# Airfield Pavements for the NextGen Decade


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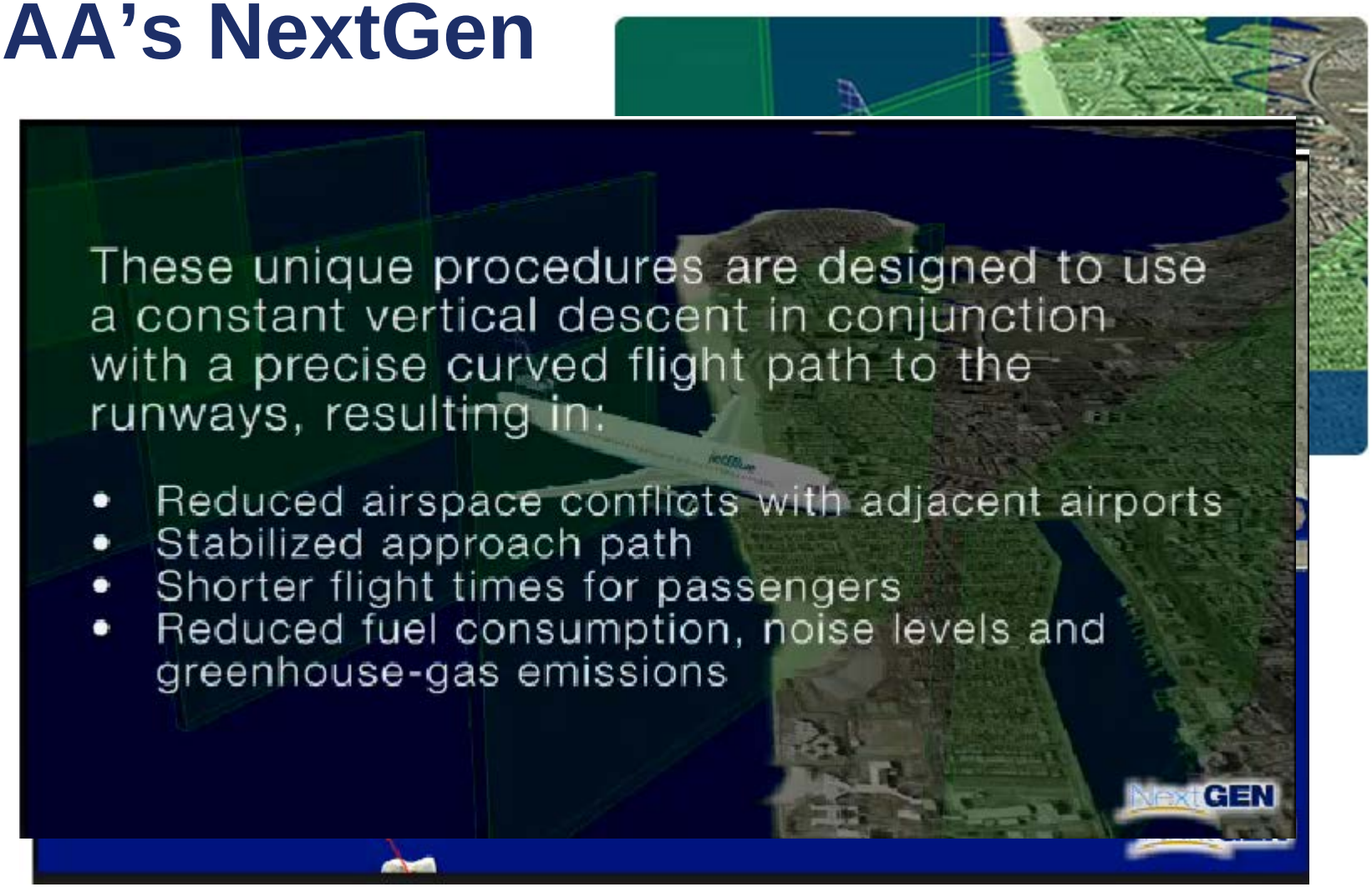
# FAA's NextGen

