

# The Future Of Flight

How do you create the most advanced flight technologies while reducing carbon emissions? GE Aviation and Safran Aircraft Engines have done it for nearly 50 years through CFM International, a 50-50 joint venture that continues to revolutionize the aviation industry.

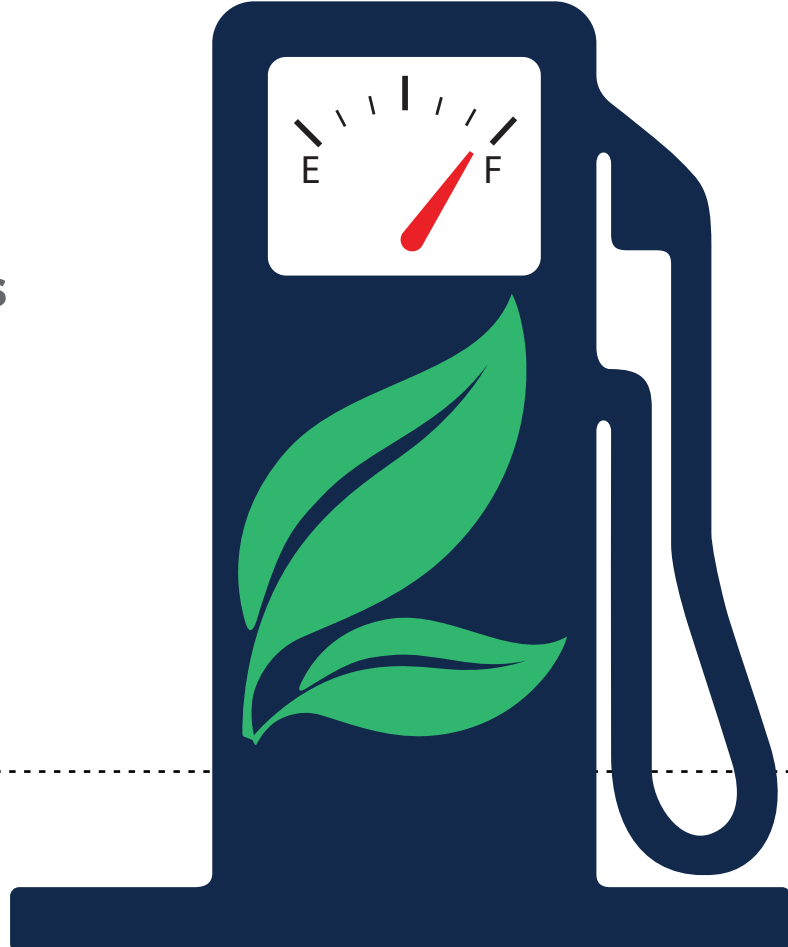
By extending their partnership to 2050 and launching the Revolutionary Innovation for Sustainable Engines (RISE)\* program, GE and Safran will build on their decades of industry leadership to pioneer aviation's next great era.

