

GF Casting Solutions

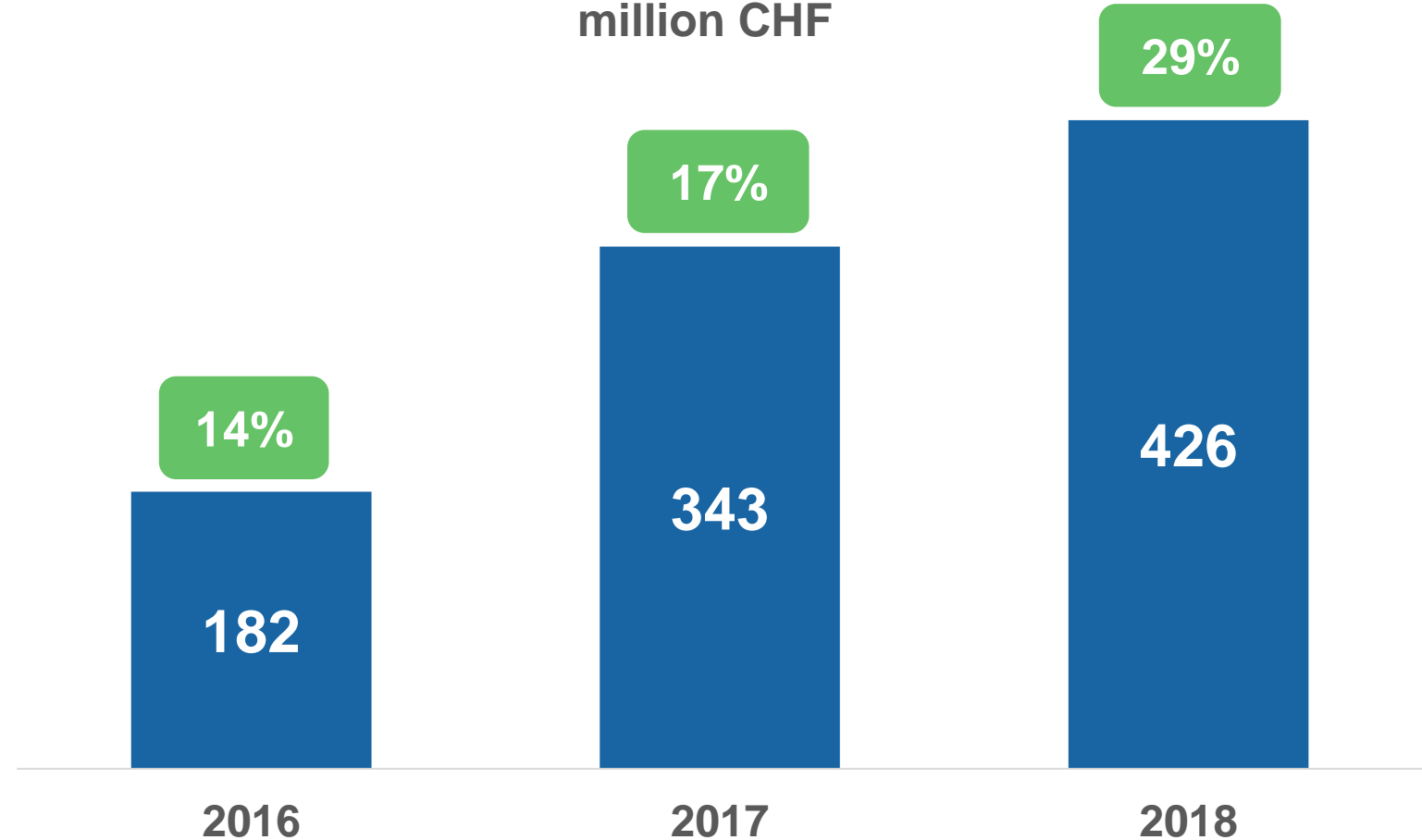
Solutions for the future of mobility

Carlos Vasto, President GF Casting Solutions
Capital Market Day 2019

Review Technology Day 2016: Future market opportunities through e-mobility



Lifetime volume of acquired e-mobility orders in million CHF

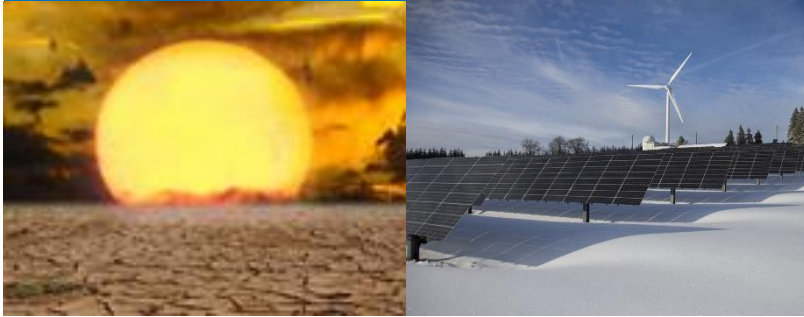


Key Market Trends

Megatrends driving our business



Climate change / CO₂-reduction



Urbanization



Mobility



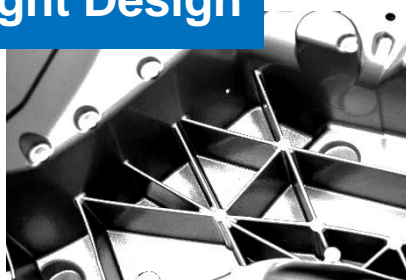
Automotive



Aerospace

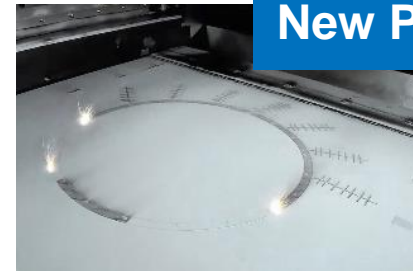


Lightweight Design



Weight reduction and reduced fuel consumption

New Production Technologies



Automotive Market Trends

Environmental regulations are among the main innovation drivers in the automotive industry



