Pratt & Whitney innovations towards achievement of the LTAG

Pratt & Whitney
An RTX Business

Dr. Graham Webb
Chief Sustainability Officer
VP, Advanced Commercial Engine Programs

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Pratt & Whitney sustainability strategy

Developing solutions to reduce the impact of our products and operations on the environment

Smarter technology

- Best-in-class GTF™ engine family
- Hybrid-electric propulsion
- Hydrogen and advanced architectures

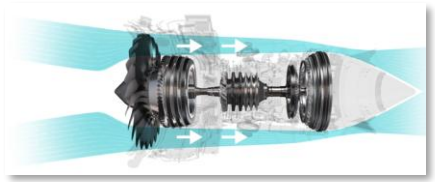
Cleaner fuel

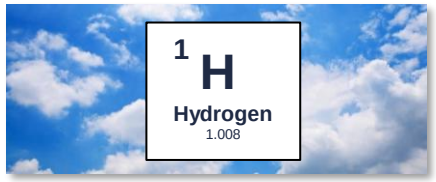
- Working towards 100% SAF compatibility
- Shaping industry specifications
- Expanding SAF availability

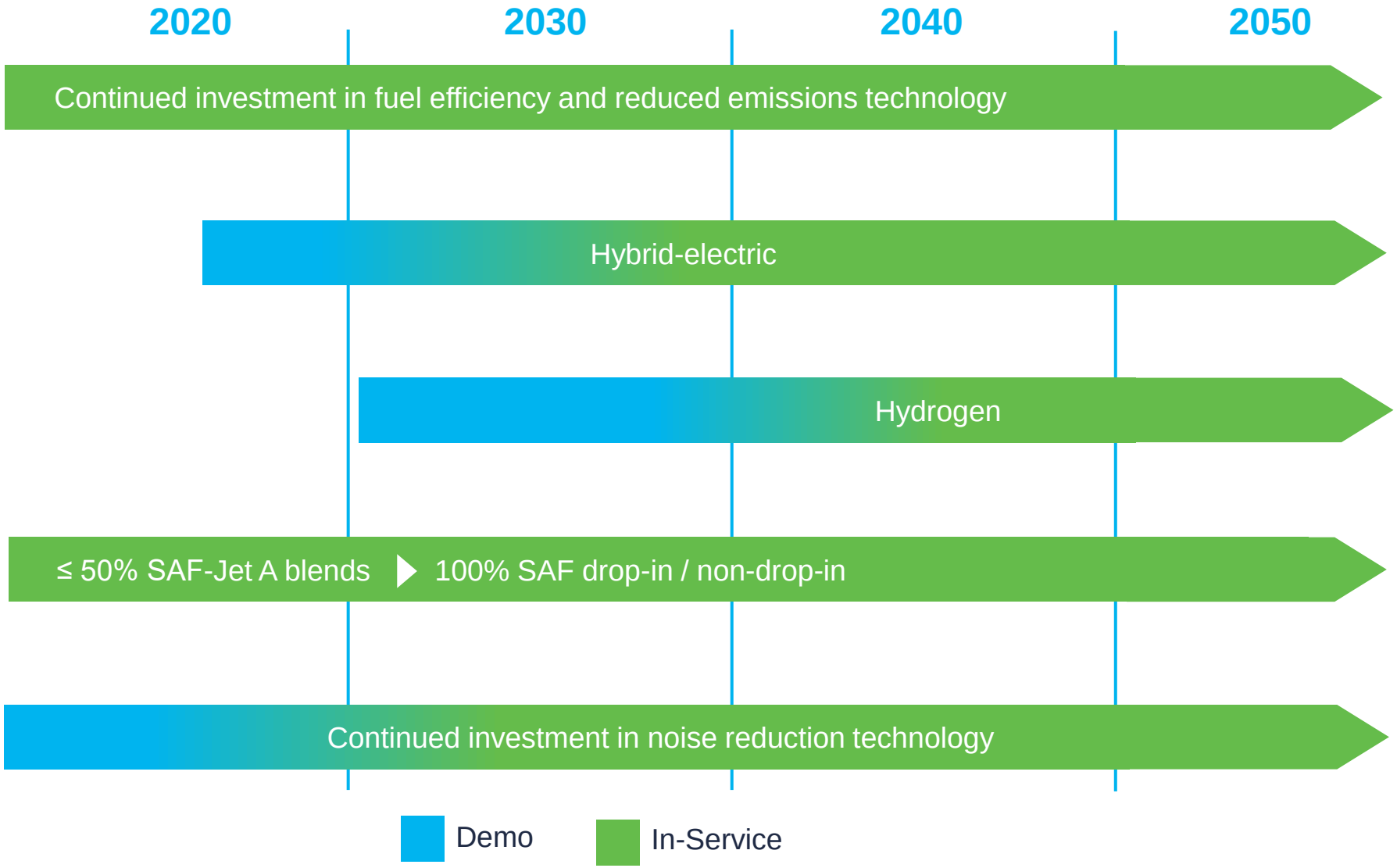
Greener business

- Continual environmental footprint reduction
- Proactive materials of concern management
- Modernized environmental manufacturing

Pratt & Whitney technology roadmap to 2050

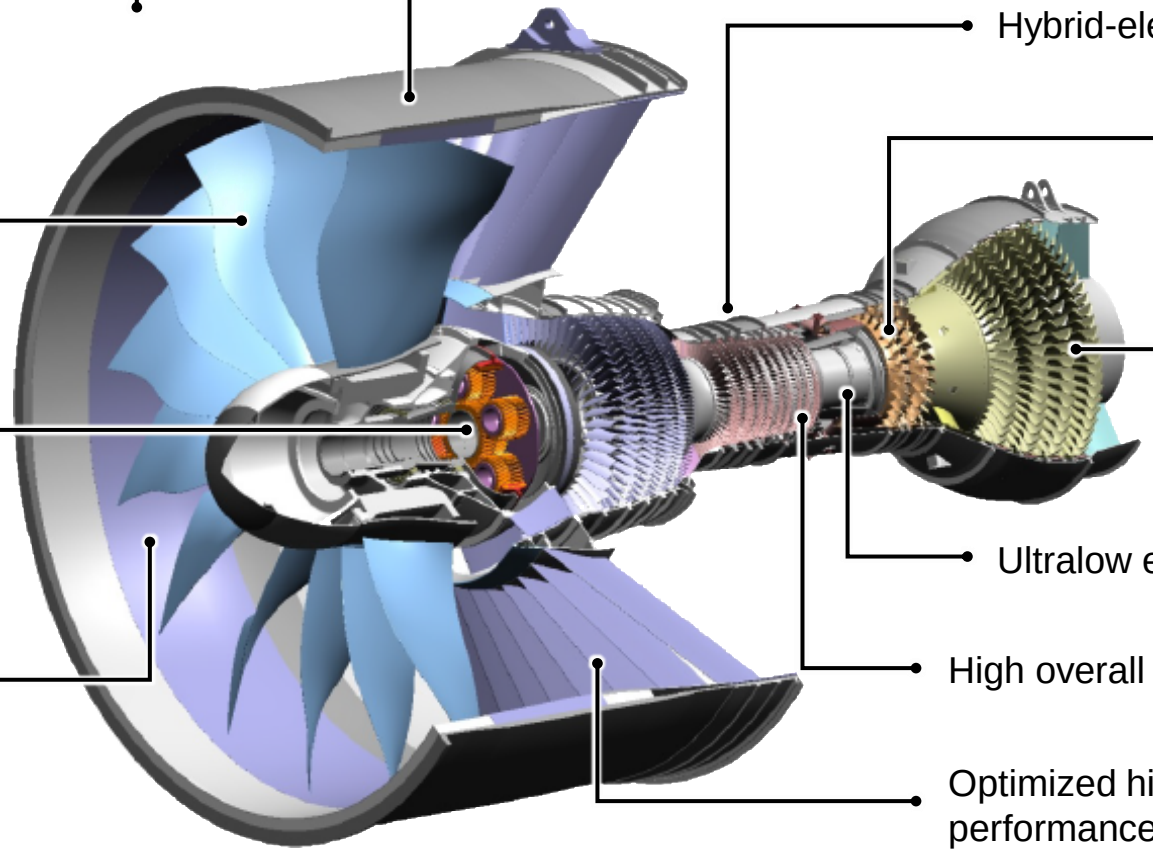






Commercial strategy – Next Gen GTF

Improve efficiency, increase durability, reduce life cycle cost



Fully compatible with 100% Sustainable Aviation Fuel (SAF)

Compact lightweight nacelle

Hybrid-electric

HPT high-temperature materials, advanced cooling technologies

Composite fan blades and case

LPT high-speed, high-efficiency

Planetary Fan Drive Gear System (PFDGS)

