



## ***AFRA Panel Discussion***

### ***Economics of End-of-Life Aircraft Management Panel***

**Moderator:** Bradley Gregory, Air Salvage International Ltd.

**Panelist:** Mark W. Atwood, Cozen O'Connor

**Panelist:** Daniel Hall, Flight Ascend Consultancy

**Panelist:** Don Wilson, Inventory Locator Service,<sup>®</sup> LLC, a Boeing company



## **Moderator:** Bradley Gregory, Commercial Director of Air Salvage International

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**Panelist:** Mark W. Atwood, Member of Cozen O'Connor

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**FAA REGULATION OF LIFE-LIMITED  
PARTS  
AND  
FAA ENFORCEMENT OF RELATED REGULATIONS**

Aircraft Fleet Recycling Association  
Annual Meeting  
Reston, VA / July 9-11, 2017

# LIFE-LIMITED PARTS

- Aircraft salvagers must pay particular attention to handling of removed Life-Limited Parts (“LLPs”):
  - Definition: “Any part for which a mandatory replacement limit is specified in the type design, the Instructions for Continued Airworthiness, or the maintenance manual.” (14 CFR section 43.10(a))
  - Limits usually calculated by hours, cycles, or both.
  - Examples include: engine disks, spacers, spools, hubs, shafts, and high-pressure cases.

# LIFE-LIMITED PARTS

- Much of the value of salvaged aircraft is recovered through reusable parts, many of which are LLPs.
- For example, a recent 737NG disassembly returned \$9 million from resale of 20% of the parts.
- As many as 1800 parts of a 737 can be returned to the supply chain.
- If these Life-Limited parts are reinstalled on a type-certificated product, the parts and those who remove them must comply with FAA regulations. Risks of non-compliance are substantial.

# LIFE-LIMITED PARTS

- 14 CFR section **43.10**:
  - Adopted in January 2002.
  - Mandated by AIR-21 Act (Wendell H. Ford Investment and Reform Act for the 21<sup>st</sup> Century).
  - Act added section 44725 to the Transportation Code.
  - Specified five methods of “safe disposition” of LLP’s that must be followed each time an LLP is removed from an aircraft.
    - (**Note:** “disposition” does not necessarily mean “disposal” – this applies to any handling of an LLP removed from aircraft.)

# LIFE-LIMITED PARTS

- Congressional action deemed necessary as FAA found use of expired LLPs during accident investigations and routine inspections.
- This violated existing FAA rules (section 43.13(b)), but Congress – with FAA agreement – felt specific measures were required.
  - Aircraft Type Certificates require observance of life limits for incorporated parts.
  - If not, aircraft in violation of TC, and therefore unairworthy.
  - Operators may incur substantial penalties for flights.

# LIFE-LIMITED PARTS

- In January 2004, after extensive comments on its proposal were filed, FAA adopted its current rule.
- Requires compliance with one of 7 methods of “disposition:”
  1. Record keeping system;
  2. Tag or record attached to part;
  3. Non-permanent marking;
  4. Permanent marking;
  5. Segregation (for expired/unusable parts);
  6. Mutilation (for expired/unusable parts); and
  7. “Other methods” approved or accepted by the FAA.

# LIFE-LIMITED PARTS

- This rule applies to “a person who removes a life-limited part” from an aircraft; you don’t have to be an MRO.
  - In fact, a/c disassembly has been considered maintenance. (See *In the Matter of Stambaugh’s Air Service, Inc.*, FAA Order 2001-7.)
- Although only the first refers to “record keeping system,” in fact all these methods require accurate and updated records.
- Records *do not* have to be “back to birth;” the FAA only expects that they will provide sufficient data to determine how the current life status was obtained. (July 18, 2009, Legal Opinion.)

# LIFE-LIMITED PARTS

- The FAA rulemaking preamble makes clear that the rule's requirements *don't* just apply if the part is already out of time; it applies to *any* LLP at any point in its life.
  - A part may be technically airworthy when removed, but quickly put an operator into violation if installed.
- Does the rule create liability for the removers if a part is installed past time? *No.*
  - FAA changed proposed language from “must *prevent* installation” after life limit, to “must *deter.*”

# FAA ENFORCEMENT OF THE RULE

- FAA can bring actions for civil penalties or action against a certificate (either an air operator, Part 145 maintenance base, or individual airman).
  - Can also end up merely with “administrative action” such as letter of correction
- Enforcement is most likely against an operator flying out-of-time part.
  - FAA would consider this a violation of several parts, particularly operating an *unairworthy* aircraft (e.g. section 91.403(c)).
  - This can result in enormous civil penalties.

