation incentives tied to sustainability performance.

The industry is committed to combating climate change and it will require collective action.

Aerospace has always been about efficiency and has competed on innovation and fuel efficiency to meet customers' expectations. Climate change and decarbonizing aerospace have further increased the urgency for progress. Airlines, defense customers, leasing companies and governments around the globe are aligning to bold climate change ambitions. We support the commercial aviation industry's ambition to achieve net-zero carbon emissions by 2050. Boeing's strategy to decarbonize aviation is focused on four key areas: fleet renewal, operational efficiency, renewable energy transition and advanced technologies. We are engaged in studies, tests, research and partnering across these areas and the industry to learn together and provide customers with sustainable product life cycle insights and solutions to help them meet their climate change commitments.

Aerospace protects and connects; people will continue to take flight.

Aerospace plays a profound role in our world and enables societal benefits. Aerospace connects and protects, and while the COVID-19 pandemic challenged the industry it also reminded us of our industry's value. People all over the world yearned to be connected to others and global air transport delivered necessary products and goods to people's doorsteps. Billions of passengers fly every year to connect with loved ones, explore new places and understand cultures, engage in commerce and care for those in need. Dave mentioned the industry's vision for sustainable growth by 2050, which will require us to work, learn and solve challenges together to create future opportunities for passengers, workers and economies. At the same time, aerospace continues to be essential to national security, humanitarian and peacekeeping efforts, which are social responsibilities the world too often reminds us remain much needed. Our industry has a responsibility to preserve and grow the societal and economic benefits of aerospace, safely and sustainably.

Nicola Sturgeon (center), Scotland's first female First Minister and the first female leader of any of the devolved U.K. administrations, met with women attending the Boeing Innovation Forum after touring the ecoDemonstrator at Glasgow Airport. (Boeing photo)

Partnerships, innovation and learning together are critical to our collective success.

To explore and mature sustainable solutions, we must continue to work together with partners — across our communities, our industry, academia, governments and non-governmental organizations, and philanthropic foundations — given each have a role to play in tackling climate change and aerospace decarbonization. In October 2021, we hosted a Boeing Innovation Forum in Glasgow. We convened customers, government officials, manufacturers, academia and future talent to discuss the future of sustainable aerospace. It was an enlightening few days as expert stakeholders hosted panels on future sustainable solutions. Perhaps most inspiring was that this forum lent itself to diverse perspectives, given the range of participants and talent. The First Minister of Scotland Nicola Sturgeon opened the day with inspiring remarks and announced plans for The Newton Flight Academy at Glasgow Science Center. This Boeing-supported academy is used to teach students about aviation-related STEM concepts and inspire our next generation of leaders. Boeing's ecoDemonstrator was a popular attraction at the event. The ecoDemonstrator program celebrates its 10th anniversary this year and continues to take technologies out of a lab and test them in the sky with airline and industry partners. It is perhaps one of the best and most visual representations of how innovation and partnerships are informing and maturing sustainable technologies for current and future aircraft.

Boeing also participated in COP26, where the world convened to discuss climate change across all industries and on a global scale. There, the World Economic Forum, in partnership with US Special Presidential Envoy for Climate John Kerry, announced the First Movers Coalition — a new platform for companies to make purchasing commitments that create new market demand for low-carbon technologies. Boeing is honored to be a founding member. This is just one example of companies and governments collaborating together to advance and accelerate progress.

Forward, the Future of Flight

Going forward, we will remain focused on employee well-being and safety; global aviation safety; equity, diversity and inclusion; sustainable operations; innovation and clean tech; and global community engagement; among many other important elements.

As we look to the future of flight, aerospace innovation is energized by how to decarbonize the industry. Boeing's strategy is focused on four key areas. Continued fleet renewal with more fuel-efficient aircraft and operational efficiencies will remain critically important levers to reduce carbon emissions. Renewable energy will intersect aviation in new, exciting ways with the industrialization and growth of new sustainable aviation fuel (SAF) pathways, technology innovation, and production volumes. SAF and the parallel research, studies and demonstrations of electric and hydrogen applications, the renewable energy total life-cycle accounting, zero climate impact aircraft design concepts, safe certification and infrastructure implications, coupled with a sustainable product life-cycle approach, will drive our industry talent, partnerships, innovation and policies going forward. It is an exciting era for aerospace.

These are ambitious challenges. Throughout our industry and our company history, we have had the resolve and teamwork to bring jet travel to the world and take people to the moon. We must continue to help humanity take flight in every sense while protecting our planet for generations to come. As Bill Boeing also said, "We are embarked as pioneers on a new science and industry in which our problems are so new and unusual that it behooves no one to dismiss any novel idea with the statement that 'It can't be done!'"

In that spirit, we are on a journey to solve sustainable aerospace challenges together. We appreciate our stakeholders' partnership for shared successes as we move forward.

Onward,

Chris Raymond
Chief Sustainability Officer

2021 Sustainable Aerospace Journey

Boeing innovated and partnered across the industry in 2021, making significant progress toward our industry's net-zero commitments and goals.

January

Committed to deliver 100% SAF capable airplanes by 2030

February

Became founding member of MIT Climate and Sustainability Consortium

April

ENERGY STAR Partner of the Year Award for Sustained Excellence

June

Announced Alaska Airlines as 2021 ecoDemonstrator partner

July

Announced partnership with SkyNRG to scale availability and use of sustainable aviation fuels globally

Highlighted sustainable technologies at congressional event in Washington, D.C.

August

Showcased new technologies tested on ecoDemonstrator to STEM-focused students, part of the Alaska Native Science & Engineering Program

September

Amplified SAF ambitions during White House sustainability roundtable

Showcased sustainable technologies on ecoDemonstrator at Boeing Field in Seattle

October

Partnered with United Airlines on first passenger flight with 100% SAF in one engine

Partnered with Etihad Airways on sustainable flight

Partnered with Rolls-Royce on 100% SAF flight

Partnered with NASA Langley Research Center to test the emissions of SAF on ecoDemonstrator

Supported commercial aviation industry's ambition to achieve net-zero carbon emissions by 2050

COMMITMENT TO FLY NET ZERO 2050

Hosted Innovation Forum in Glasgow, convening industry to discuss decarbonizing aerospace within the region and globally

November

Became founding member of First Movers Coalition, partnering with leading companies to accelerate new technology development to reduce emissions

First Movers Coalition

Hosted 2021 STEM event at San Francisco International Airport to showcase ecoDemonstrator's sustainable technologies

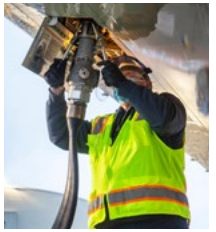
Participated in COP26, highlighting our perspectives, innovations and partnerships for a more sustainable aerospace future

Expanded sustainability alliance with Etihad Airways

December

Conducted successful testing with NASA and DARPA on a large, fully composite, linerless cryogenic fuel tank with the capacity to hold 16,000 gallons (over 60,500 liters) of liquid hydrogen

Bought 2 million gallons (7.6 million liters) of SAF blended with EPIC Fuels to power Commercial Airplanes operations in Washington state and South Carolina through 2022



Map of Engagement

Sustainable Aerospace Together

Boeing remains committed to pioneering sustainable aerospace for current and future generations. This involves a long history of innovative solutions with our people, and partnerships that are foundational to all we do. While the activities on the map are not exhaustive, they give an indication of the actions we've taken and the partnerships we've formed around the globe to decarbonize aerospace.

Learn more about our global presence and partnerships.

- People and Presence
- Products and Services
- Efficient Operations
- Communities and Industry

People and Presence

Locations with Boeing teammates and key partners focused on advancing sustainable aerospace efforts.

- Abu Dhabi, UAE
- Amsterdam, Netherlands
- Beijing, China
- Brasilia, Brazil
- Brussels, Belgium
- Brisbane, Australia
- London, U.K.
- Pulau Ujong, Singapore
- Tokyo, Japan
- Washington D.C., U.S.