Ultralow emissions combustor

Dirt rejection and enhanced coatings

High overall pressure ratio, small core

Optimized high/low work split for performance and durability

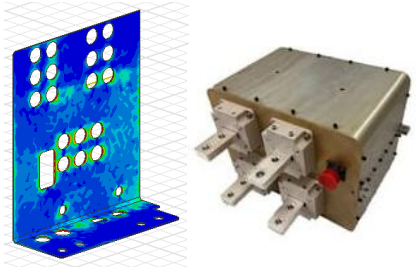
Electrification focus areas – now and beyond

Increasing specific power fundamental to delivering system-level tradeoff benefits

Current: MW-class components

High Density Electric Machines
> 9 KW/KG

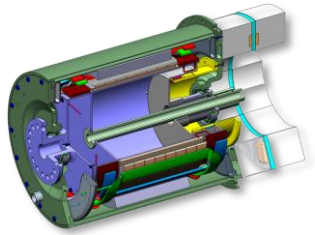
High Density Power Electronics
> 15 KW/KG



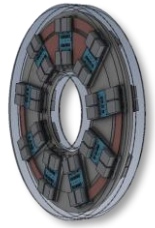
High Voltage Power Distribution & Protection
> 50 kW/kg

Energy Storage
> 250 Wh/kg

Beyond 2040: >10 MW class system



High Voltage / Cryocooled Electric Machines
> 40 KW/KG



High Voltage / Cryocooled Power Electronics
> 50 KW/KG

High Voltage / Cryocooled Cables and Protection
< 2 kg/m, > 100 kW/kg

Heat Exchangers
> 30 kW/kg

Advancing hybrid-electric propulsion

Demonstrating benefits of hybrid solutions across range of platforms

eVTOL

Program: STEP-Tech (Scalable Turboelectric Powertrain Technology)

Applications: 100 to 500+ kW

Status: Sustained system operation summer 2024

Helicopter

Program: Airbus PioneerLab

Target: +30% fuel efficiency & CO_2 reduction

Tech: PW210 1,100 shp + 2X 250 kW electric motor

Status: Flight test 2027+

Image credit: Airbus

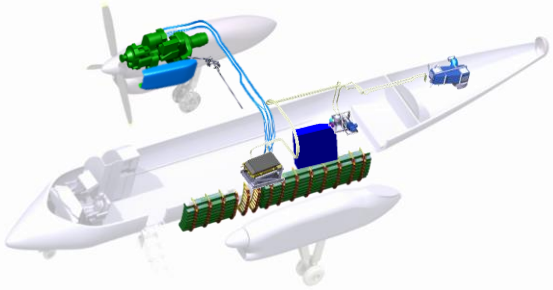
Regional

Program: Hybrid Electric Flight Demonstrator

Target: +30% fuel efficiency & CO_2 reduction

Tech: Advanced thermal engine + 50% hybrid-electric

Status: Progressing to flight test



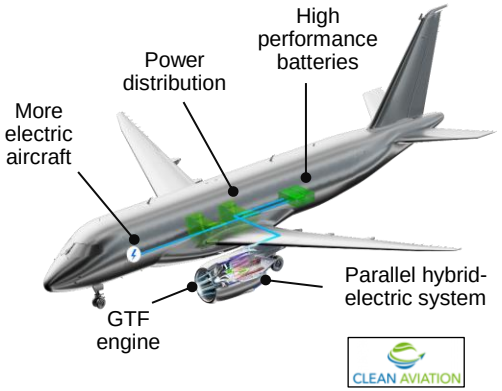
Single Aisle

Program: EU Clean Aviation

Target: +25% fuel efficiency & CO_2 reduction

Tech: Hybrid-electric GTF engine

Status: Progressing to ground test



Advancing technology through collaboration

Collaboration through public-private partnerships is key to advancing technology

NASA Sustainable Flight Demonstrator

Transonic Truss-Braced Wing (TTBW) high-wing aircraft

Powered by GTF™ engines

Targeting 30% reduced fuel consumption and emissions compared to current aircraft

First flight in 2028

FAA ASCENT Program

Rig tests to study Jet A and 100% SAF (HEFA-SPK) emissions

Assess nvPM and NOx using advanced Rich-Quench-Lean (RQL) combustor

Opportunity to advance contrail formation understanding

Partnering with University of Missouri, Aerodyne Research and EPA

Pratt & Whitney is a world leader in the design, manufacture and service of aircraft engines and auxiliary power systems, and has been revolutionizing modern flight and going beyond for nearly 100 years.

Pratt & Whitney

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