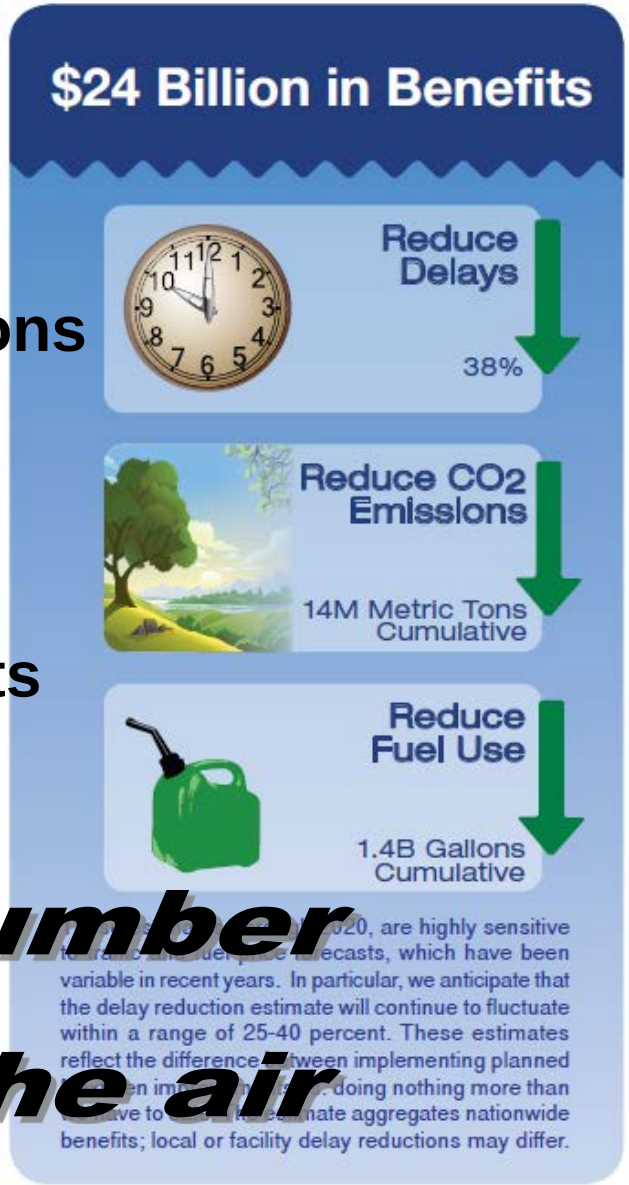
- **Comprehensive Overhaul of US National Airspace System**
- **Benefits**
  - Fewer Delays
  - Reduce Environmental impacts
  - Improve Safety
  - Improve Performance
- **Products**
  - Satellite Based Navigation
  - Performance Based Navigation (PBN)
  - Airport Surface Detection (ASDE-X)
  - Area Navigation (RNAV)