# FAA ENFORCEMENT OF THE RULE

- An example is 2016 case against R&R Conner Aviation of Montana – settled for a \$140,000 penalty for four flights using three out-of-time components.
- If parts used on commercial a/c in scheduled service, the penalties can be in the millions.
- And needless to say, there can be substantial civil liability as well. (E.g. *Cartillar v. Turbine Conversions Ltd.*, 187 F.3d 858 (8<sup>th</sup> Cir. 1999))

# FAA Enforcement

- Out-of-time components can also be considered “suspected unapproved parts.”
  - FAA Order 8120.16A definition includes “life limited parts misrepresented as new or having useful time left.”
- “SUP” are taken *very* seriously by FAA.
  - Can entail *criminal* prosecution.
  - In past 5 years, FAA investigations have resulted in 63 indictments and 51 convictions.
- DOT Inspector General issued a report in May urging FAA to improve its enforcement in this area.

# FAA Enforcement

- Last year FAA issued a series of orders outlining new “compliance philosophy” – encouraging a “problem-solving approach,” self-disclosure, using enforcement as weapon of last choice.
- Practical result: fewer civil penalty or certificate actions, more “administrative” actions.
- However, would this affect enforcement posture towards use of out-of-time parts or SUP’s?  
Questionable....



**Panelist:** Daniel Hall, Senior Analyst for Flight Ascend Consultancy

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# Economics of End-of-Life Aircraft Management



AFRA Aircraft Fleet Recycling Association Annual Conference  
Reston, VA 9-11 July 2017

Daniel Hall, Senior Analyst, Flight Ascend Consultancy



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- └ Presence at all major aviation events (Paris Airshow, ISTAT Asia / US / Europe...)