Climate change & CO₂ -reduction



130 g CO₂/km
By 2015

95 g CO₂/km
By 2021

81 g CO₂/km
By 2025

59 g CO₂/km
By 2030

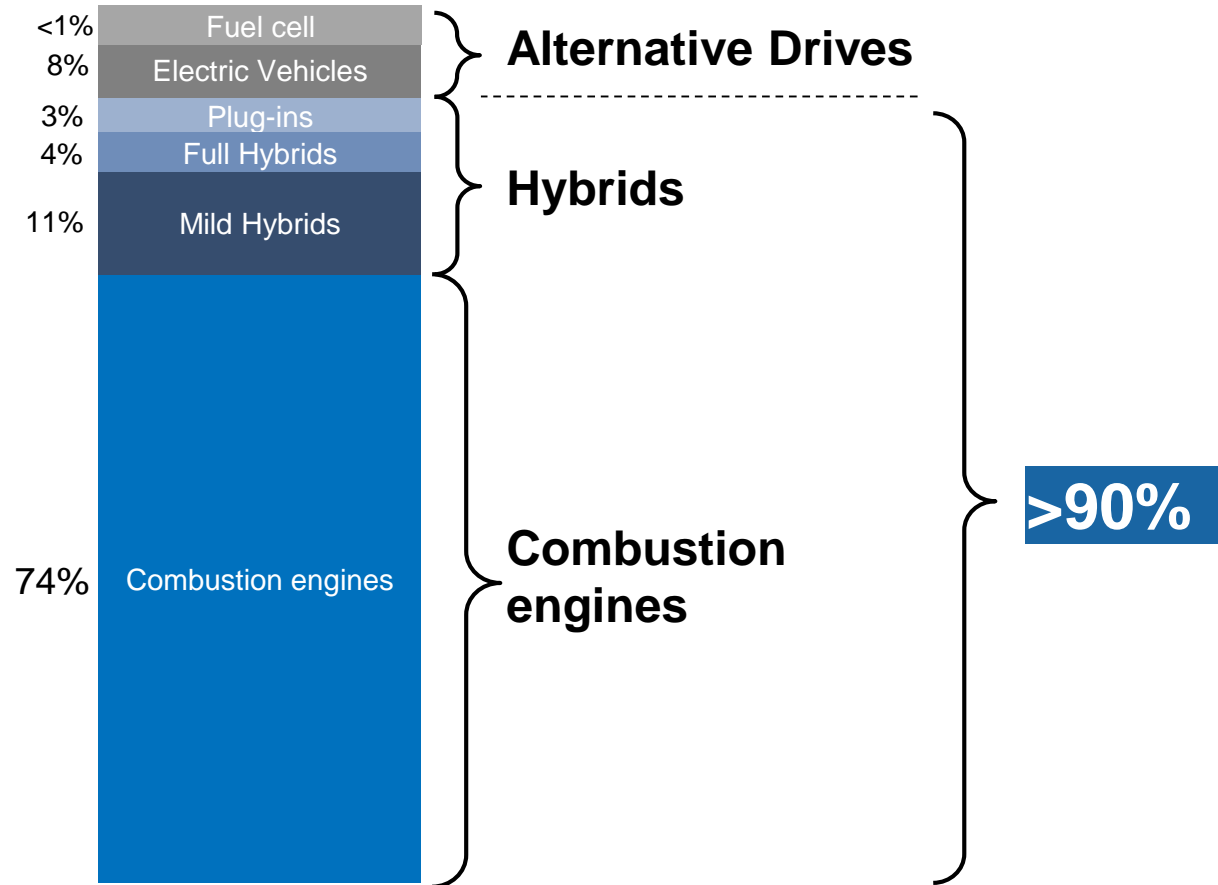
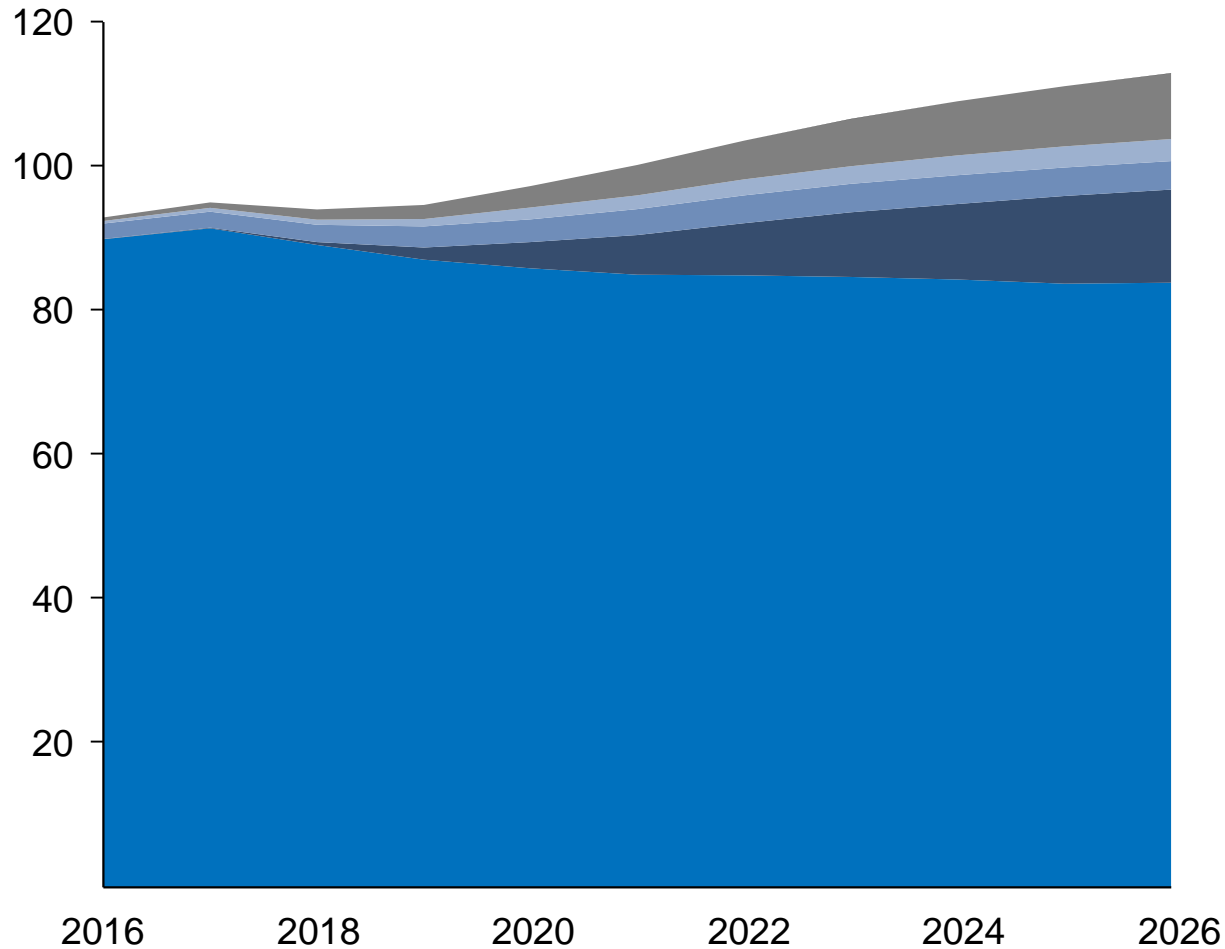
We support the UN Sustainable Development Goals with our solutions