# FAA's NextGen



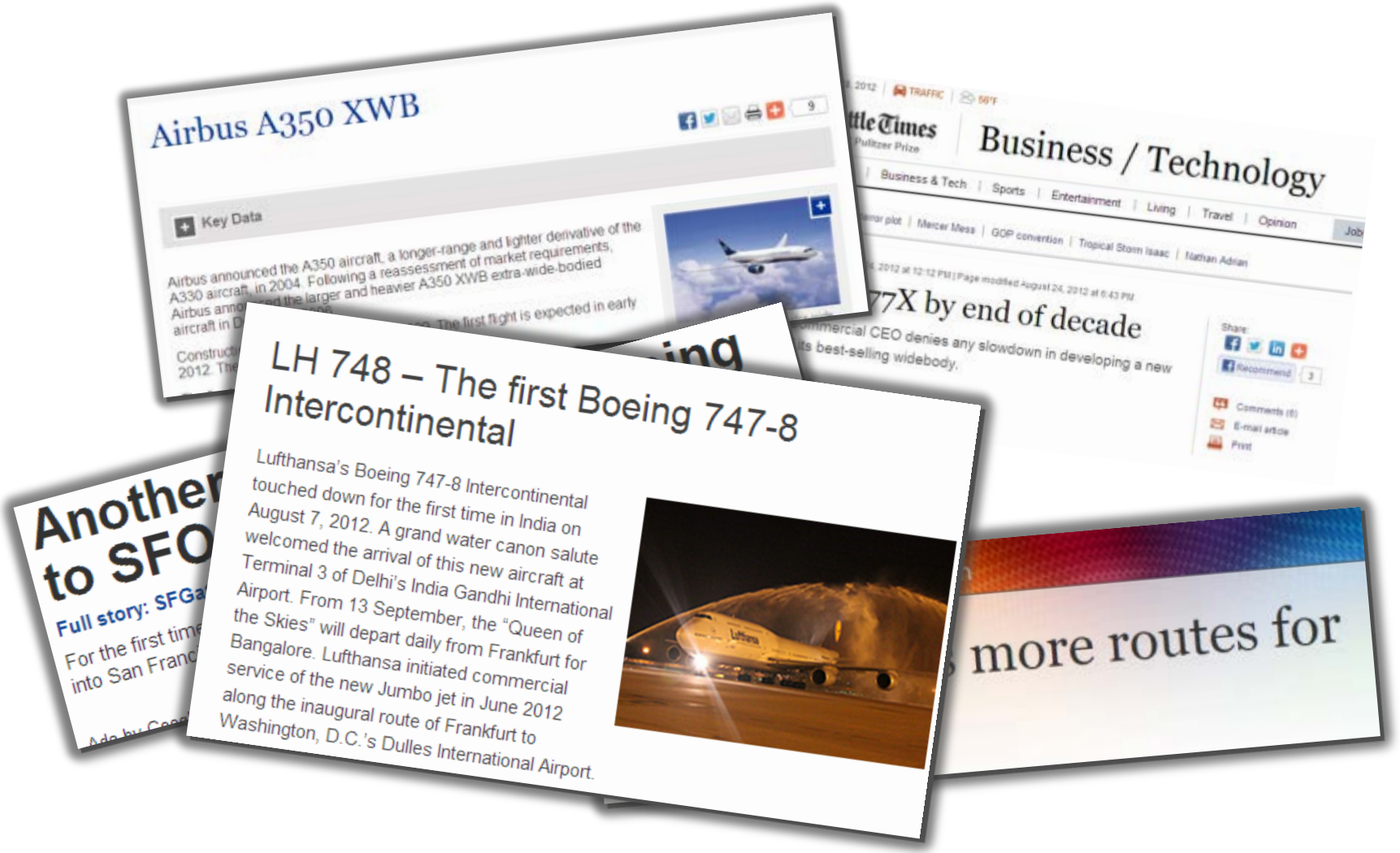
# FAA's NextGen

- Impacts
  - **Closely spaced parallel operations (RW Separation <1,300 m)**
  - **Reduction in aircraft spacing**
  - **Reduction in taxiing times**
  - **Larger aircraft at smaller airports**