Source: Flight Ascend Consultancy

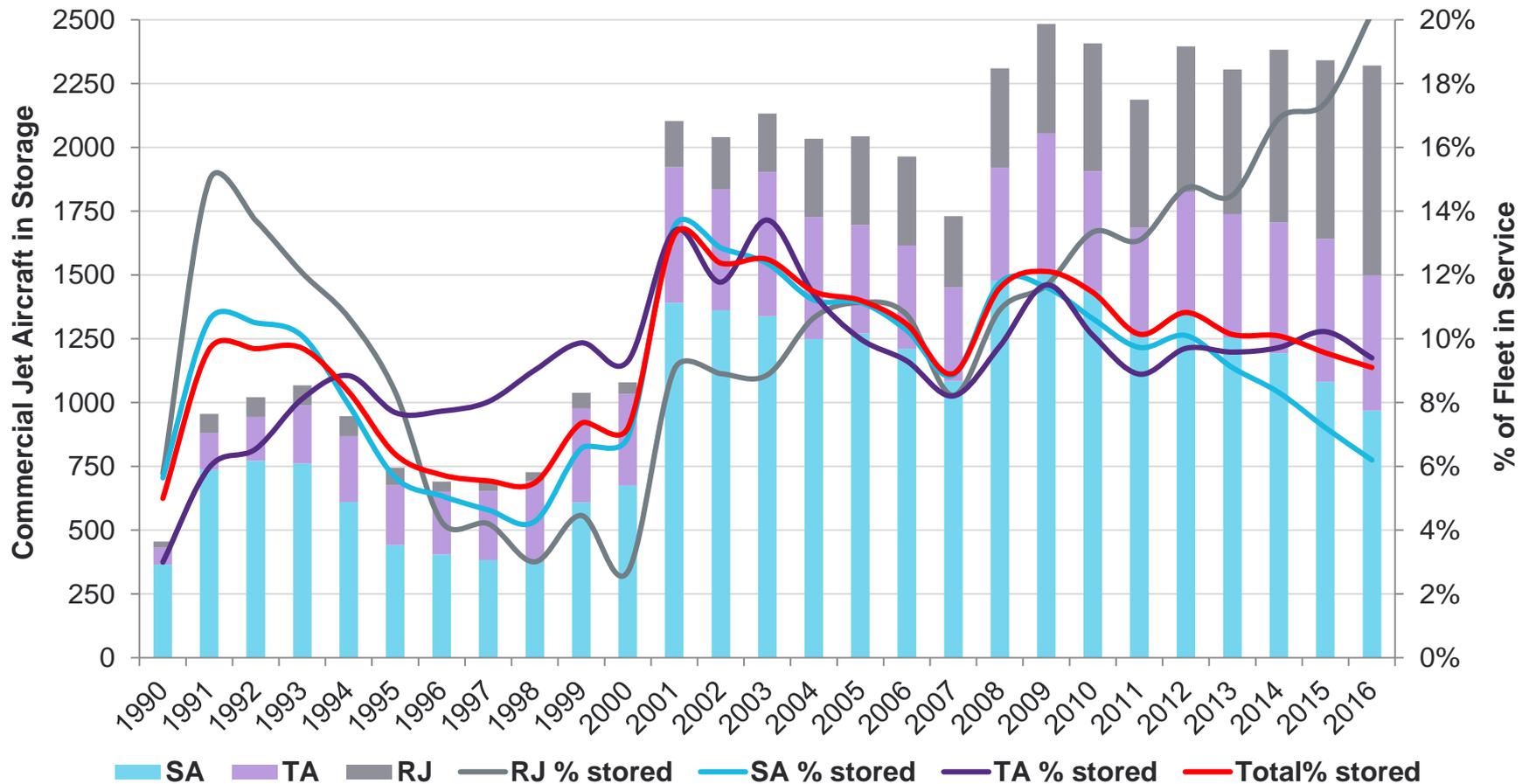
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- **Ascend appraisals used globally to value in excess of 200,000 aviation assets annually**
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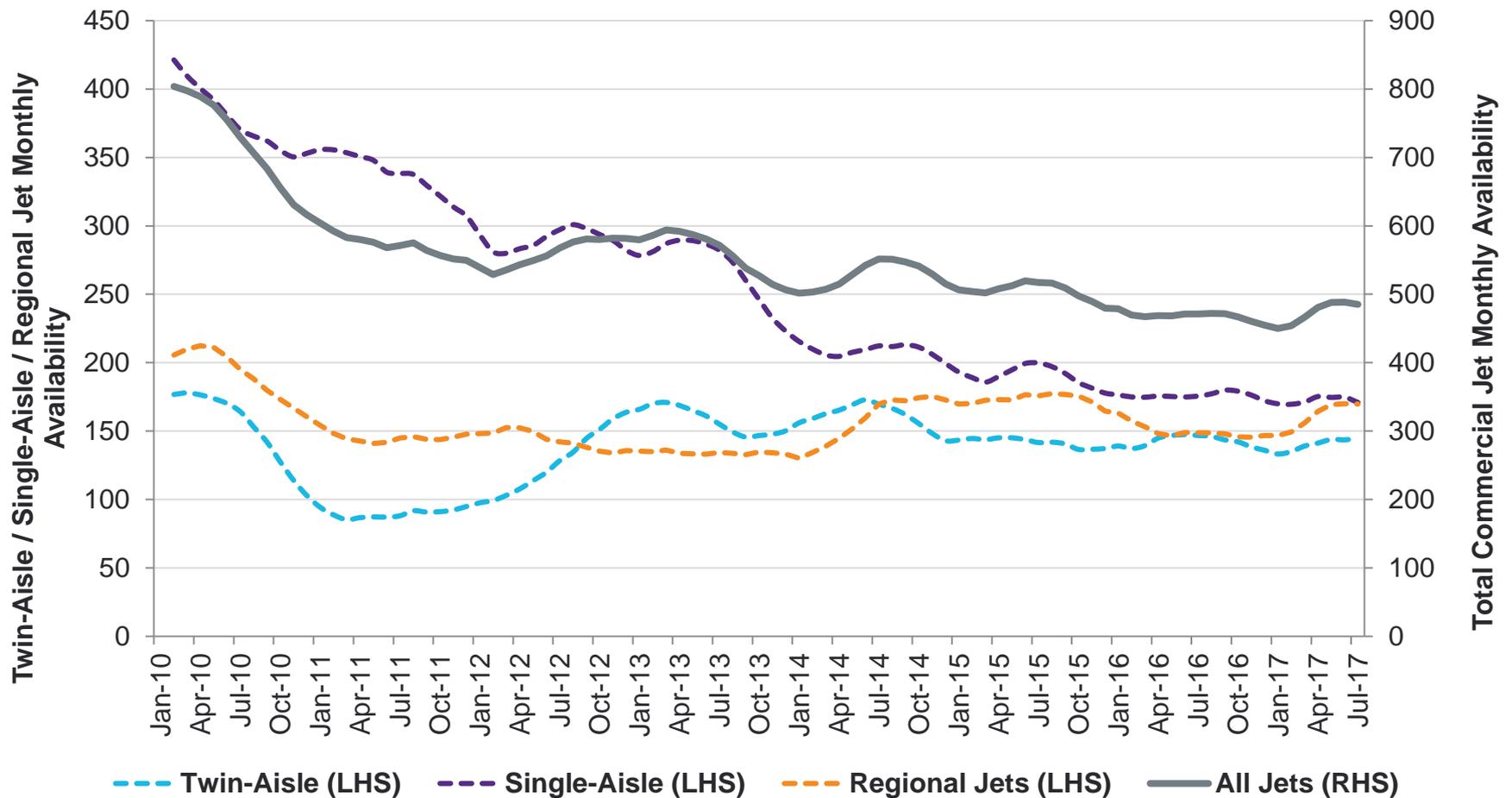