By 2025, >90% of light vehicles are forecasted to be still powered by hybrid / combustion engines



Global LV production outlook in mill. units

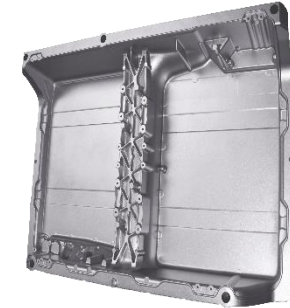
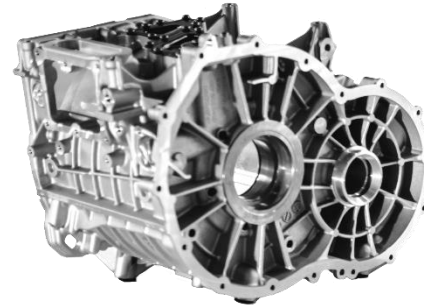


Source: LMCA 2019 Q1

GF is prepared – and already a strong partner for complex hybrid / alternative drive solutions ...



Powertrain Parts in E-Vehicles



Transmission Housing VW MEB Platform



Source: VW

E-Engine Housing Audi E-Tron



Source: Audi

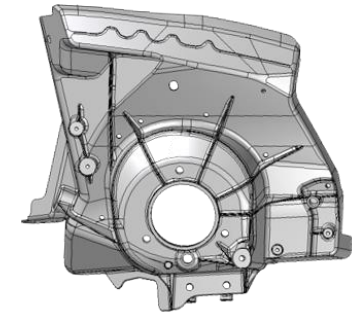
Battery Housing VW Golf GTE



Source: VW

... and for structural parts based on its lightweight expertise ...

Structural Parts in E-Vehicles



Cross Car Beam
Jaguar I-PACE



Source: Jaguar Land Rover

Rear Door Frame
Mercedes-Benz EQC



Source: Daimler

Shock Tower
Audi e-tron



Source: Audi

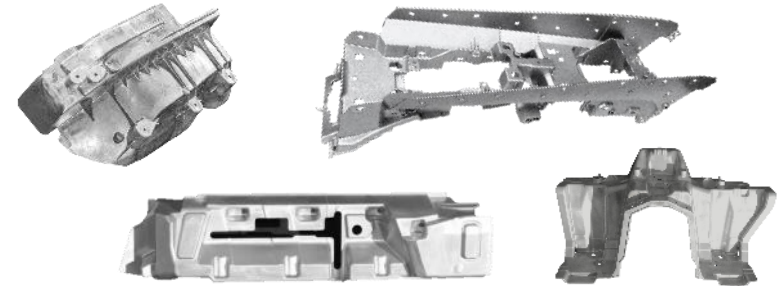
... and its global presence in all three major Automotive markets



Parts in e-vehicles – NAFTA and Asia



Upper Door Frame
US OEM



Various Structural Parts
Aiways (China)



Source: Aiways

Magnesium components up to 50% lighter than aluminum



Development
Know-How



Digital
Production
Know-How

Aerospace Market Trends

Market trends in Aerospace – geared towards eco-efficiency and alternative powertrain concepts



Eco regulations to reduce Noise, NOx, CO₂



Example: GE9X Jet Engine

Image source: GE Aviation

- 10% CO₂ than previous generation
- 45% less NOx
- 8 db reduction to Stage 5 noise emission standard