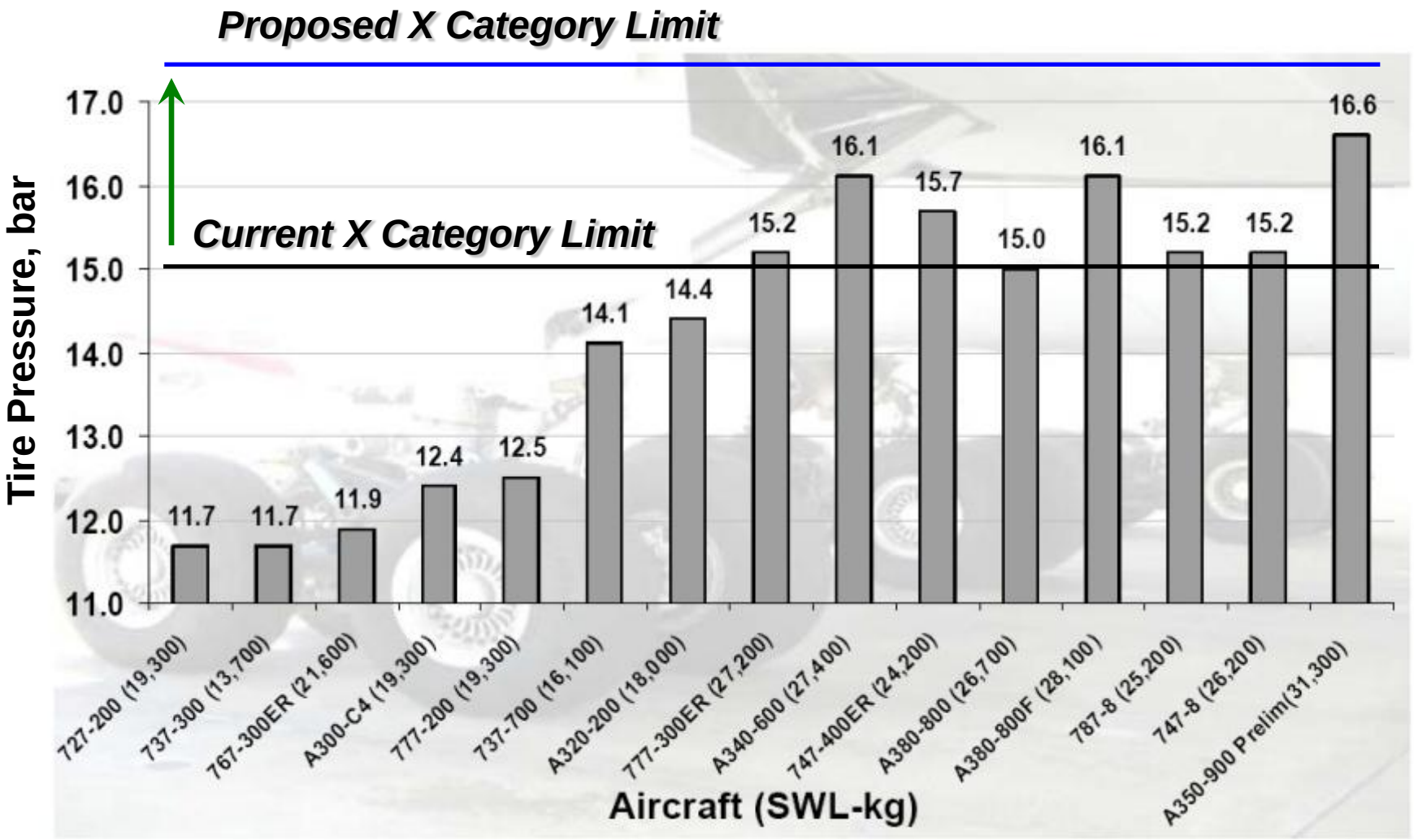



***Doubling the number of aircraft in the air***

# New Aircraft Designs



# New Aircraft Designs





# Future?

# New Aircraft Designs

- **Aircraft Manufactures are**
  - Increasing
    - Payloads
    - Range
  - Decreasing
    - Fuel Burn
    - Drag
    - Noise during approach
    - Emissions

- **Max Takeoff Weight (MTOW) Increase**
- **Fuselage length increase**
- **Wing-span increase (& shape) for drag reduction**
- **Fewer wheels for:**
  - Weight saving, noise & drag reduction (approach)
  - Better maneuverability
- **larger wheels and tires**
  - higher load capabilities higher braking capabilities