## Sustainability

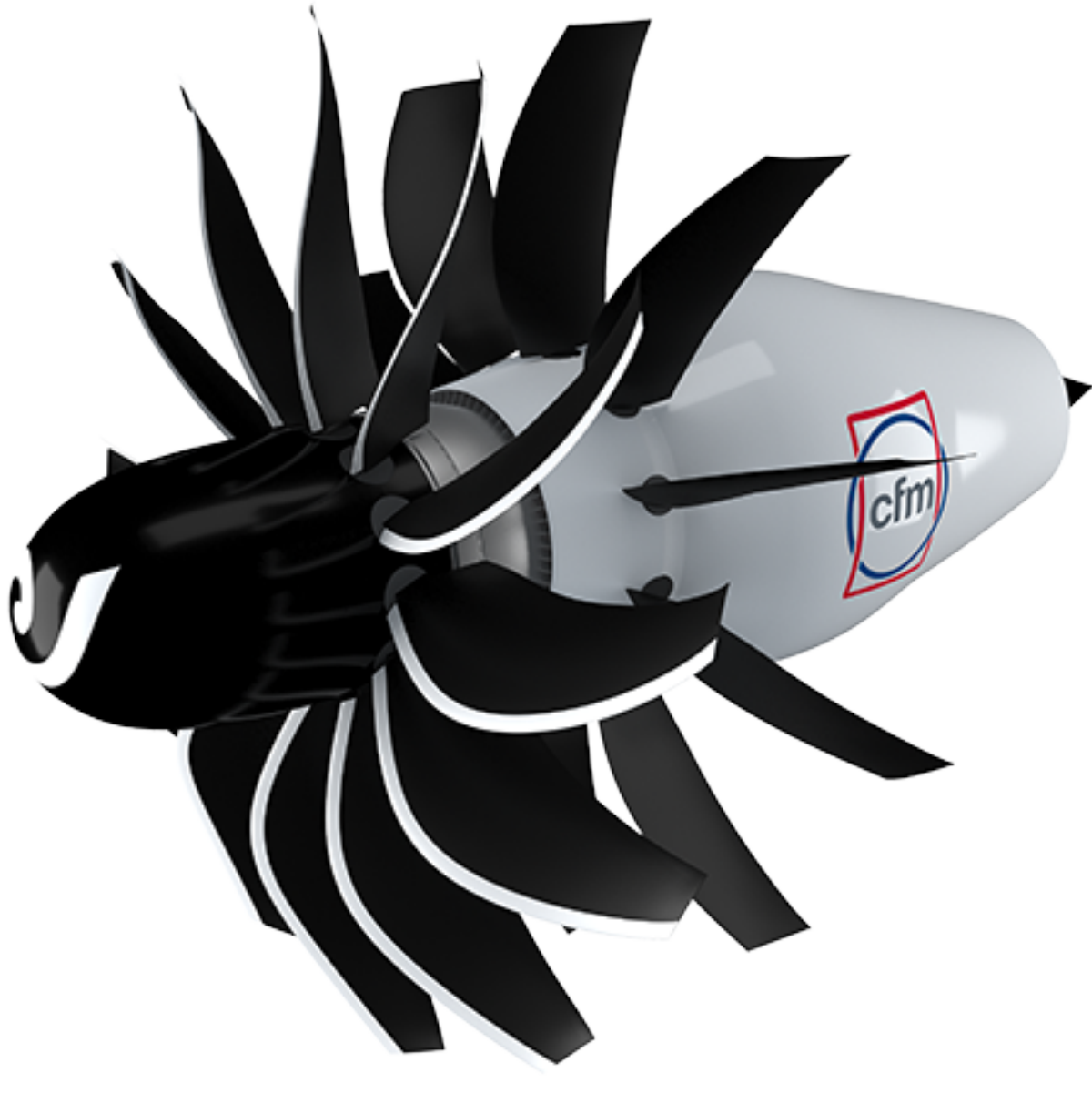
Since 1980, CFM International has reduced its engines' overall fuel consumption and CO<sub>2</sub> emissions by 40%, compared to the engines that were replaced. The RISE program will continue to prioritize a more sustainable jet propulsion future.

**20%+** targeted gains in fuel efficiency: the RISE program's central focus

**15** years' experience in biofuels strategies



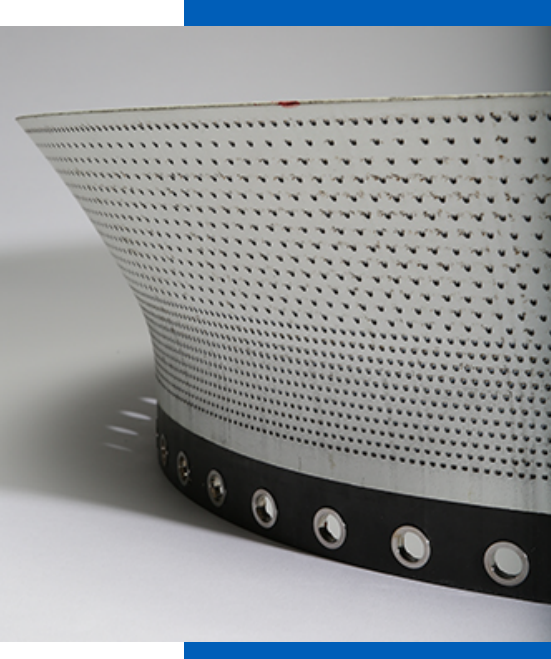
## Revolutionary Design



GE and Safran partnered on the GE36, the world's first open-rotor aircraft engine, in 1984. In 2017, Safran and Avio Aero tested an open rotor as part of Europe's Clean Sky initiative. The RISE program will continue to advance the engine's revolutionary unducted design.