Emerging Alternative Drives



Source: ZeroAvia

Hydrogen-fueled electric powertrain

10-20 seat
500 miles



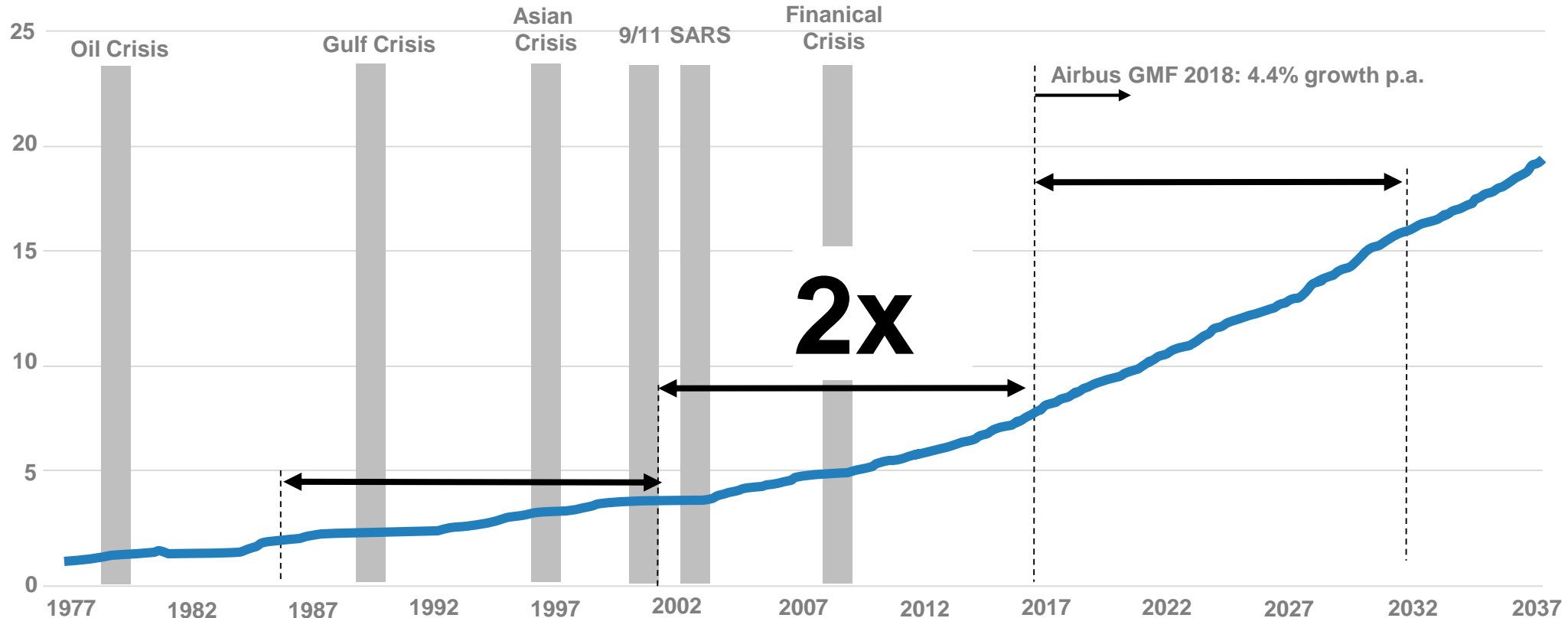
Source: Atkins: Current and emerging trends in the aerospace sector July 2018

Image source: Safran

Main driver remains the traffic increase ...