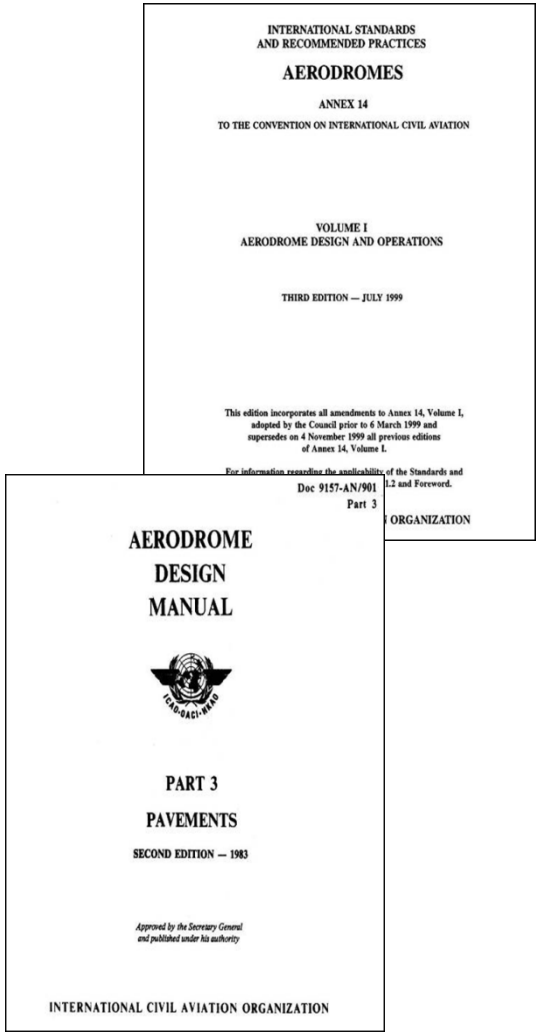
**Higher wheel loads & Tire pressures**

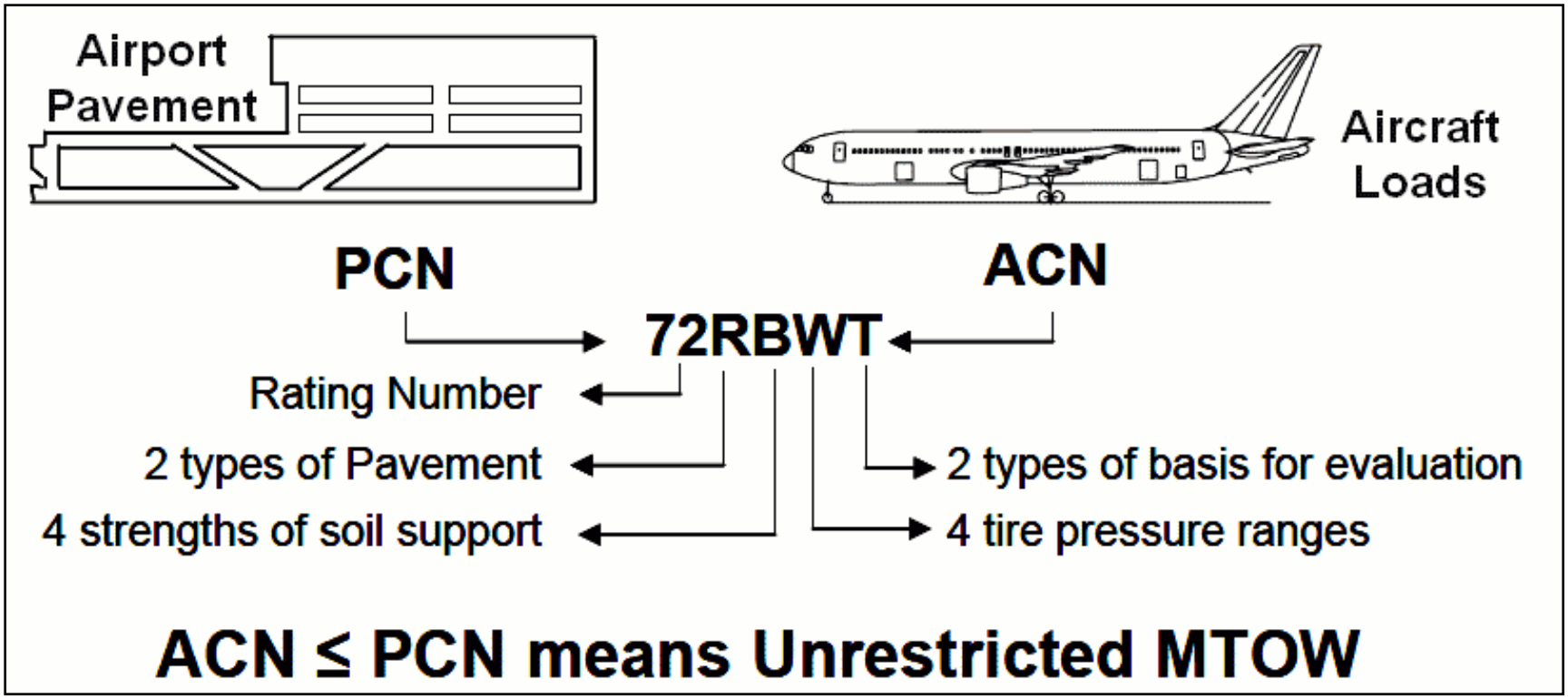
# ICAO Tire Pressure Categories

| Tire Pressure Category | Current ICAO Limits psi (MPa), loaded | Proposed New ICAO Limits psi (MPa), loaded |
|---|---|---|
| W | Unlimited | Unlimited |
| X | 217 (1.50) | 254 (1.75) |
| Y | 145 (1.0) | 181 (1.25) |
| Z | 72 (.50) | 72 (.50) |