Communities and Industry

- Aerospace Industries Association (AIA)
- Aerospace Defence, Security and Space
- Air Transport Action Group (ATAG) (Geneva, Switzerland)
- Aircraft Fleet Recycling Association (AFRA)
- Airlines for America (A4A)
- Airlines for Europe
- Association of Aerospace Industries (Singapore)
- Boeing Aerospace Technology Institute Accelerator project
- Commercial Aviation Alternative Fuels Initiative (CAAFI)
- International Aerospace Environmental Group (IAEG)
- International Air Transport Association (IATA)
- International Civil Aviation Organization (ICAO)
- Jet Zero Council (London, UK)
- MIT Climate & Sustainability Consortium
- Nordic Initiative for Sustainable Aviation
- Roundtable on Sustainable Biomaterials (Geneva, Switzerland)
- Sustainable Aviation Buyers Alliance (SABA), BC-SMART
- Sustainable Aviation Fuel Alliance of Australia and New Zealand (SAFAANZ)
- UK Sustainable Aviation
- World Economic Forum Clean Skies for Tomorrow Coalition (Cologny, Switzerland)

STEM Newton Rooms

- Angers Mobile Room (France)
- Bari Mobile Room (Italy)
- Beijing Room (China)
- Dijon Mobile Room (France)
- Hoogerheide Mobile Room (Netherlands)
- Łódź Permanent Room (Poland)
- Lyon Mobile Room (France)
- Ourense Permanent Room (Spain)
- STEM Education (Turkey)

Report on Net Zero Indicator

At our 2022 Annual Meeting of Shareholders, our Board recommended a vote in favor of — and our shareholders approved — a shareholder proposal requesting a report on the Net Zero Indicator, which is defined as the Climate Action 100+ Benchmark's Indicator 1. The requested report, evaluating and disclosing if and how we meet the criteria of the Net Zero Indicator, including Scope 3 Use of Sold Products emissions, is set forth below.

Climate Action 100+ Net Zero Benchmark Indicator 1: Our Approach

What's Included	Scope 1 and 2 Direct Company Activities: Manufacturing and Other Facilities	Scope 3 Downstream Activities: Commercial; Defense and Space	Scope 3 Upstream Activities: Supply Chain
Climate Action 100+ Net Zero Company Benchmark: Indicator 1	Indicator 1: **Partially meets**		
	Metric 1.1.a: The company has made a qualitative net-zero GHG emissions ambition statement that explicitly includes at least 95% of Scope 1 and 2 emissions.	**Metric 1.1.b:** • The company's net-zero GHG emissions ambition covers the most relevant Scope 3 GHG emissions categories for the company's sector. • Boeing is classified as Other Transport, for which the Category 11 — Use of Sold Products is the only relevant Scope 3 category[1].	Climate Action 100+ does not list purchased goods and services, capital goods, or upstream transportation and distribution as relevant Scope 3 categories for the company's sector.
Company Assessment	**Meets:** Boeing's ambitions and actions for Scopes 1 and 2 meet the Climate Action 100+ Net Zero Company Benchmark Disclosure Indicator 1.	**Partially meets:** Our active engagement and support for the commercial aviation industry's net-zero ambition largely — but not fully — aligns with the Climate Action 100+ Net Zero Benchmark Disclosure Indicator 1 objective for addressing Scope 3 emissions by working with and supporting aviation's decarbonization, without establishing company-specific Scope 3 GHG reduction targets at this time.	Not applicable: See above
Company Ambitions and Actions	We have set several 2030 goals to support GHG action on operational emissions: • Reduce Scope 1 and 2 GHG emissions by 55% from 2017 levels • Maintain net-zero emissions for Scope 1 and 2 • Achieve 100% renewable electricity Our strategy to reduce Scope 1 and 2 emissions is founded on science and aligns to a reduction pathway for a 1.5°C scenario, in support of global goals.	We address Scope 3, Category 11 (Use of Sold Products) emissions collaboratively as an industry; this approach makes sense for our sector. In support of a net-zero transition, the first step is to ensure we have a path that is credible and aligned with the industry in support of the global GHG emissions reduction goals. • Boeing supports the commercial aviation industry's ambition to achieve net-zero carbon emissions for global civil aviation operations by 2050, which focuses on Use of Sold Products. • Boeing has established a goal that current and future commercial aircraft will be 100% SAF capable by 2030. • Boeing is actively working with our government customers to understand and support their future requirements.	Boeing works with our suppliers to increase GHG reporting and proactively address climate change-driven risks.

1. Climate Action 100+ Net Zero Company Benchmark (v1.1) sector classification & Scope 3 emissions application.

Report on Net Zero Indicator (continued)

The aerospace industry as a whole and Boeing face significant climate change-driven risks and opportunities as well as the need to decarbonize for sustained long-term growth. We believe that safe and sustainable aviation is an imperative for our commercial and defense customers, communities and employees. This is a primary strategic focus for Boeing; our efforts are outlined below.

Boeing strives to reduce operational greenhouse gas (GHG) emissions, both during times of growth and during times of challenge.

Boeing achieved net-zero carbon emissions at manufacturing sites and other facilities (Scope 1 and 2) and in its business travel (Scope 3, Category 6) in 2020 and 2021 by expanding conservation and renewable energy use, while securing responsible offsets for the remaining GHG emissions. The company's ambition includes our goals to reduce operational GHG emissions, maintain net-zero emissions for Scope 1 and 2, and increase our adoption of renewable energy sources. Read more about how we reduce operational GHG on Page 51.

Achieving aviation industry climate objectives to decarbonize requires a portfolio of solutions and partnerships. Boeing is working to advance the development of key technologies to further these objectives.

On the products side, Boeing committed that its commercial airplanes will be capable to fly on 100% SAF by 2030. Long term, we support the commercial aviation industry's ambition to achieve net-zero carbon emissions for global civil aviation operations by 2050. We are partnering across the industry with the goal to reimagine and ultimately decarbonize commercial aviation in the second half of this century. Learn more about our plans to decarbonize commercial aviation on Page 41.

Boeing is actively developing low-carbon transition plans to meet long-term goals with meaningful milestones.

In October 2021, we announced our support for the commercial aviation industry's ambition to achieve net-zero carbon emissions for global civil aviation operations by 2050. By supporting this industry goal, we are addressing emissions from the use of Boeing's sold commercial aircraft (Scope 3 Category 11) which is estimated to comprise greater than 90% of Boeing's total GHG emissions, and therefore defined as the only relevant category of Scope 3 emissions for Boeing under the Climate Action 100+ Net Zero Benchmark.[1] Our active support for the commercial aviation industry's net-zero ambition largely — but not fully — aligns with the Climate Action 100+ Net Zero Indicator objective for addressing Scope 3 emissions. In 2021, Boeing disclosed our Scope 3 Use of Sold Product emissions for commercial aircraft, an important step toward understanding our contributions and potential reduction pathways. Due to the unique aspects of our sector including global scope, long product life-span, and financial and technological decarbonization challenges, Scope 3, Category 11 emissions are best addressed as a collaborative effort across the industry. In support of a net-zero transition, the first step is to ensure we have a path that is credible and aligned with the commercial aviation industry in support of its global reduction goals. Boeing's existing Scope 3 ambitions to support our commercial industry's net-zero goals do not address (i) our defense portfolio, where we are actively working with our government customers to understand and support their future requirements, or (ii) our supply chain, where we are working with our suppliers to increase GHG reporting and proactively address climate change-driven risks to create resilience and stability within our supply base. Read more about our work to decarbonize commercial aviation on Page 41.

Boeing protects, connects and explores our world and beyond, safely and sustainably. We believe that safe and sustainable aerospace is an imperative for all of our stakeholders. Achieving desired decarbonization will require continued partnerships with airlines, industry, governments and research institutions over decades. Learn more about our goals and partnerships to decarbonize aerospace on Page 8.