# Stored aircraft shows contrast between fall in single-aisle and increase in twin-aisle & RJ



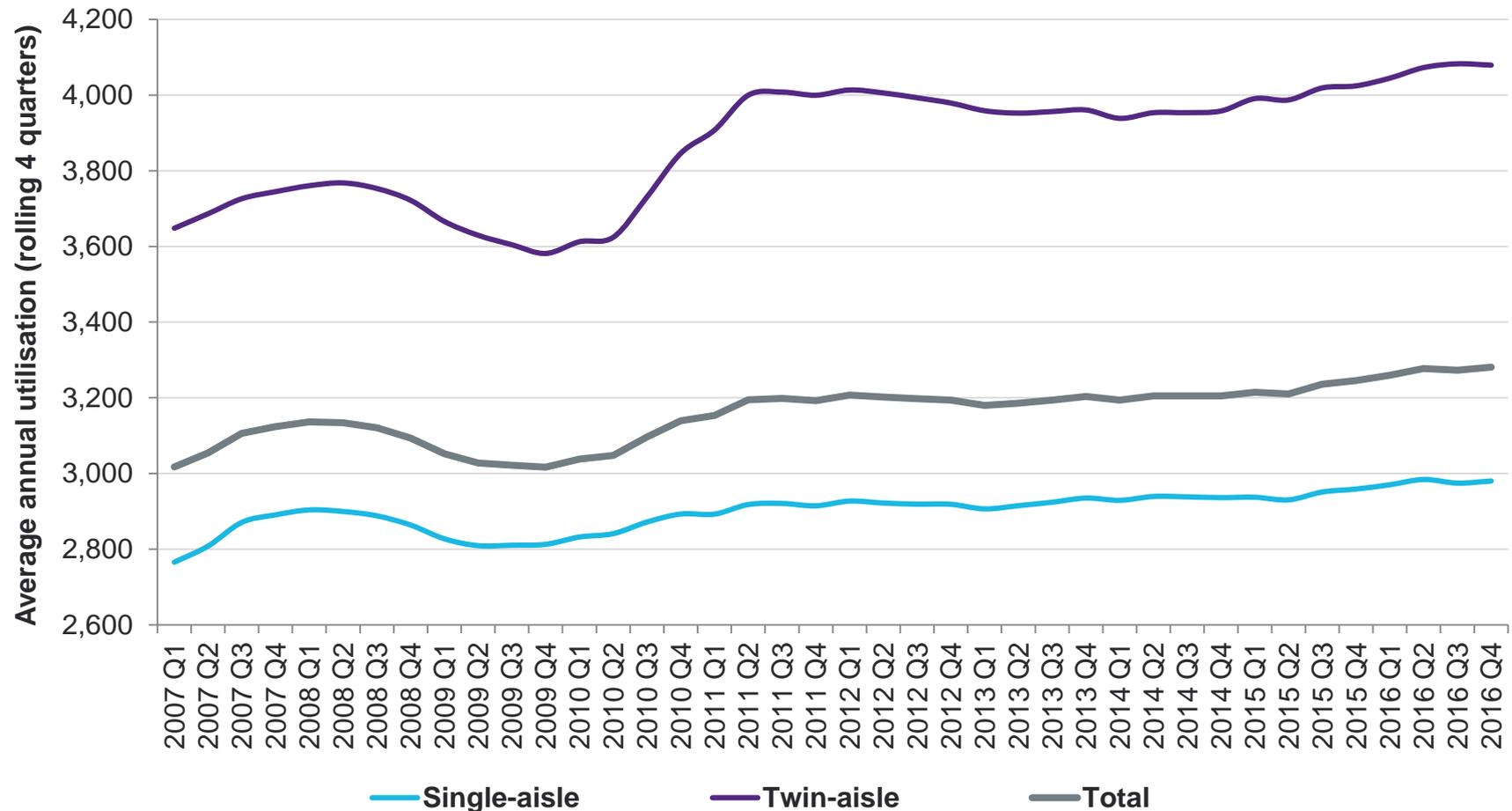
Source: Flight Fleets Analyzer – western build jets only