# Pavement Rating System

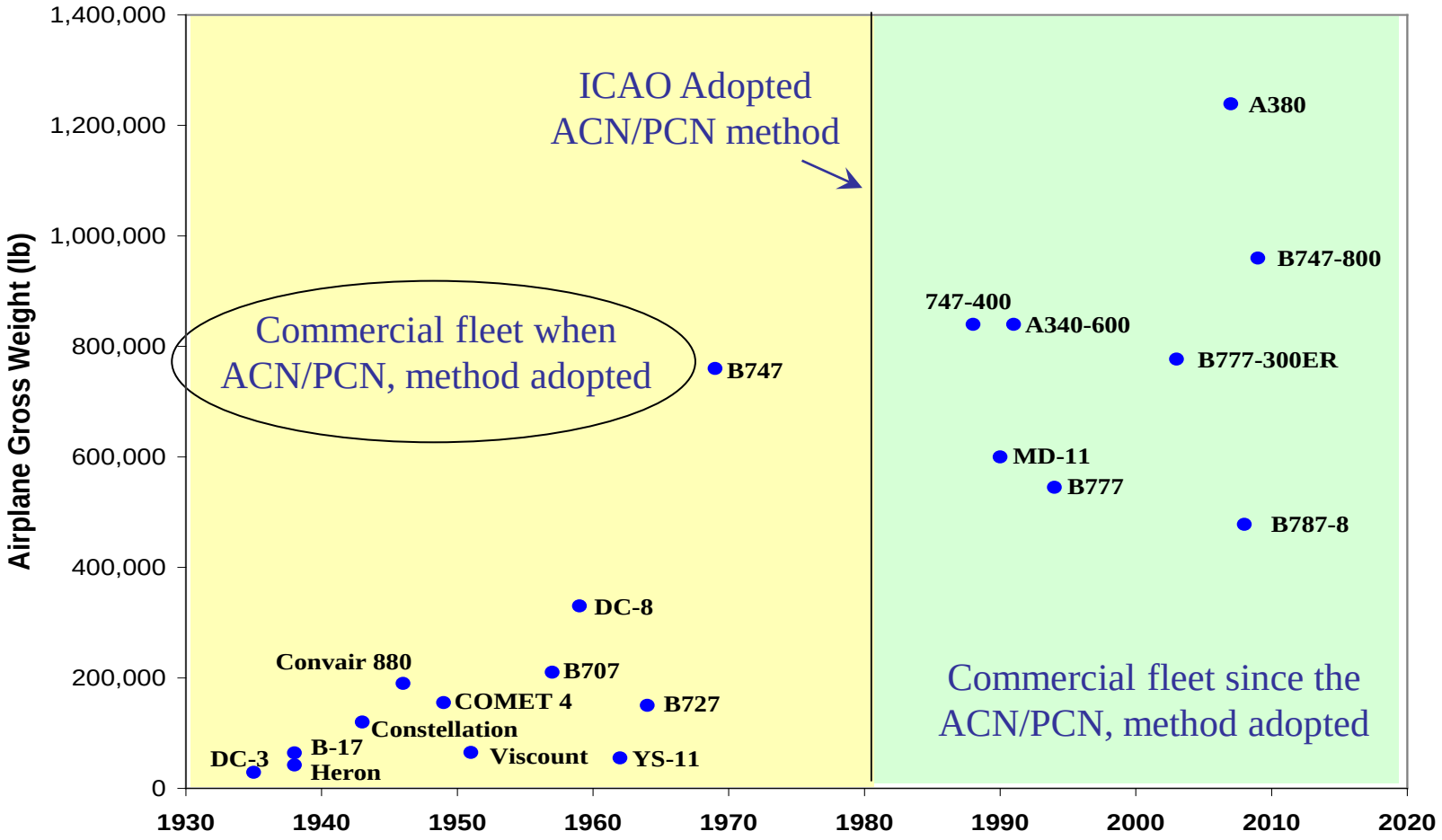
- **The ACN-PCN System**
  - Aircraft Classification Number (ACN) is precisely specified as a standard by ICAO in Annex 14 to the Convention on International Civil Aviation.
  - Aircraft manufacturers are required to publish properly computed ACN values for all of their aircraft.
  - Procedures for determining Pavement Classification Number (PCN) are given in the ICAO Aerodrome Design Manual, Part 3, Pavements.
  - **The PCN procedures in the manual are for guidance only and a great deal of latitude is provided.**
  - Airport operators are responsible for determining and publishing PCN values for runways.