## Advanced Materials

The RISE program builds on CFM engines' advanced materials and aerodynamics for the next generation of aircraft engines.



### Ceramic Matrix Composites

This mix of ceramic fibers and ceramic resin is one-third the weight of metal alloys and more heat resistant. Developed for CFM's LEAP engine, they are now also used in the GE9X.

### Additive Manufacturing

GE Aviation developed its first 3D-printed component, a fuel nozzle injector, in 2003. Additive manufacturing yields lighter, more durable parts than metal casting, and speeds up development and production.



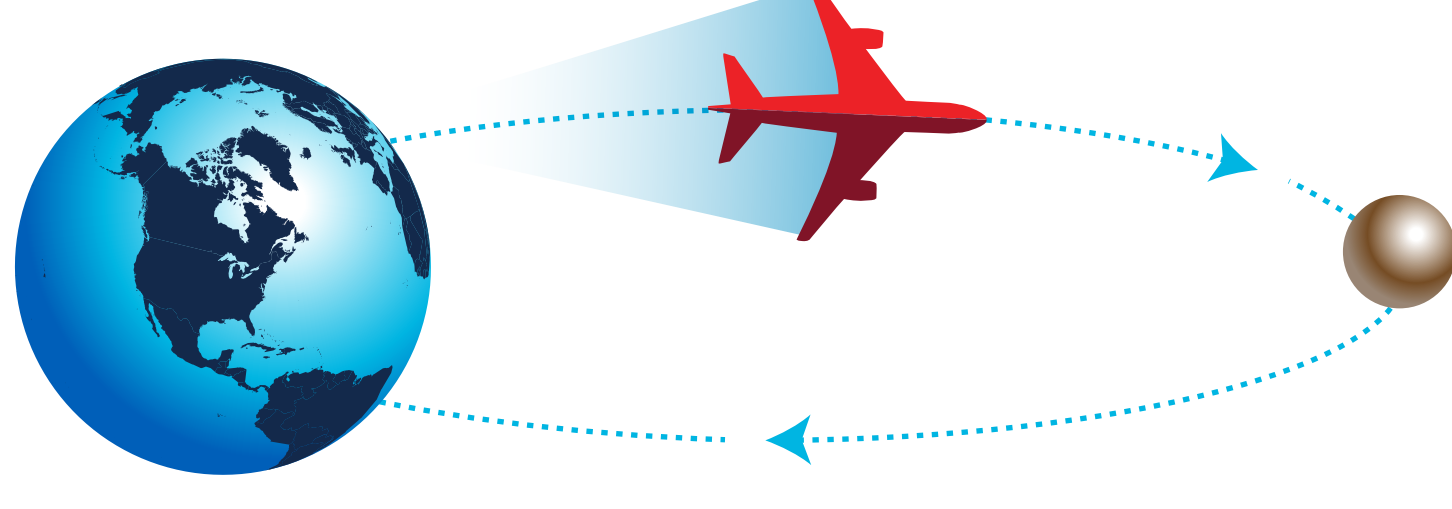
### Carbon Fiber Composites

GE originally developed the first carbon fiber composite fan blades for the GE36 UDF. These advanced blades have gone on to be used on the GE90, GENx and LEAP engines. Their artful design was displayed at the Museum of Modern Art in New York.



## Leading The Way

**1 billion** engine flight hours logged with the CFM56, the world's best-selling jet engine



**20** round trips to Pluto — the equivalent of 200 billion miles flown collectively by the world's CFM56-equipped jets

**4,500** LEAP engines — the fastest-selling jet engine — delivered to date

**>9,000** LEAP engine orders outstanding