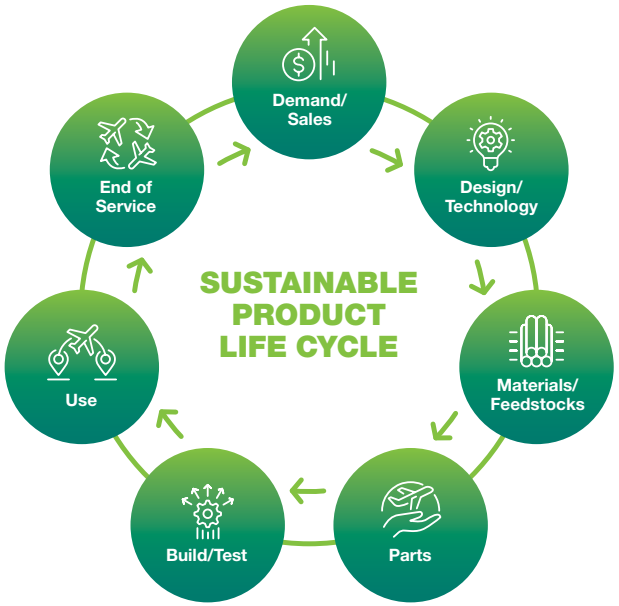
1. This relevance is based on the sector classification and Scope 3 emissions application of the Climate Action 100+ Net Zero Company Benchmark v1.1 (March 2022).

Sustainable Product Life Cycle

The Key to Boeing's Product Life Cycle

From a customer's initial request to the creation of the aircraft or product to its use and eventual retirement, every stage along the way can be engineered with Earth and all its inhabitants in mind. This is Boeing's life-cycle approach: Design, build and deliver each of its products and services with the highest standards of safety, quality, integrity and sustainability. Digital solutions span many aspects of our product life cycle.

Boeing's product life-cycle strategy centers around creating a product with its own end of life taken into account. These examples demonstrate how Boeing technology is sustaining and maintaining fleets and accelerating product life-cycle development from design to production to use — all the time supporting customer's efficiency needs.



Read more about the Sustainable Product Life Cycle here.

The MQ-25 T1 test asset refuels an F/A-18 Super Hornet for the first time. (Boeing photos)

Materials and Use

MQ-25 Stingray: Mission and Design Efficiency Leads the Way

Efficiency is a founding principle for the MQ-25 Stingray, the U.S. Navy's first uncrewed aerial refueler. Instead of diverting F/A-18 Super Hornets from their fighter mission to refuel other carrier aircraft, the MQ-25 — with its highly efficient commercial engine and lightweight composite skins — will be able to stay in the air much longer, using little fuel itself to complete its mission.

"Efficiency is part of the mission, but it's also part of our design and production philosophy," said Jim Young, Boeing MQ-25 Chief Engineer. MQ-25 is a digitally native aircraft, with 3D models of every structure and system. Even their performance is modeled, which helps predict operations and sustainment.

"Using the models — and validating them over more than 120 flight-test hours and three refueling flights — has accelerated our confidence in this design and helped us identify improvements much earlier than traditional programs," said Young.

The efficiency thread continues through MQ-25 production, where advanced manufacturing techniques eliminate the need for drilling during aircraft assembly.

"As a result, our mechanics are holding digital tablets — not drills — that guide the assembly process," Young said. "It's not only safer and more ergonomic, but also helps increase quality and reduce foreign object debris. It's all part of supporting the Navy's air wing of the future."

Uncrewed Aircraft Manufacturing Technology Rises to Sustainability Challenge

Safe and sustainable manufacturing technology developed for Boeing's commercial airplanes has transitioned to improving efficiency of the Airpower Teaming System (ATS), the first military aircraft designed, developed and manufactured in Australia in over 50 years.

"Our team leverages several advanced technologies, including additive manufacturing, to produce the aircraft structures in the most efficient manner," said Phil Crothers, Affordability and Technology Integration, ATS.

Many of the resulting flyaway parts are made from composites — carbon-fiber reinforced plastic combined with an advanced resin-infusion process — which are much lighter than the more commonly used metallics, thereby reducing fuel use and emissions. Excess and end-of-life composite material can be recycled into laptop cases, car parts, rail-car undercarriages and other products.

"To evaluate the benefits of these measures and to uncover where we can strive further, we are conducting research to address the full life-cycle impact of materials used in the aircraft," said Crothers. "This is an essential part of our commitment to sustainability transparency."

Airpower Teaming System manufacturing underway at the Boeing Melbourne, Australia site. (Boeing photo)

Using Data to Improve C–17 Readiness and Reduce Costs

Deploying predictive technology in the area of fleet sustainment is a maintenance game-changer. Through the Boeing Aircraft Data Reasoner (ADR), C-17 airlifter service teams are identifying concerns before they become issues.

Starting in 2015, the ADR system has been a part of operations for several of Boeing's global defense customers.

"We have seen proven results utilizing the data collected by the ADR," said Brian Hansen, C-17 Digital Engineering Services Manager at Boeing. "The ADR enables customers to be proactive with data rather than waiting for something to happen."

The ADR records over 65,000 parameters while executing approximately 36,000 sensor-based algorithms. The derived analytics enable data-driven decisions for C-17 operations by minimizing unscheduled repairs, reducing troubleshooting times and supporting crew training and safety initiatives, all while aligning with CBM+ principles.

Hansen said the ADR has also positively affected sustainability results by saving customers over 4.5 million pounds (2 million kilograms) of fuel and over 28,000 maintenance hours over a six-year time frame. In addition, the ADR provided over 1,100 maintenance recommendations and mitigated over 17,000 non-mission-capable hours.

"We owe it to our customers to keep the C-17 flying as efficiently as possible. ADR enables us to do just that," said Hansen.

An aviator with the Royal Australian Air Force performs system checks on a C-17 with Boeing's Aircraft Data Reasoner. (RAAF photo)

Emissions Reporter: Air Astana Case Study

With a complex emissions-reporting process and a busy operation, employees at Air Astana, the flag carrier of Kazakhstan, used to spend hours manually sorting data and filling out forms to report on their annual carbon dioxide emissions for every single flight to ensure accurate reporting.

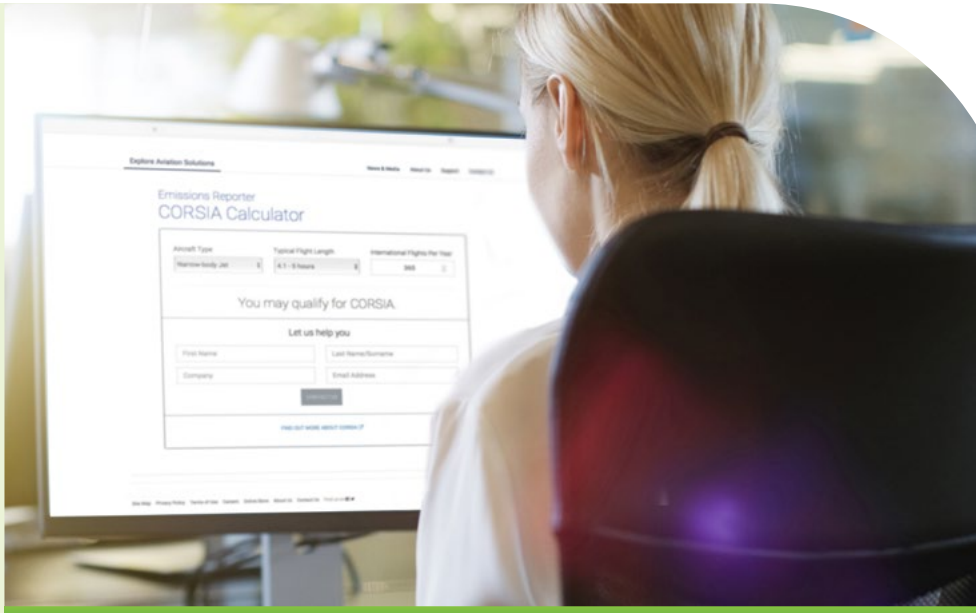
Since adopting the Boeing Emissions Reporter (ER) solution in 2021, all that has changed.

Air Astana required a solution that automates the data sorting process and generates ready-to-use reports with clearly displayed results, reducing time spent on repetitive tasks that could otherwise be used for deeper analysis or completing other projects. ER's tailored and automated data validation capabilities enable Air Astana to easily pinpoint all types of possible errors and address them more quickly.

This smart application is part of the Boeing Flight Data Analytics suite of fuel efficiency solutions that identifies broad opportunities to reduce fuel consumption, costs and emissions.

Key Benefits of ER Tool

- A single tool to meet multiple carbon-reporting requirements
- Accurate and automated report generation
- Secure, flexible and easy-to-use web-based tool
- Rapid implementation (one to two weeks)
- Airline has full administrative control
- Efficient data validation and auditing process
- Enables compliance with legislative requirements
- Complements Boeing Fuel Dashboard solution



"Using Emissions Reporter, I no longer have to manually sort flights and fill out the report forms. It saves time and lets me focus on my other projects and tasks."