Traffic has proven to be resilient to external shocks and doubles every 15 years

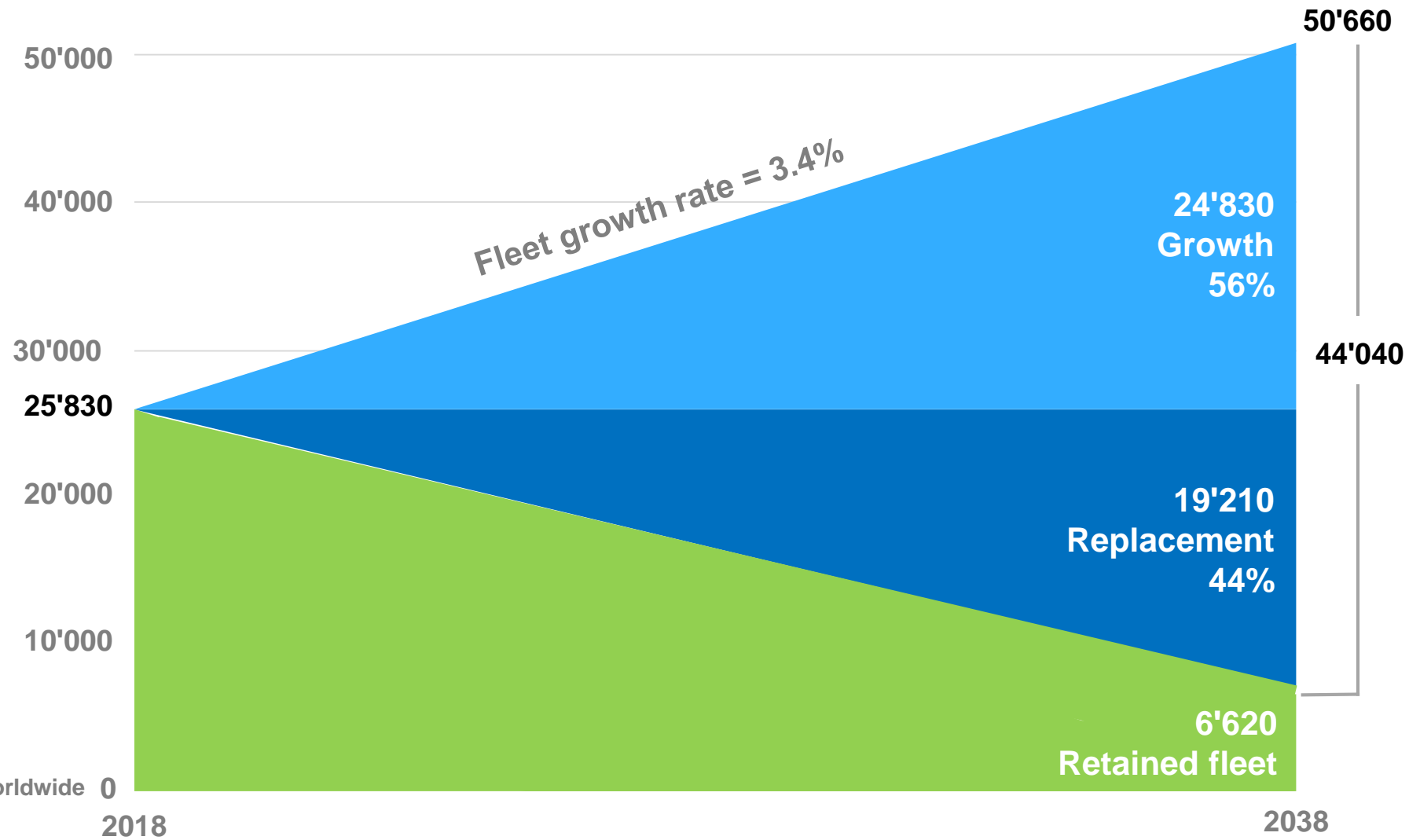
World annual traffic (trillion RPKs)