# Used jet availability stable and at lowest level since 2010



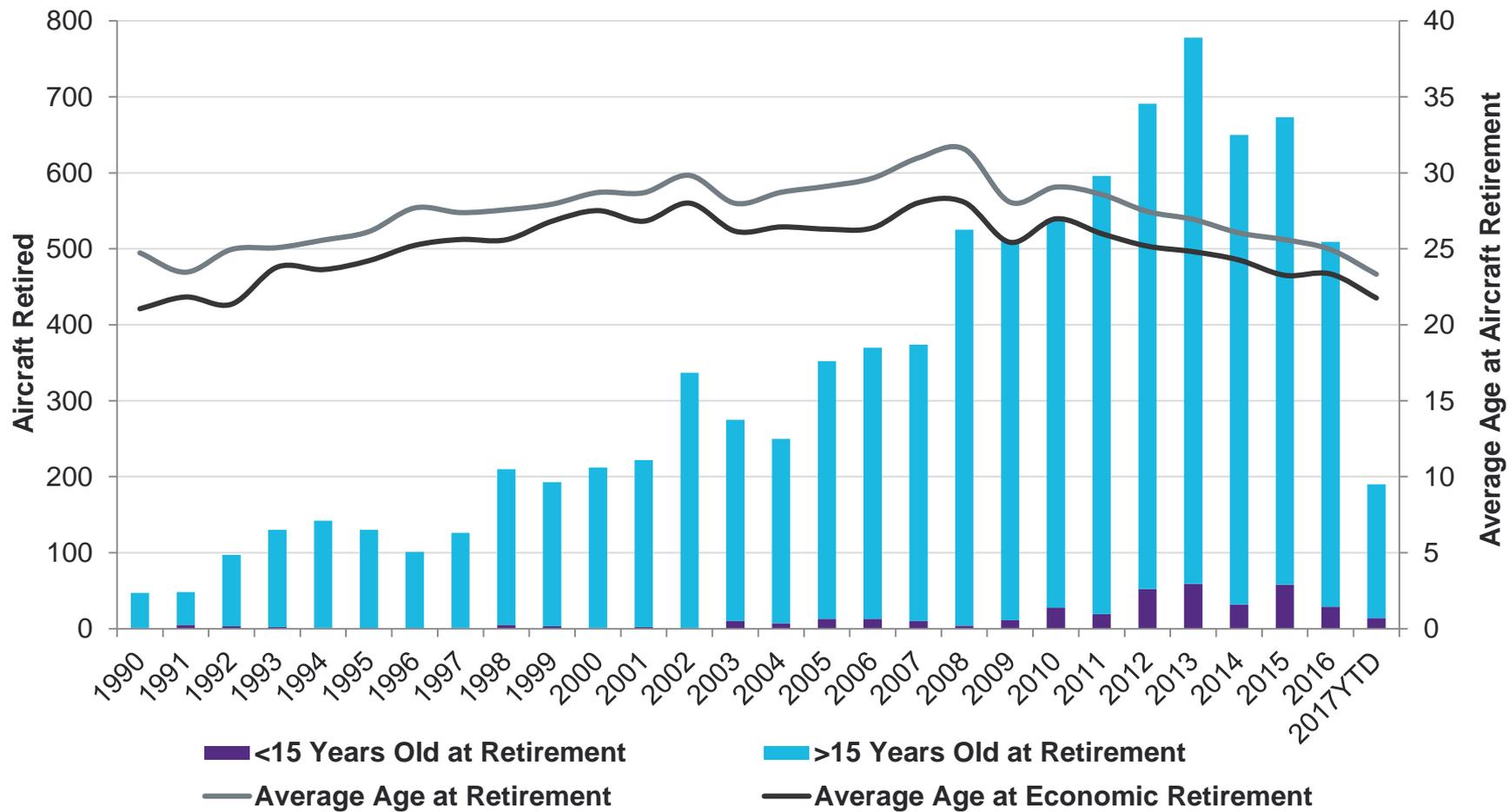
Source: Airfax, 6-month rolling average of aircraft available for lease or sale (excludes wet-lease / ACMI)