Darya Sotskova, Operations Analyst, Air Astana

Boeing's Emissions Reporter enables customers of all sizes to easily report their carbon emissions and improve fuel efficiency by identifying broad opportunities to reduce fuel consumption, costs and emissions. (Stock photo)

Innovation and Clean Technology

The societal benefits of aerospace are immense. It protects and connects people, enables livelihoods and cargo, provides humanitarian relief and national security and allows for human exploration of space. In 2019, 4.5 billion people flew, $7 trillion in goods were exchanged and the aviation industry supported 87.7 million jobs (Aviation Benefits Beyond Borders). Air Transport Action Group analysis predicts that by 2050 air travel will carry over 10 billion passengers a year, support 180 million jobs and generate nearly $9 trillion in economic activity.

The aviation industry also created 900 million tons of carbon emissions in 2019, which is about 2% of the world's emissions and ~12% of transportation's emissions. As we look to create a sustainable future of flight, we are united with our customers and governments around the globe in establishing bold climate change goals and supporting civil aviation's ambition to achieve net-zero carbon emissions by 2050.

To ensure the benefits of aerospace remain available for generations to come, we have work to do. We've made great strides since the beginning of the jet age, but our greatest accomplishments are yet to come. In creating the future of flight, Boeing is focused on four key areas to decarbonize aviation. Throughout this section of the report, you will find examples of how Boeing is putting this strategy to work.

Fleet Renewal
Each new generation of airplanes significantly reduces CO2 emissions

Operational Efficiency
Operate and fly more efficiently leveraging data and technology

Renewable Energy
Transition to renewable energy solutions in our operations and our products and services

Advanced Technology
Incorporate advanced digital tools, airframe, propulsion and systems technology and energy solutions

Etihad Airways has utilized 787s to test new, sustainable operations for more than three years. (Etihad Airways photo)

Stan Deal, Boeing Commercial Airplanes President and CEO (left), and Tony Douglas, Group Chief Executive of Etihad Aviation Group, in November 2021. (Boeing photo)

Boeing and Etihad — Pioneering Sustainability Solutions Together

Boeing and Etihad Airways extended their partnership in November 2021, focusing on improving the efficiency of navigation and flight operations. The agreement builds upon the Etihad-dubbed "Greenliner program" that has utilized 787s to test new, sustainable operations since the original partnership launched in 2019.

In past years, an Etihad 787 has served as the Boeing ecoDemonstrator platform, while the airline has been at the forefront of incorporating SAF into its fleet. This includes using SAF on 787 delivery flights and revenue flights, where Etihad has pioneered new approaches in developing a more sustainable network.

Boeing and CSIRO Launch New 5-Year, AU$41M R&D Program

Boeing and CSIRO, Australia's national science agency, have launched a five-year, AU$41 million ($29.5 million) research-and-development program to boost manufacturing safety and productivity and to improve aviation sustainability.

Building on a 32-year partnership, the program aims to advance sustainable aviation solutions that deliver on the great challenge of lowering emissions while expanding the global economy.

Projects include accelerating satellite communications and other space-related technologies and enhancing Boeing's digital twin and model-based engineering capabilities. These initiatives will further improve the operational efficiency and sustainability of Boeing's commercial, government and defense products.

The Rolls-Royce 747 flying test bed carried out a flight with one Trent 1000 engine running on 100% SAF. (Rolls-Royce photo)

David Pook (left), Boeing Research & Technology Melbourne Centre Manager, and Shravan Singh, CSIRO Senior Technical Adviser to Boeing. (Boeing photo)

Advancing Sustainable Aviation Fuel

Managing the various blends of sustainable aviation fuel (SAF) for Boeing's commercial operations is no easy feat for fuel truck driver Terry Garl. Garl is a vital part of the Boeing Licensed Transportation fueling team that coordinates the storage and distribution of three different types of SAF at Seattle's Boeing Field — the 100% SAF, a 50/50 blend (half SAF, half conventional jet fuel) used for the Boeing ecoDemonstrator program and a 30/70 blend previously reserved for delivery flights by customer request, in addition to various types of conventional jet fuel.

When Boeing signed a deal to purchase 2 million gallons of SAF from EPIC Fuels for its commercial airplane operations for 2022, the largest announced SAF procurement by an airframer, Garl's job became a bit easier.

"We used to have to take our SAF deliveries and segregate them into a fuel truck," said Garl. "Now with this large of a shipment, it goes straight into the fuel farms at each site. So any airplane being fueled at Boeing Field could get SAF in its tank."

By 2030, all commercial airplanes Boeing delivers will be capable to fly on 100% SAF — that was the commitment we made in January 2021. Keeping that promise requires steady progress and strong partnerships. Boeing is forging ahead with other stakeholders to advance this drop-in replacement for conventional jet fuel.

A key challenge of SAF is creating commercial-scale production of price-competitive supplies. Producing this level of SAF globally will require significant investment and policy changes. To address these challenges, Boeing announced a partnership with SkyNRG on scaling the availability and use of SAF globally, including an investment in SkyNRG's SAF production project.

A big thumbs-up from the 100 passengers who flew on the United Airlines 737-8 from O'Hare International Airport in Chicago to Ronald Reagan Washington National Airport in Virginia on Dec. 1, 2021, with 100% SAF in one engine. (United Airlines photo)

Sustainable Aviation Fuel Development is a Team Sport

No one entity can decarbonize aviation alone, so Boeing provided technical support for SAF flights with two customers on board 737 MAXs and for Rolls-Royce's 100% SAF flight with its 747 test bed. In December, several Boeing leaders boarded a United Airlines 737-8 in Chicago for the first-ever passenger flight on 100% SAF in one engine. They flew to Washington, D.C., on 500 gallons (1,900 liters) of 100% SAF in one engine and an equivalent volume of conventional jet fuel in the other.

"United continues to lead from the front when it comes to climate change action," United CEO Scott Kirby said on the day of the historic flight. "Today's SAF flight is not only a significant milestone for efforts to decarbonize our industry, but when combined with the surge in commitments to produce and purchase alternative fuels, we're demonstrating the scalable and impactful way companies can join together and play a role in addressing the biggest challenge of our lifetimes."

SAF advancements in aviation can happen on the ground as well. In late 2021, Boeing entered into a long-term partnership with the NASA Langley Research Center to test SAF emissions. The two aerospace pioneers joined forces to collect and analyze SAF emissions on the ground from the 2021 Boeing ecoDemonstrator, an Alaska Airlines 737-9. The testing included a flight with 100% SAF in one engine and conventional jet fuel in the other. The data collected thus far is consistent with the expectations of the benefits of the renewable fuel. Working with our industry partners, Boeing is conducting the research not only to make our commercial airplanes 100% SAF-capable, but also to better understand all aspects of SAF and how it will improve aviation sustainability.

The 2021 Boeing ecoDemonstrator soars above Washington state's San Juan Islands. (Boeing photo)

> We've set a goal of achieving net-zero carbon emissions by 2040, but we can't do it alone. That's why partners like Boeing and programs like the ecoDemonstrator are so critical – to innovate and test new technologies and to work together to ensure they're implemented and scalable. We are grateful for Boeing's visionary leadership in setting a sustainable course for aviation."
>
> **Diana Birkett Rakow, Alaska Airlines Senior Vice President of Public Affairs & Sustainability**

Alaska Airlines Partners with Boeing ecoDemonstrator to Innovate

The 2021 Boeing ecoDemonstrator leaned into the program's mission — innovate, collaborate, accelerate. Since 2012, the ecoDemonstrator has tested over 200 technologies in a flying laboratory, enabling engineers to gain knowledge faster. Our collaboration with airlines, suppliers, government agencies and academia allows those learnings to be shared. Both accelerate the path to products, services and production for a more sustainable aerospace future.

"One of the best parts the ecoDemonstrator program is sharing the innovative work we do with others," said Program Manager Rae Lutters. "Collaboration with industry partners is a key component of the program and Boeing's strategy to decarbonize aviation. Alaska Airlines was instrumental in making this year's program a success."