RPK = Revenue Passenger Kilometer
Source: ICAO, Airbus GMF 2018

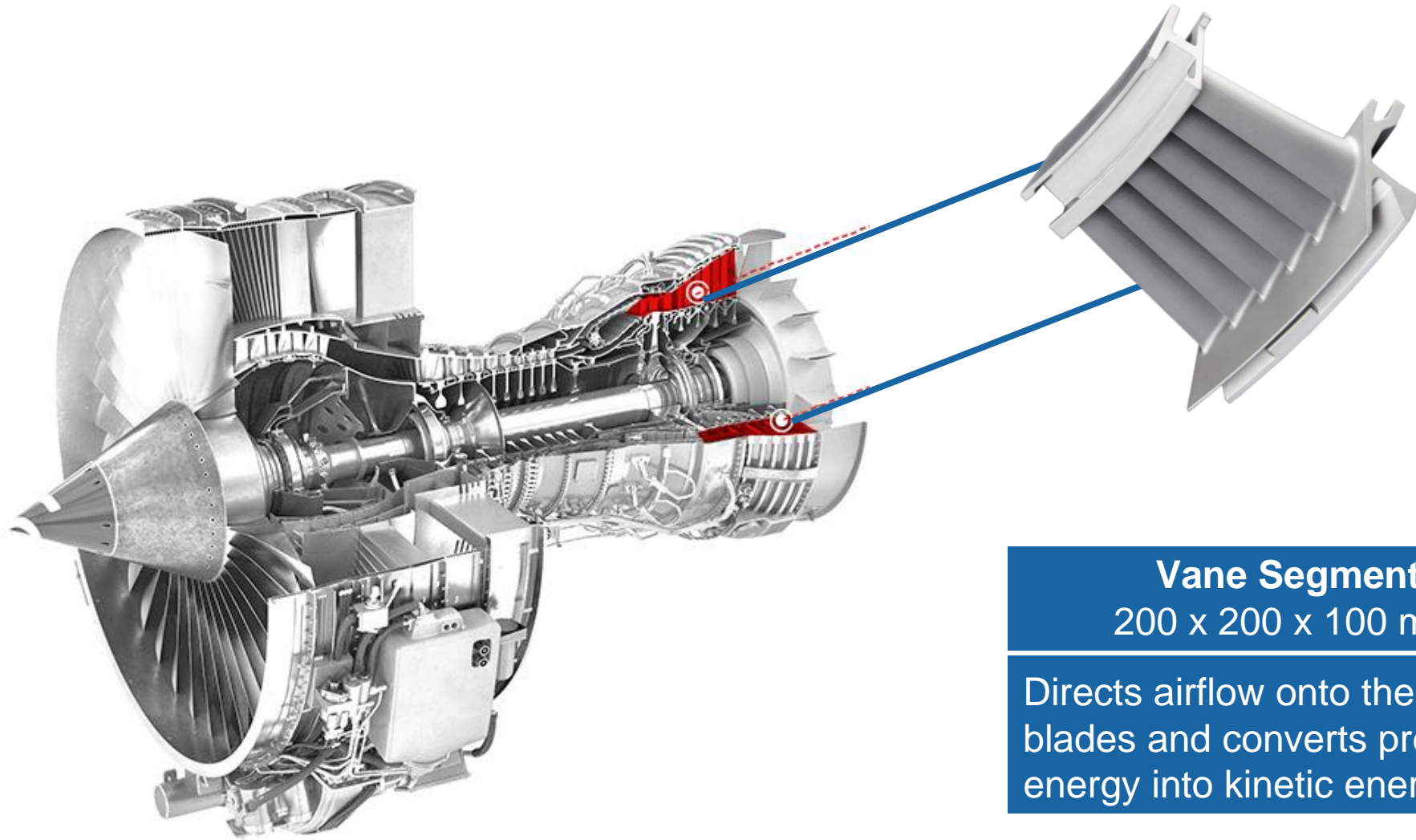
AIRBUS

...driven by backlog and replacement needs



Sources: Fleet Analyzer & Boeing CMO

Our focus is on lightweight and efficient aircraft engines



Vane Segment
200 x 200 x 100 mm

Directs airflow onto the turbine blades and converts pressure energy into kinetic energy

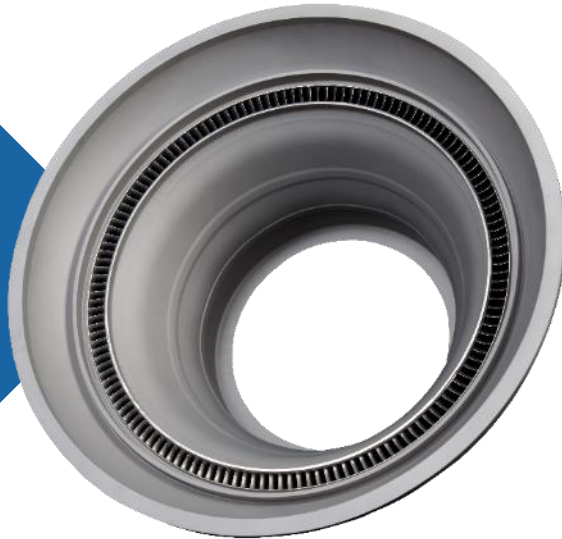
GF Solutions for the future of air travel



GF Casting Solutions offers fully NADCAP certified value chain



Precision
Casting
Know-How



Additive
Manufacturing
Know-How



Showcase GF Casting Solutions



Roger Kupferschmid
Head of Research & Development



Automotive:
Lightweight Design &
Digital Production



Antoine Marty
Head of Sales & Strategy BU Precision
Casting + Additive Manufacturing



Aerospace:
Growth market &
Additive Manufacturing

Thank you!