# Average annual utilisations recovered through 2011 and show an improving trend during 2016



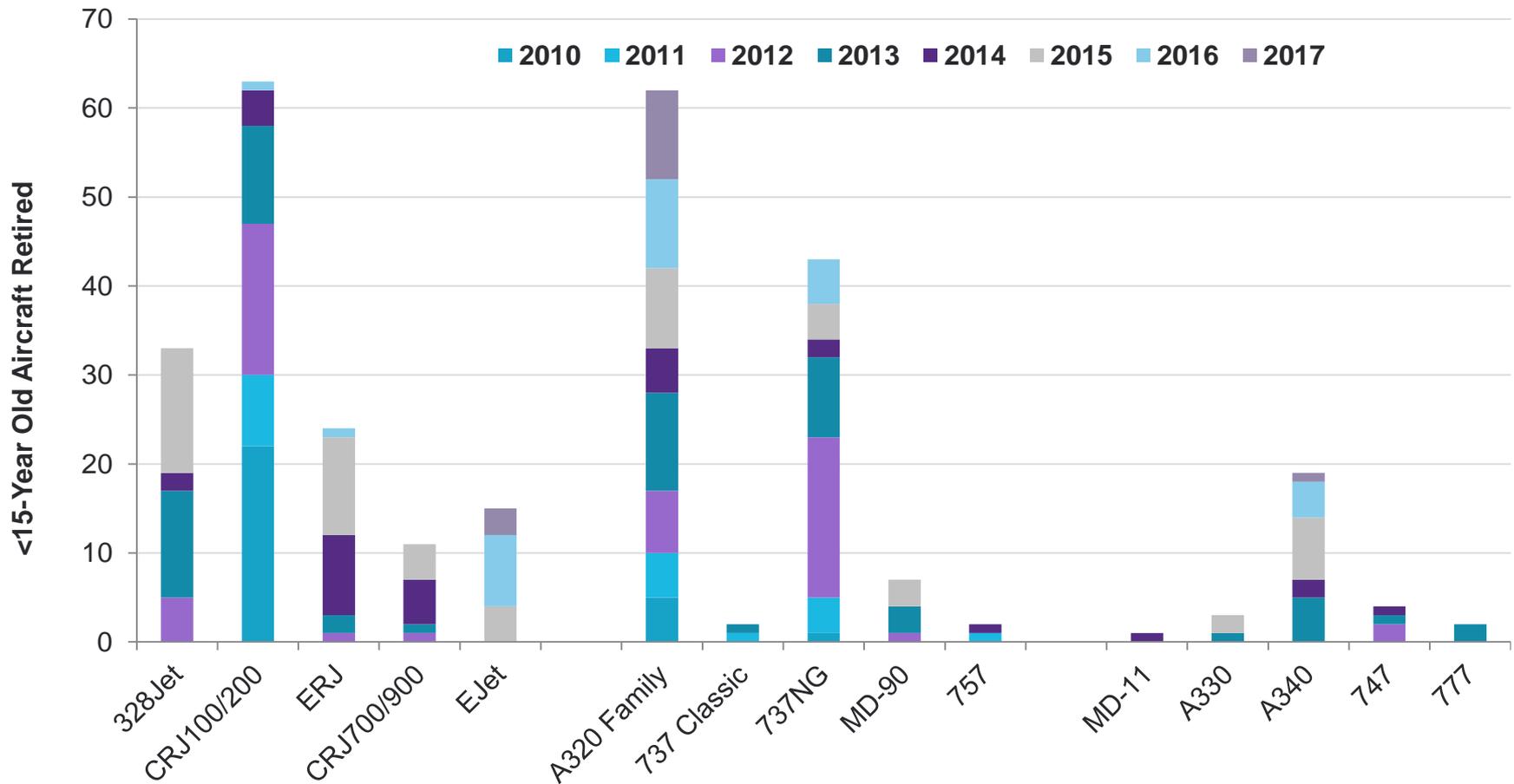
Source: Flight Fleets Analyzer, all Airbus/Boeing/MDC aircraft with data, all usages