Boeing and Alaska Airlines partnered on the 2021 ecoDemonstrator program using one of the airline's new 737 MAX airplanes. In addition to its test flights, it flew to Anchorage, Alaska; Washington, D.C.; San Francisco; Glasgow, Scotland; and the Dubai Airshow — all on a 50/50 blend of sustainable aviation fuel (SAF) and conventional jet fuel, which is the current maximum allowable blend for commercial flights.

"Alaska Airlines flies to some of the most beautiful places in the world and we care deeply about ensuring the communities, lands and natural habitats where we live and fly are strong and healthy for the long haul," said Diana Birkett Rakow, Alaska Airlines Senior Vice President of Public Affairs & Sustainability.

In 2021, 20 new technologies were tested that can reduce fuel use and noise, enhance safety and operational efficiency, and incorporate more sustainable materials. Those technologies include an acoustic lining inside the engine nacelle that reduces noise. Boeing and Alaska Airlines partnered with the National Oceanic and Atmospheric Administration on sensors that measure greenhouse gas emissions. Engineers conducted ground tests on a fire-extinguishing agent intended to replace Halon 1301. We also tested cabin interior sidewalls made from recycled carbon composite fiber, a by-product of our own production. The sidewalls can reduce noise and waste going to landfills and are lighter than the panels they replaced.

This was the eighth airplane to serve as a flying test bed for the ecoDemonstrator program, which will celebrate its 10-year anniversary this year.

Propelling the Future of Aerospace

The future of flight will take into account the latest digital design, test and production tools, airframe, and propulsion and systems technology. Boeing is at the forefront of informing the future of aerospace and understanding how alternative power and energy solutions such as hydrogen and electrification systems will apply across market segments and missions.

We need green hydrogen — generated using electrolysis powered by renewable electricity — to produce SAF. Beyond using hydrogen for SAF, the industry is considering using it as an energy carrier on board an aircraft. Boeing has innovated with hydrogen and fuel cell applications onboard aircraft for over 15 years. We have developed insights through five flight demonstration programs with crewed and uncrewed aircraft using hydrogen fuel cells and combustion engines. We also have substantial experience with hydrogen and especially cryogenic storage systems from our space and launch business.

Performing Under Pressure

In late 2021, Boeing and the Defense Advanced Research Projects Agency (DARPA) conducted testing on a new type of large, fully composite, linerless cryogenic fuel tank, designed and manufactured by Boeing. It passed a series of burst tests at NASA's Marshall Space Flight Center, validating the tank's composite materials and fabrication methods and signifying that the technology is mature, ready and reliable for use in aerospace vehicles — in space and in the air.

While this particular cryotank was designed for space applications, the lessons learned from this testing campaign, along with our previous hydrogen demonstration flight-test programs, mark an important leap in materials technology for sustainable aviation. The 30-foot (9-meter) tank has the capacity to hold 16,000 gallons (60,600 liters) of liquid hydrogen, the energy equivalent of about 3,700 gallons (14,000 liters) of Jet A fuel, which is typical of a regional jet-sized airplane. Using hydrogen aboard a commercial aircraft can eliminate in-flight carbon emissions, which has exciting potential. But it also introduces a number of important engineering and life-cycle sustainability challenges that Boeing continues to actively assess. Read more here.

This cryotank designed for space has the capacity to hold 16,000 gallons (60,600 liters) of liquid hydrogen, the energy equivalent of about 3,700 gallons (14,000 liters) of Jet A fuel, typical of a regional jet-sized airplane. (Boeing photo)

Top: (Wisk photo) Bottom: (GE Aviation photo)

Advancing Electric Aerospace

Our work in electric aviation is equally exciting. Boeing and Wisk are developing a two-passenger eVTOL air taxi which has flown more than 1,500 successful test flights since 2017. Boeing recently invested $450M in addition to previous funding, establishing Wisk as one of the most well-funded Advanced Air Mobility companies in the world. Wisk's 6th generation eVTOL aircraft will represent a first-ever candidate for the certification of autonomous, all-electric, passenger-carrying aircraft in the U.S.

In early 2022, GE Aviation selected Boeing and its subsidiary Aurora Flight Sciences to support flight tests of its hybrid electric propulsion system using a modified Saab 340B aircraft and CT7-9B turboprop engines. The flight tests are in support of NASA and its Electrified Powertrain Flight Demonstration project.

We're taking these learnings and incorporating them into a series of flight concept developments to understand the art of the possible in sustainable technology applications across markets.

Innovating Safe Return to Travel

Through the Confident Travel Initiative, Boeing has been working with airlines, industry organizations, infectious disease experts and behavioral specialists around the world to innovate and enhance health safeguards and develop new solutions. As air travel resumes and restrictions ease around the globe, the health and safety of those who fly is always our top priority. We continue working across the industry to enhance health safeguards and develop new solutions.

Read more https://www.boeing.com/confident-travel/

Operations

Section Key Topics

- Enterprise Quality
- Climate Action
- Environmentally Responsible Operations
- Environmental Compliance and Biodiversity
- Responsible Supply Chain
- Data Privacy and Information Security

Mechanic Thipp Bounyasith, 737 Preflight, performs an airworthiness inspection in Renton, Washington. (Boeing photo)

Operations

Responsible and Resilient

It's not just what we do — it's also how we do it. We strive to operate sustainably and engage transparently on behalf of our customers and stakeholders.

Goal: Sustainable Operations
Maintain a net-zero future for Boeing manufacturing and work-site operations through conservation, renewable energy and responsible offsets

Partner with the supply chain for responsible business practices

2021 Highlights

Manufacturing and other facilities achieved
NET-ZERO
CO_2e emissions again in 2021

Since 2017,
Boeing has **reduced greenhouse gas emissions** from our operations[1] by **25%**

Achieved 28%
renewable electricity in 2021
on our path to 100% in 2030

Received
EPA ENERGY STAR Partner of the Year Award for Sustained Excellence

72,000
employee actions
taken in a month in support of the Battle of the Buildings conservation program

Boeing spent
$4B+ with small and diverse suppliers

Supplier Code of Conduct implemented

1. Greenhouse gas (GHG) emissions from our operations is calculated using GHG emissions from the energy (electricity and natural gas) consumption at Boeing's Core Metric Sites. Core Metric Sites represent the majority (70%) of Boeing's GHG footprint from operations. This is an absolute reduction in GHG emissions; no normalization has been applied.

Enterprise Quality

Start with Quality to Finish with Quality: Early Involvement Sets the Stage

The best way to achieve quality is by incorporating it into products and services from the beginning of design. Quality fuels sustainability by evaluating and improving efficiency, reducing waste and improving management processes.

For years, design and proposal teams in Phantom Works — a Boeing organization that innovates the next generation of aerospace and defense solutions — have been using Early Quality Involvement (EQI) methods and tools to ensure that quality is incorporated from the start. This helps to identify quality issues, concerns and risks that may surface and to prevent them from happening.

With Phantom Works' success, teams are replicating EQI across Defense, Space & Security (BDS). BDS Total Quality is driving EQI methods and tools across BDS and integrates them into the Enterprise Standard Gated Process by which development programs are shepherded from initial concepts through deployment. All BDS Total Quality employees are asked to take a 10-minute trainer on EQI.

The EQI Toolset lays out a series of checklists and templates for program managers and others to follow as they pass through the first stages of new-product development, helping them identify crucial issues that could crop up and plan ahead for them, said Clark Rucker, Manager of BDS Integrated Quality. Rucker served on the Phantom Works Quality team when EQI was designed.

"The intent of EQI, then and now, is not to correct quality issues, but to avoid them in the first place," Rucker said.

Strengthening System Drives Higher Quality in Building and Delivering Products

The Boeing Quality Management System (QMS) is an established business management system meant to ensure customer, regulatory and business requirements are met. In 2021, the company continued to strengthen its system through application of the One Boeing Production System and lean principles, using new industry assessment tools and operating in alignment with a Safety Management System (SMS). QMS and SMS work together and are built into the company's organizational policies, processes, procedures and resources. They are intended to enable teams to make a perfect copy — conforming and safe — every time. The Boeing QMS is based on AS9100, the internationally recognized and premier aerospace QMS standard. Like other major aerospace manufacturers, Boeing flows down AS9100 certification and compliance requirements to its suppliers to build a quality foundation that enables effective and efficient processes that meet multiple customer, regulatory and business requirements.