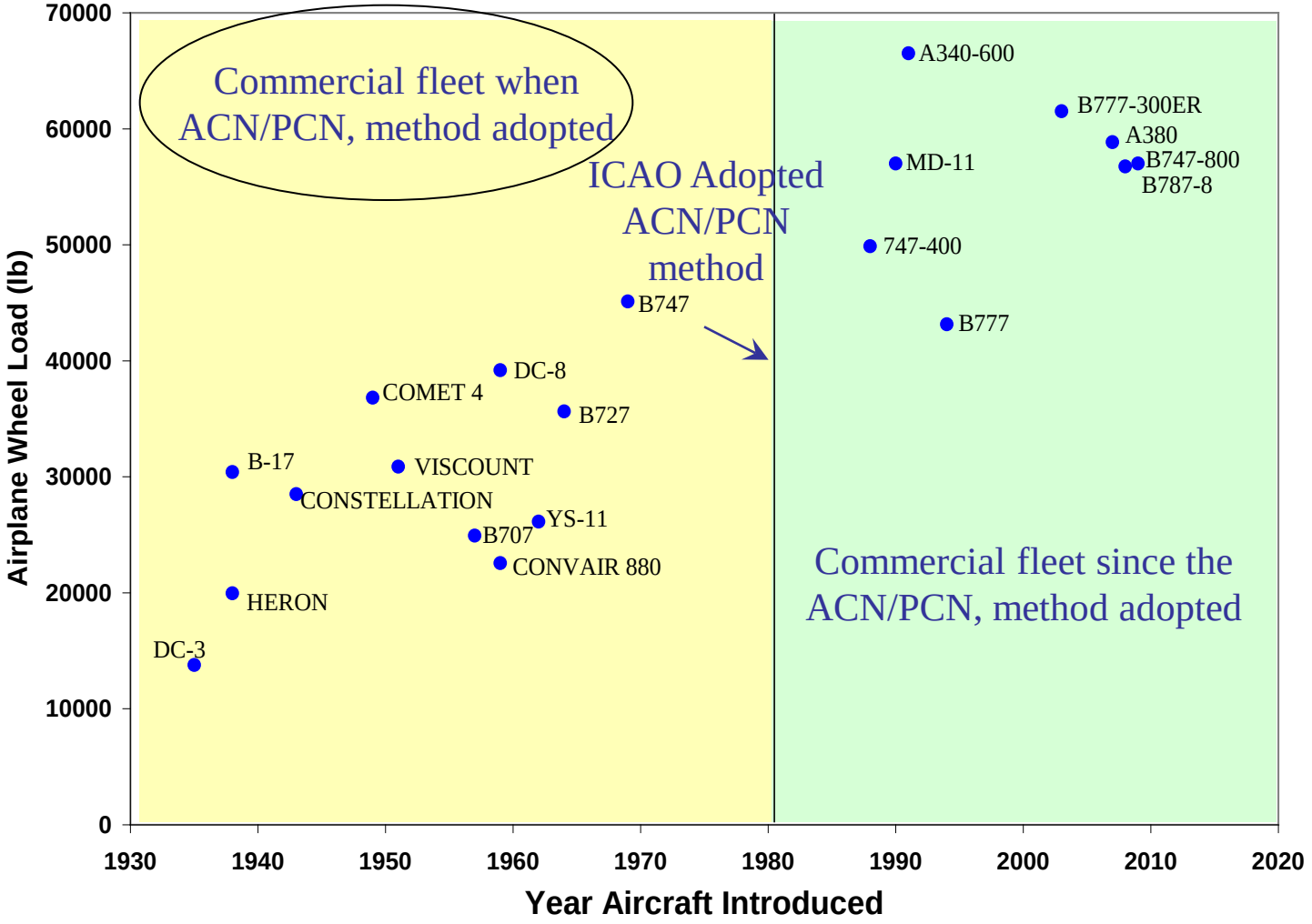



- **The aircraft mfg. provides the ACN.**
- **In the US, the airport determines the PCN using FAA advisory circular guidance.**