# Over 10,000 commercial jet aircraft have been retired to date



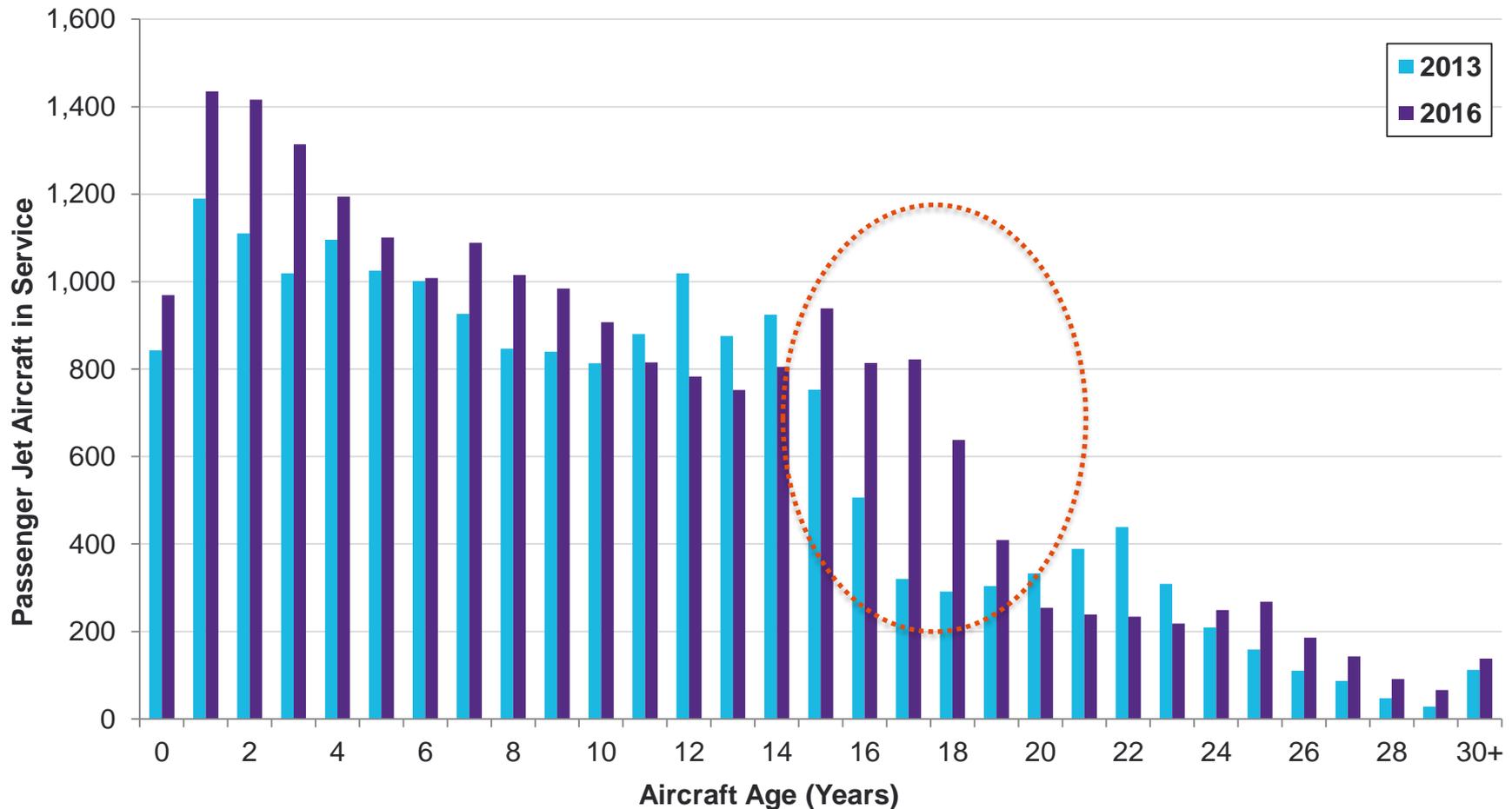
Source: Flight Fleets Analyzer

# 291 <15-year old aircraft parted-out since 2010



Source: Flight Fleets Analyzer