Boeing St. Louis employee Keith Gallup works on the MQ-25 uncrewed aerial refueling aircraft. (Boeing photo)

When I put safety and quality first, I enable performance.

I am responsible for the quality of my work.

I believe all defects are preventable.

Quality is our customers' fundamental expectation.

Each teammate's contributions to high-quality performance directly relate to the safety and quality of all products and services Boeing delivers.

Design Engineer Rupinder Aulakh checks 737 MAX electrical system architecture in Renton, Washington. (Boeing photo)

Getting it Right the First Time – Safe and Clean

The Boeing Production System (BPS) is the framework by which Boeing uses standards and problem solving to continually improve its production system. The goal is zero safety incidents, zero foreign object debris (FOD) and 100% first-pass quality. Teammates can expect a safe place to work, the right tools, training and materials, timely feedback and recognition, and ways to raise concerns and get the help they need.

By learning, adopting and maturing the BPS standards across our global enterprise, we foster the predictability and discipline necessary to operate with excellence and deliver results with first-time quality. As we apply lean principles and take steps to eliminate waste in every aspect of our business, we need to determine not only how to solve the problems that arise, but also how to prevent them from happening again.

BPS contributes to sustainability by improving efficiency, reducing waste and improving management processes.

Climate Action

Boeing achieved net-zero carbon emissions at manufacturing and other facilities and in business travel in 2021 for the second consecutive year. (Boeing photo)

Tackling Climate Change in Our Operations

Climate risks and opportunities inform our path toward sustainable aviation both in our products and in how we build them. More information — including identification of risks and opportunities and discussion of the mechanisms Boeing uses to manage risks and realize opportunities — is included in our annual CDP (formerly Climate Disclosure Project) report. Information about oversight, assessment and management of climate-related risks and opportunities is provided on Page 15 of this report.

To achieve our goals related to the climate and to greenhouse gases (GHG), we actively monitor emissions, fuel use and energy efficiency. We have set targets for performance in each of these areas. As part of Boeing's robust business continuity program, we also monitor the length and severity of business interruptions. The scope of monitoring includes damaging weather, natural disasters, pandemics and public health crises. It helps us understand how to increase resiliency in light of a changing climate.

Net-Zero at Manufacturing and Facilities

Boeing achieved net-zero carbon emissions at manufacturing and other facilities and in business travel in 2021 for the second consecutive year, by expanding conservation and renewable energy use while securing verified offsets for the remaining greenhouse gas emissions.

Since 2008, Boeing has voluntarily and transparently reported greenhouse gas emissions from our operations in annual CDP disclosures. In 2021, CDP awarded Boeing a climate change grade of B; C for water security.

Boeing's greenhouse gas emissions reduction strategy is managed within the Global Enterprise Sustainability organization. The management team tracks performance, procures energy, and initiates energy and emissions reduction projects across the company. This organization is well positioned to set strategic goals for greenhouse gas emissions reduction and energy conservation and to play an active role in achieving these goals.

Enterprise greenhouse gas emissions from operations are calculated after the conclusion of the reporting year. However, the emissions from natural gas and electricity usage at Core Metric Sites are calculated and monitored on a monthly basis through the use of utility bills and are continuously validated and updated throughout the reporting year. The emissions factors for these energy sources are validated at least annually and updated when appropriate following guidance from the World Resources Institute GHG Protocol. The energy data and emissions factors are verified as part of a third-party limited assurance process.

Enhancing Nature to Benefit Humans Globally

In 2021, we maintained manufacturing and other facilities net-zero emissions, specifically Boeing-controlled emissions and business travel. The company is continuously increasing renewable energy use, conserving resources and using carefully selected offsets to sustain this achievement.

Boeing chooses offsets that meet rigorous requirements set by Verified Carbon Standard (VCS), American Carbon Registry or Gold Standard. Many projects leverage the power of nature and are designed for the protection and restoration of forests. Boeing looks for "co-benefits" or the positive effects that a policy or measure aimed at one objective might have on other objectives. For example, forest health may be the main objective, and while other benefits extend to supporting local communities and protecting biodiversity.

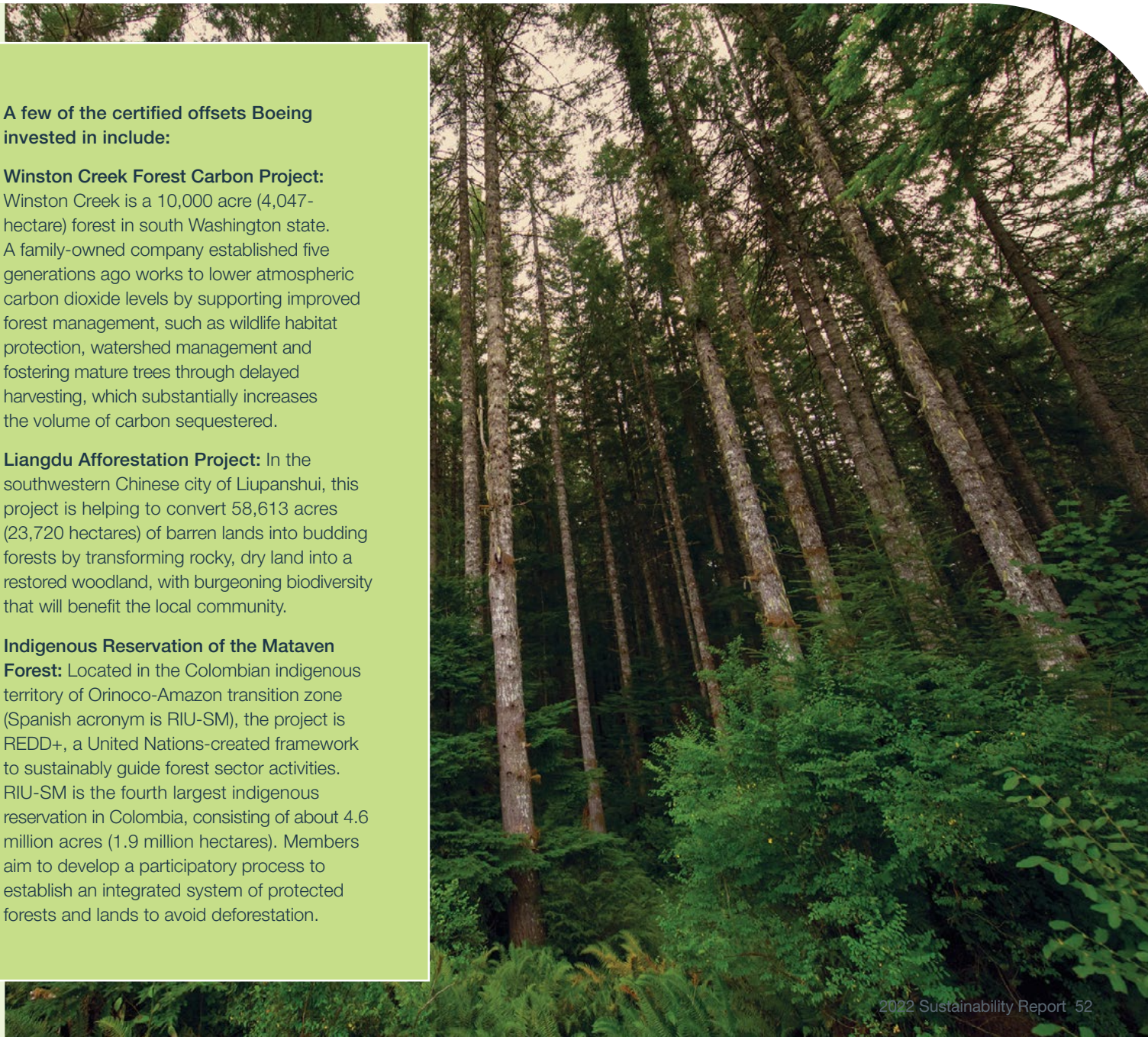
Since 2020, Boeing has been an official partner of the Aviation Carbon Exchange (ACE), a partnership between the International Air Transport Association (IATA) and XCHG company, CBL Markets. ACE is a centralized marketplace for airlines and other stakeholders to buy offsets eligible for the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).

