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ENVIRONMENT



ICAO Environmental
Symposium 2019

DESTINATION GREEN: THE NEXT CHAPTER



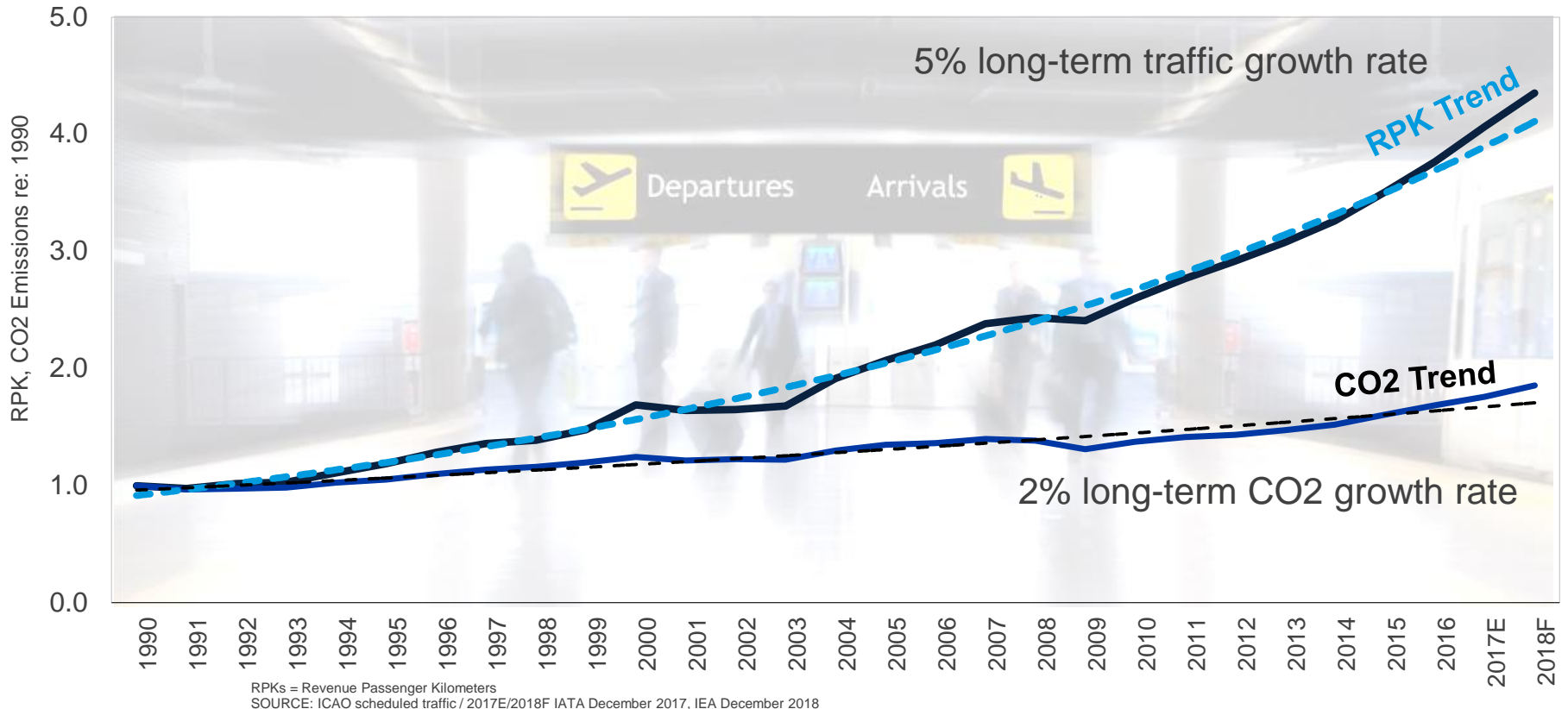
Boeing Airplane Technology Progress

Sean Newsum

Director, Environmental Strategy
Boeing Commercial Airplanes



Passenger traffic and CO2 emissions growth are already partially decoupled



Boeing Airplane Family

15 to 25% more fuel efficient with each new generation



737 MAX

20% reduction
in fuel and CO₂

50% smaller
noise footprint

Compared to
original Next-Generation 737

787

20% to 25% reduction
in fuel and CO₂

60% smaller
noise footprint

Compared to 767-300ER

777X

20% reduction
in fuel and CO₂

30% smaller
noise footprint

