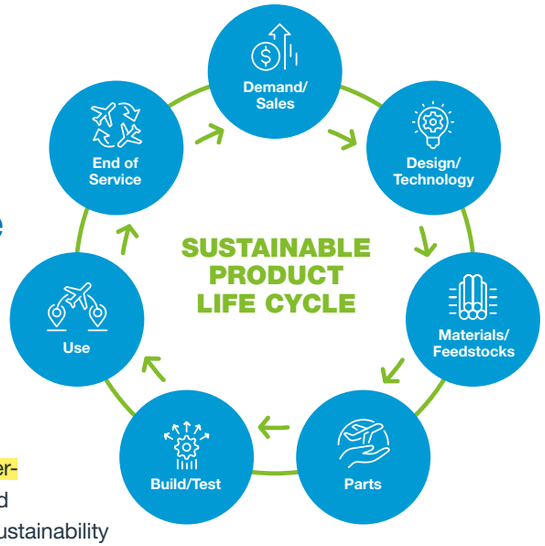
Sustainable Product Life Cycle

"Across Boeing Defense, Space & Security, we believe that operational effectiveness and sustainability are two sides of the same coin. A more sustainable, lower cost, energy efficient defense enterprise is a more operationally effective one. That's why we have a history of partnering with our customers to pioneer the use of sustainable aviation fuels and are leveraging digital design and production to reduce our carbon footprint throughout the life cycle of our products"

Ted Colbert, president and CEO of Boeing Defense, Space & Security

Boeing increasingly looks at every stage of the product life cycle through a sustainability lens

We continue to evolve our approach so that our next generation of products consider the full breadth of sustainability including environmental, health, safety and human factors improvements by targeting the following seven areas:



Demand/Sales. Customers continue to demand higher-efficiency, lower emissions products. Globally, airlines and governments are increasingly accountable to emerging sustainability standards, which requires that they evaluate the life cycle of aircraft they operate.

Cascade: Boeing's data modeling and visualization tool quantifies the potential of four strategies to cut emissions, including fleet renewal, operational efficiency, renewable energy and future aircraft introduction.

Design/Technology. Boeing evaluates new product designs and technologies to determine if they are safe and sustainable by conducting an environmental life cycle assessment. We strive to evaluate new aircraft design concepts, materials and technologies early in the development process to assess how much we can reduce the risks and expenses associated with its environmental footprint. We aim to examine whether more sustainable approaches exist for new product design, considering everything from selecting materials and parts to improving manufacturing processes and in-service operations to recycling the plane.

SAF-Compatible Commercial Airplanes: Boeing is collaborating with suppliers to achieve our goal that all commercial airplanes we deliver by 2030 will be compatible with SAF.

Materials/Feedstocks. Boeing examines coatings that improve our planes' aerodynamics, fuel efficiency and longevity, in part by using more parts that can be repurposed. Lighter composite materials permit us to design more fuel-efficient aircraft like our primarily composite 787 Dreamliner. Boeing simultaneously supports research into regenerative feedstocks that can replace constituents that are nonrenewable resources. For example, the bio-based regenerative feedstocks from forestry waste and pine root oil that we are researching at Villanova University may one day be integrated into the epoxy resins used in our interior parts, enabling us to reduce the feedstock-related emissions from extraction and refining compared to petrochemical-based feedstocks. Meantime, we recycle the metals used in manufacturing our aircraft back into our supply chain, reducing reliance on virgin materials.