A few of the certified offsets Boeing invested in include:

Winston Creek Forest Carbon Project: Winston Creek is a 10,000 acre (4,047-hectare) forest in south Washington state. A family-owned company established five generations ago works to lower atmospheric carbon dioxide levels by supporting improved forest management, such as wildlife habitat protection, watershed management and fostering mature trees through delayed harvesting, which substantially increases the volume of carbon sequestered.

Liangdu Afforestation Project: In the southwestern Chinese city of Liupanshui, this project is helping to convert 58,613 acres (23,720 hectares) of barren lands into budding forests by transforming rocky, dry land into a restored woodland, with burgeoning biodiversity that will benefit the local community.

Indigenous Reservation of the Mataven Forest: Located in the Colombian indigenous territory of Orinoco-Amazon transition zone (Spanish acronym is RIU-SM), the project is REDD+, a United Nations-created framework to sustainably guide forest sector activities. RIU-SM is the fourth largest indigenous reservation in Colombia, consisting of about 4.6 million acres (1.9 million hectares). Members aim to develop a participatory process to establish an integrated system of protected forests and lands to avoid deforestation.



Winston Creek Forest Carbon Project is located in western Washington in the shadow of Mount Rainier. (Winston Creek photo)

Environmentally Responsible Operations

Addressing GHG, Conserving Energy and Water, Reducing Solid and Hazardous Waste

Boeing invests in sustainable operations to drive our extremely high levels of industrial performance at our manufacturing sites. As we demonstrate progress on our goals for 2030, our previously set 2025 targets will act as a milestone to guide our actions. All of our 2025 goals are absolute targets and are not indexed to production levels or growth. Our progress on these 2025 goals is shown in the table and reflects how our performance was affected by changes associated with occupancy and operations during the COVID-19 pandemic in 2021.

The aspirational 2030 goals/targets encompass more of our company and reach further than ever before. The companywide goals shown are converted to site-level goals annually. Site performance is assessed throughout the year to monitor challenges and opportunities to share best practices. In 2021, we continued to invest in the conservation projects that advance our operational environmental goals.

Performance Area[1]	2025 Goals Versus 2017	2021 Progress Toward 2025 Goals[3]	2030 Goals
Greenhouse Gas Emissions	Reduce emissions by 25%[2]	**25% reduction** Greenhouse gas emissions were 10% under plan primarily due to reduced production activities and procurement of renewables.	• Net-zero emissions[4] • 55% GHG reduction from 2017 • 100% renewable electricity
Energy	Reduce energy[5] consumption by 10%	**12.2% reduction** Despite cold northwestern U.S. weather in December, energy continued to be under plan overall for the enterprise, ending the 2021 reporting year at 9.8% under plan. Remote working conditions; reduced production activities; and conservation gains contributed.	• 10% energy-intensity reduction from 2025
Water	Reduce water withdrawal by 20%	**26.4% reduction** Water consumption was 18.9% under plan in 2021, primarily due to remote working conditions and reduced production.	• 5% reduction from 2025
Solid Waste	Reduce solid waste to landfill by 20%	**53% reduction** Solid waste was steady at 44% under plan in 2021. Reduced production rates and work-from-home operations throughout 2021 drove this metric.	• 30% reduction in waste produced from 2025 • Over 90% diversion from landfill or incineration • Zero solid waste where applicable at major sites
Hazardous Waste	Reduce hazardous waste by 5%	**28% reduction** Hazardous waste was 16% under plan in 2021. Key events, including improvements in treatments lines, were positive. Dealing with unused expired materials is an issue.	• 5% hazardous waste reduction from 2025

1. Operational goals shown are absolute targets and not indexed to production levels or growth. 2021 performance was affected by changes associated with occupancy and operations during the COVID-19 pandemic, as well as conservation and changes in how Boeing purchases energy. The targets were established against a 2017 baseline. The 2025 goals will act as a milestone to guide actions and progress to the 2030 goals.
2. The 2025 GHG reduction goal was set with an operational boundary of the Core Metric Sites, which represent the majority (70%) of Boeing's operations, and includes emissions from electricity use and natural gas.
3. The 2030 GHG reduction goal is set with an operational boundary of The Boeing Company, and includes all Scope 1 and Scope 2 emissions.
4. The net-zero achievement covered Scope 1 and Scope 2 emissions for all manufacturing and work sites within the company's operational control as well as Scope 3 – Business Travel.
5. Energy includes natural gas, other fuels and electricity.

Sustainable Fix Keeps 52 Miles of Nylon Out of Landfill

At the Boeing EnCore Interiors (BEI) facility in Seal Beach, California, technicians noticed a sticky situation on the shop floor: During 737 floor panel fabrication, the double-sided tape used to create a vacuum seal during curing was difficult to work with and damaging tooling.

The materials used in the process were also single use, so over 11,000 rolls of tape and 52 miles (84 kilometers) of nylon were making their way to the landfill each year.

“We knew we needed to find a solution that was better for our tooling and the environment,” said David Brink, General Manager of the facility.

Alongside Boeing Research & Technology, the BEI team researched, tested and implemented a new design with a reusable silicone bag and nonadhesive zipper seal that doesn’t damage tooling.

The sustainable solution keeps 8.7 tons (7.9 tonnes) of waste out of the landfill and saves an estimated $175,000 annually in material costs. There are also ergonomic benefits, as technicians no longer have to peel the double-sided tape off the tooling.

“Oftentimes a new project improves one area at the sacrifice of another for the greater good,” Brink said. “Implementing the reusable bag was a win on all fronts: financially, ergonomically and environmentally.”

BEI is a Boeing subsidiary that supplies cabin products for new production and retrofit on Boeing and non-Boeing airplanes.

Boeing EnCore Interiors layup technicians Alberto Nieto Garcia (left) and Bang Nguyen laying out a silicone bag as part of the 737 floor panel fabrication process. The new reusable bagging system is expected to save an estimated $175,000 annually in material costs. (David Brink photo)

Employee Acts Reduce Waste, Energy and Water Use

Boeing celebrated Earth Day on April 22 by kicking off its Battle of the Buildings (BoB) competition, an annual event since 2018. BoB engages employees to conserve resources at manufacturing and office work sites.

In 2021, employees at 163 sites in 39 countries participated by taking over 72,000 60-second actions to benefit the environment over a month. Boeing Munich emerged as the winner.

“The Battle of the Buildings really speaks to what so many of our employees care about,” said Maria Bethke, conservation team lead in Munich. “We were able to reduce waste and conserve energy by taking small yet meaningful, steps.”

Top 60-second actions included turning off lights, HVAC, electronics and equipment; sorting waste properly; refusing to use single-use plastic; and picking up foreign object debris and litter onsite. Conservation leaders used Boeing’s production system boards to engage manufacturing employees.