Compared to 777-300ER

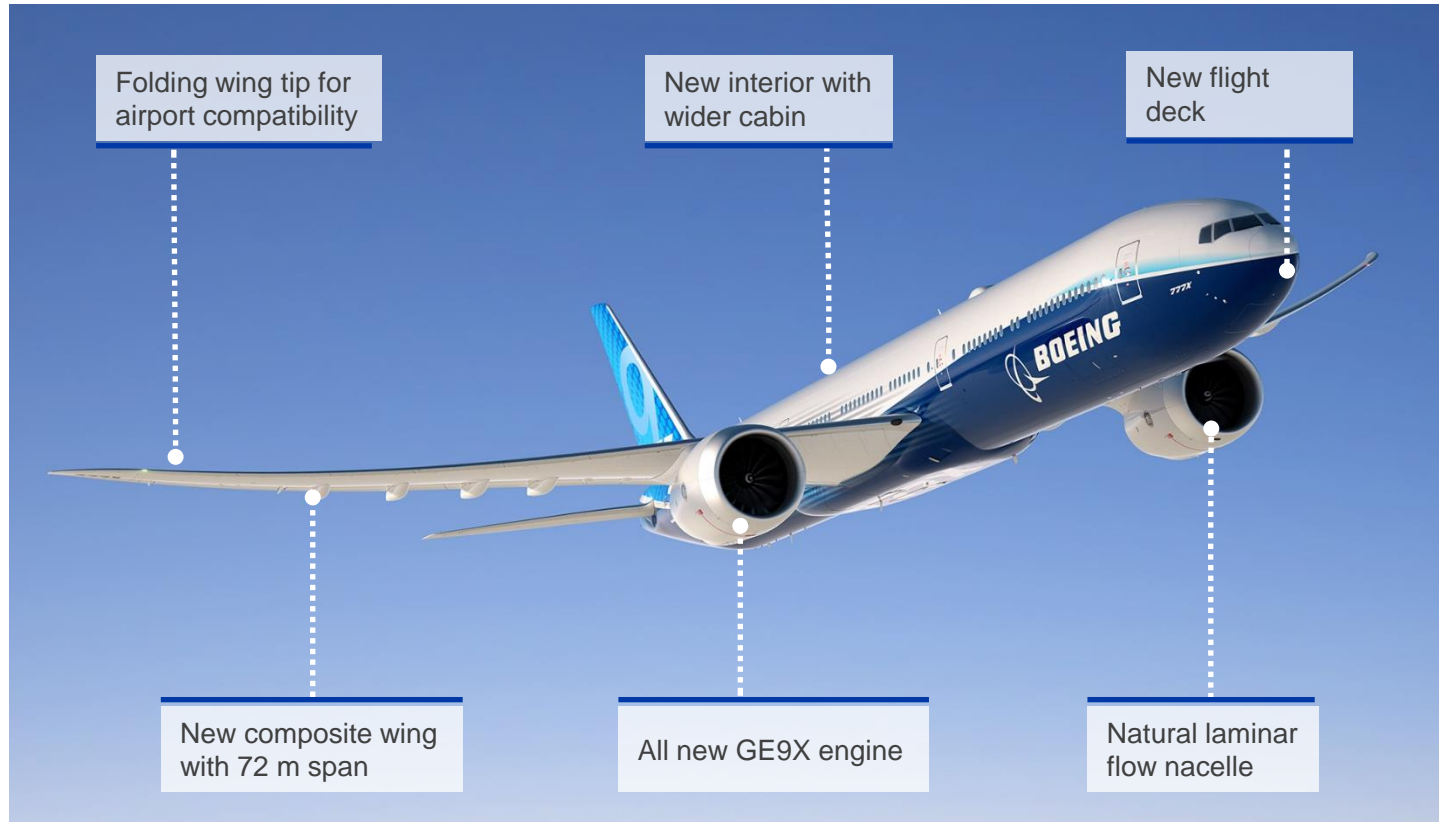
747-8

18% reduction
in fuel and CO₂

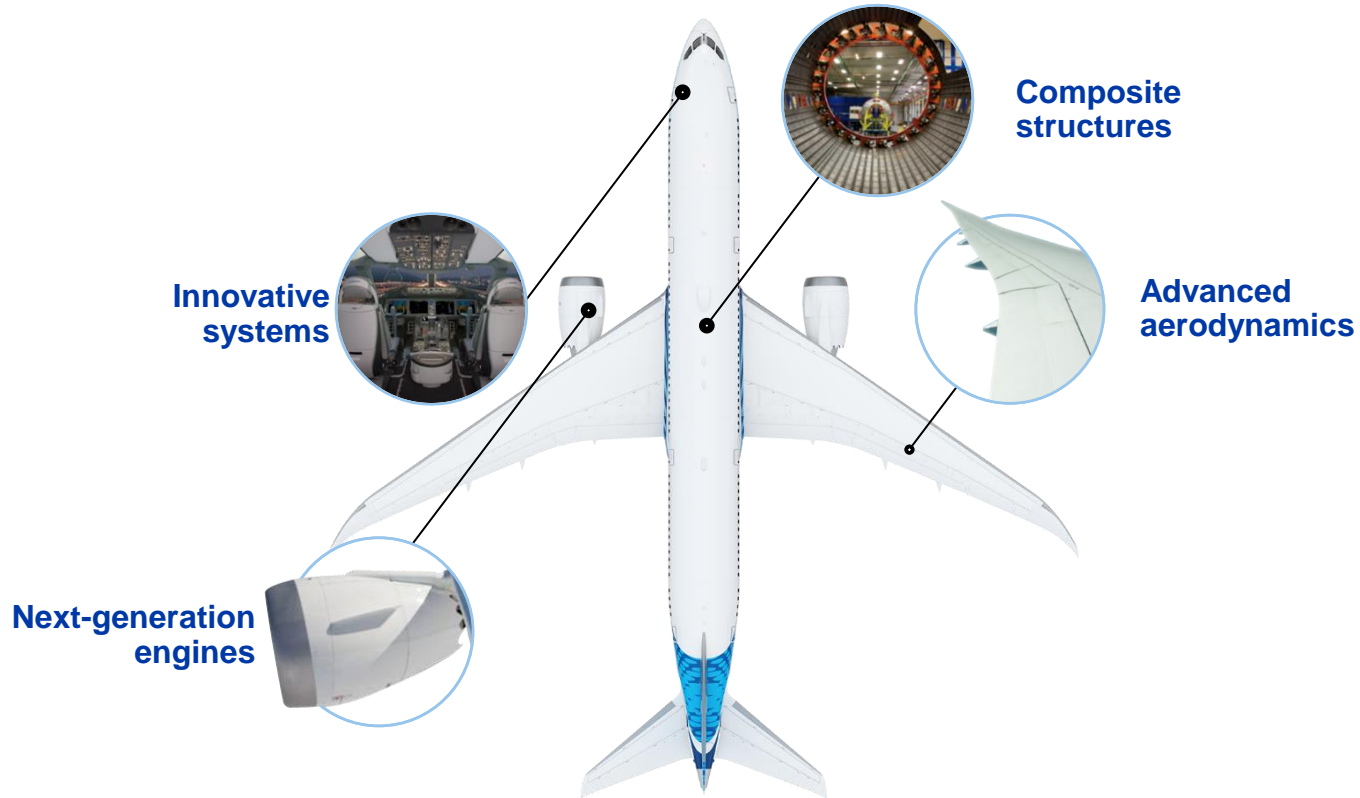
30% smaller
noise footprint

Compared to 747-400

777X Benefits from key technologies



Continued innovation in airframe and engine technology will deliver future efficiency improvements



ecoDemonstrator Program

Innovate, Collaborate, Accelerate

Innovate

- Learn by doing, fail fast, discover quickly

Collaborate

- With airlines, government, suppliers, academia & industry

Accelerate

- Speed path to products, services and production



Boeing electric aircraft studies

Advanced Concepts – active and realistic approach for over a decade



Alternative Energy - significant opportunity and challenge



Key opportunity: 60 to 80% life cycle emissions reduction

Key challenges: Production scale & economics



Key opportunity: Potentially zero direct emissions*

Key challenge: Energy/power density, limited mission capability, market penetration

*TBD net emissions

All of the above approach to technology

Airframe



Engines



Alternative
Fuels



Electric/
Hybrid Electric



- Attaining industry's ambitious 2050 emissions reduction target will require innovative solutions
- Boeing is researching and developing solutions in all areas - each solution has unique opportunities, challenges and limitations
- It will take an all of the above approach



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THANK YOU