# ACN-Aircraft Timeline (Gross Wt)

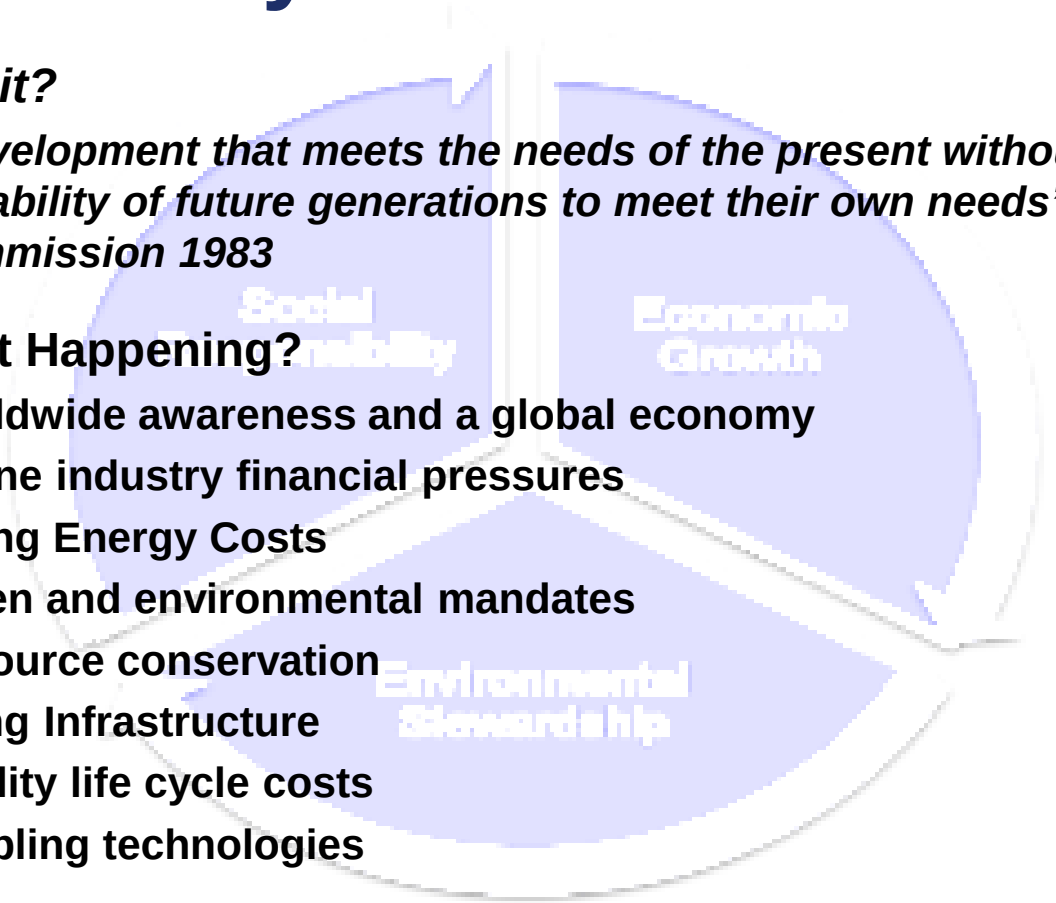


# ACN-Aircraft Timeline (Wheel load)



# Sustainability

- ***What is it?***
  - ***"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" - Brundtland Commission 1983***
- **Why Is it Happening?**
  - **Worldwide awareness and a global economy**
  - **Airline industry financial pressures**
  - **Rising Energy Costs**
  - **Green and environmental mandates**
  - **Resource conservation**
  - **Aging Infrastructure**
  - **Facility life cycle costs**
  - **Enabling technologies**




***"Triple Bottom Line"***

# Sustainability

- **Rating Systems**
  - US Green Building Council (USGBC) LEED® program
  - Institute for Sustainable Infrastructure
  - Airport Authorities



INSTITUTE FOR SUSTAINABLE INFRASTRUCTURE
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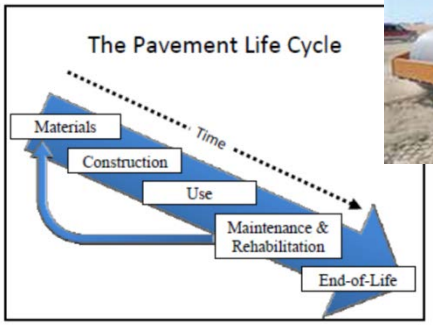
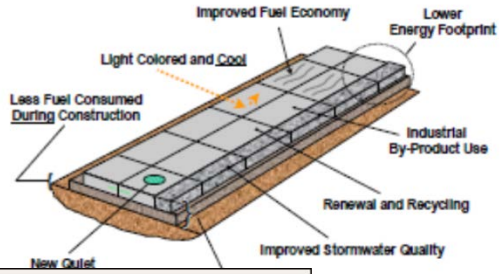
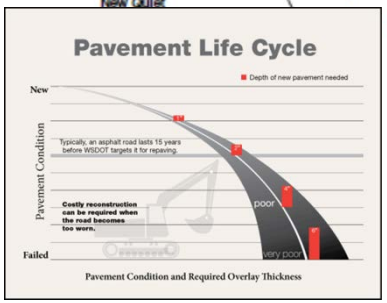
# Sustainability

- **“New” Technologies/Materials**
  - Stone Matrix Asphalt
  - Warm Mix Asphalt
  - Half-Warm Mix Asphalt
  - Increased amount of recycled materials
  - Concrete admixtures
  - Supplementary Cementing Materials (SCM)
  - Life Cycle Assessment (LCA)
  - Design Beyond Fatigue Cycles
  - Increase Pavement Design Life (20 to 40 years)



# Summary

- Continuous worldwide aircraft traffic growth
- Better aircraft control on the ground
- Climatic changes
- Reduction of natural resources
- Economic Environment

- More precise pavement design and analysis methods
- Combination of PMS with airport traffic simulation tools
- Advanced and innovative paving materials
- Performance based specifications
- Adapted pavement maintenance program
- Improved pavement construction techniques

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# Gracias

# Airport Technology R&D Branch
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