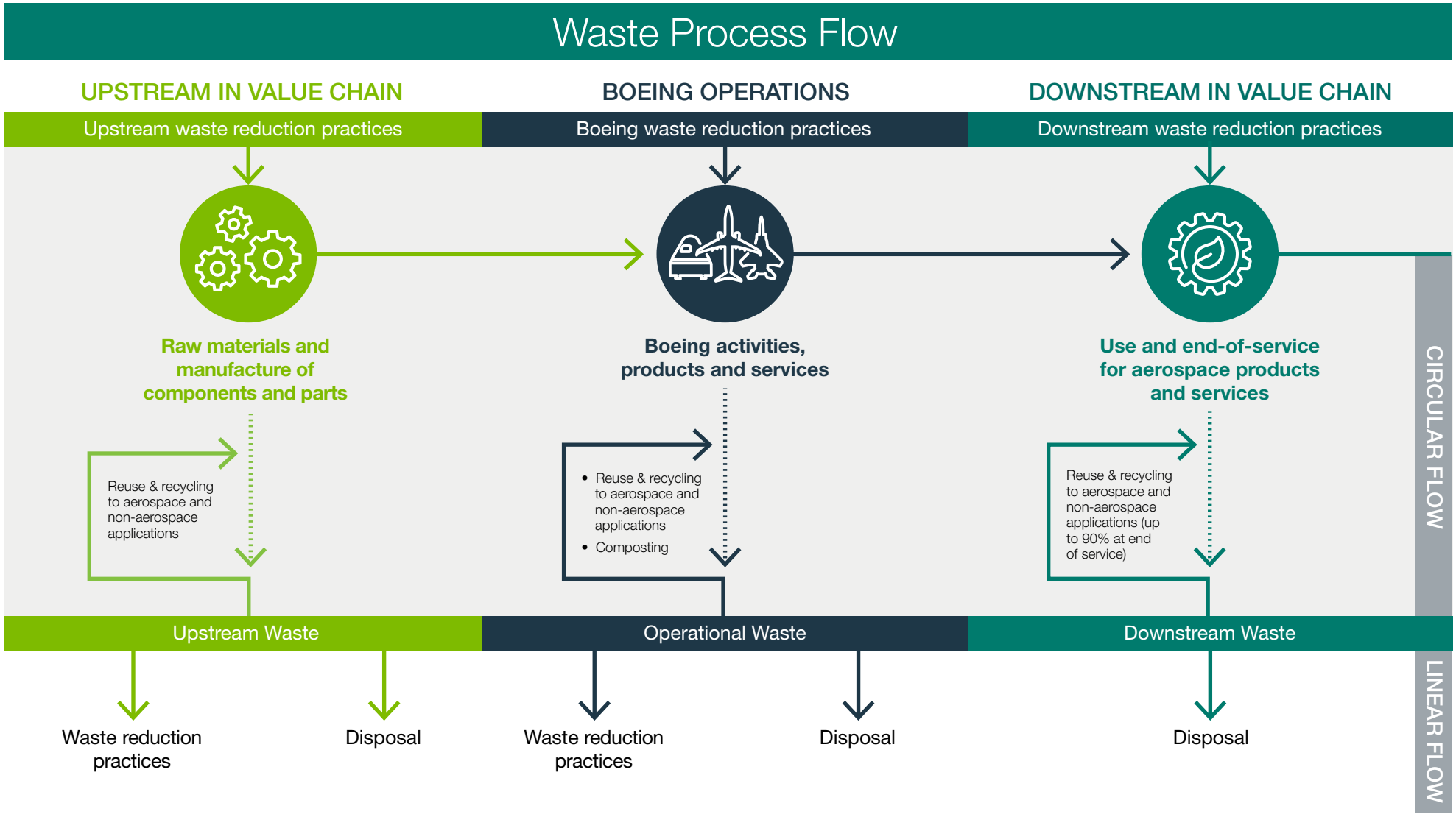
Other Boeing sites that excelled in the competition included employees from St. Louis; Mesa, Arizona; San Antonio, the Spares Distribution Center in Seattle and Boeing Distribution in Melbourne, Australia.

Conservation Manager Crystal Frost adapted the program from the U.S. Environmental Protection Agency (EPA), after Boeing participated in a 90-day pilot in 2016 and reduced energy use by 26 percent in several Renton, Washington, buildings.

60seconds FOR THE ENVIRONMENT

Circling Back Waste: Reduce, Redesign and Recapture

This diagram reflects Boeing's transition to a circular economy across our value chain. A circular economy reduces material use, redesigns materials to be less resource-intensive, and recaptures "waste" as a resource to manufacture new materials and products.



Environmental Compliance and Biodiversity

Environmental Compliance is Good for Business, People and the Planet

A fundamental element of Boeing's environmental policy is to maintain regulatory compliance. When noncompliance is identified in our environmental management systems, Boeing evaluates and analyzes the incident, implements corrective actions and shares process improvements to build the learning into the organization. Boeing had one federal reportable spill in 2021. A hot water boiler overflowed into the Boeing South Carolina campus storm drainage and pond retention system. The boiler water contained sodium nitrite, which is a rust inhibitor.

One penalty greater than $10,000 ($16,450) was incurred in 2021, in connection with a hazardous waste inspection at Kennedy Space Center in Florida. Corrective actions have been identified and implemented to prevent recurrence. There were no allegations of waste release to the environment.

Biodiversity is the Essence of Nature

Boeing owns thousands of acres of habitat across five locations that are being protected or restored. Each habitat is actively managed and maintained by site employees, nonprofit organizations or contract biologists. For some locations, additional agreements and monitoring are in place to ensure all legal, contractual and certification requirements are met.

Each habitat is certified by the Wildlife Habitat Council (WHC), with three certified at the Gold level. The WHC's certification program is the only voluntary sustainability standard designed for broad-based biodiversity enhancement and conservation education activities on corporate landholdings. Recertification is required every two years.

Boeing also partners with local nongovernmental and governmental organizations and third parties that vary by location, depending on project needs such as restoration and community educational activities.

Habitats Certified by Wildlife Habitat Council

Location	Size
Boeing Plant 2 in Seattle, WA	5 acres of marine habitat
Boeing South Carolina Keystone/ Fairlawn Project in North Charleston, SC	3,923 acres, including 2,025 acres of wetland
Emery Landfill in Wichita, KS	56.5 acres, including 35 acres of grassland
Pollinator Prairie in Olathe, KS	1.5 acres of pollinator gardens
Santa Susana in Canoga Park, CA	2,400 acres of diverse habitats

Giving Protected Species Safe Passage Over 10-Lane Highway

As part of our commitment to sustainability — with a focus on environmental stewardship and biodiversity — Boeing donated $1 million to the National Wildlife Federation in February 2022 for the Wallis Annenberg Wildlife Crossing in Los Angeles.

The crossing, with ceremonial groundbreaking in April 2022, will span 10 lanes of U.S. Highway 101 to reconnect an integral wildlife zone near Boeing's Santa Susana Field Laboratory. The wildlife crossing will be critical to saving the threatened local mountain lion population from extinction. Boeing has a history of partnership with the National Wildlife Federation, including donations for the wildlife crossing campaign, a long-term mountain lion study in the Santa Monica Mountains and educational outreach.

"We thank Boeing for their long-term partnership and support in helping to make this project a reality, as well as for their donations to our important community-based work, like Wildlife 2 Watts and building schoolyard habitats," said Dirk Sellers, Chief Development Officer, National Wildlife Federation.

National Park Service collared mountain lion (P-62) and two of her cubs at Boeing's Santa Susana Field Laboratory. (Roy Dunn, Cougarmagic, photo)

An artist's rendering of the Wallis Annenberg Wildlife Crossing, which will span the 101 Freeway in Los Angeles when complete. (Rendering courtesy of National Wildlife Federation)

Championing This Idea: 'Commit to Do What You Can'

Environmental scientist Kristin Marshall is Boeing's 2021 Environment Champion, an annual award given to an employee who exemplifies leadership by improving environmental performance and inspiring others to do the same.

Throughout her career, Marshall has been inspired by one of President Theodore Roosevelt's favorite sayings: "Do what you can, with what you've got, where you are." She encourages everyone at Boeing to act to ensure environmental sustainability.

Some examples of Marshall's environmental commitment include leading the installation of an award-winning rain garden and working with a team to implement automated environmental monitoring at paint booths.

"Many of the sustainability and environmental challenges we face are definitely huge in scale, but everyone at Boeing can — and should — contribute to the solution," Marshall said. "You can figure out what single action you are going to take with the options you have and take action today, tomorrow and in the future."

Kristin Marshall, Boeing's 2021 Environment Champion (Boeing photo)

Shining a Focus on Safety, Sustainability and Clean Tools

In 2021, motivated teams of engineers and technical experts advanced the safety and sustainability of automated laser tool cleaning, earning a Boeing Technical Replication Award for their efforts. Employees at Boeing Auburn in Washington pioneered the work, while the Composite Wing Center in Everett, Washington, advanced the concept and colleagues at Boeing Canada Winnipeg expanded it even further.

Conventional tool cleaning uses manual sanders or chemical processing, which adds ergonomic, safety and environmental concerns. Laser ablation nearly eliminates those risks. The teams' solution has the following benefits:

- Eliminates 100% of ergonomic/repetitive risks from manual sanding
- Removes 100% of hazardous chemicals from de-painting
- Reduces hazardous waste by 90%
- Reduces worker exposure to hazardous chemicals
- Reduces damage to tooling as a result of oversanding

> "We implemented this technique on tools to get our arms around how to use lasers in a manufacturing setting. Once we gained confidence, we graduated to other aircraft applications."
>
> **Kay Blohowiak, Senior Technical Fellow, Boeing Research & Technology**