# Fleet of 15+ year old aircraft is 1,300 aircraft larger than it was three years ago

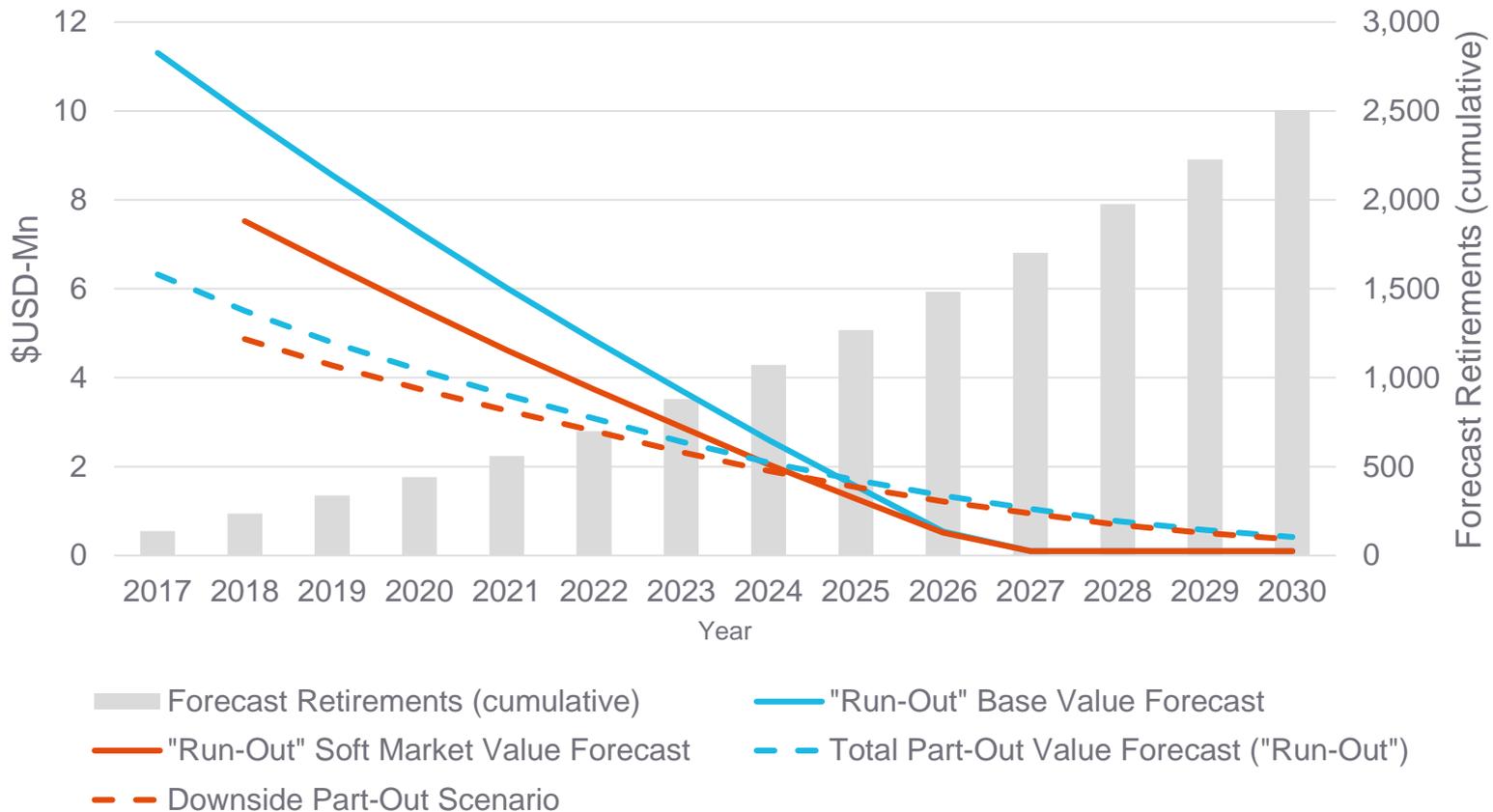


Source: Flight Fleets Analyzer, as at 20 September 2013 / 2016

# Flight Ascend Part-Out Value Forecast



## 2005-YOB Boeing 737-800 (CFM56-7B26, 155,500lb MTOW), 2%-infl

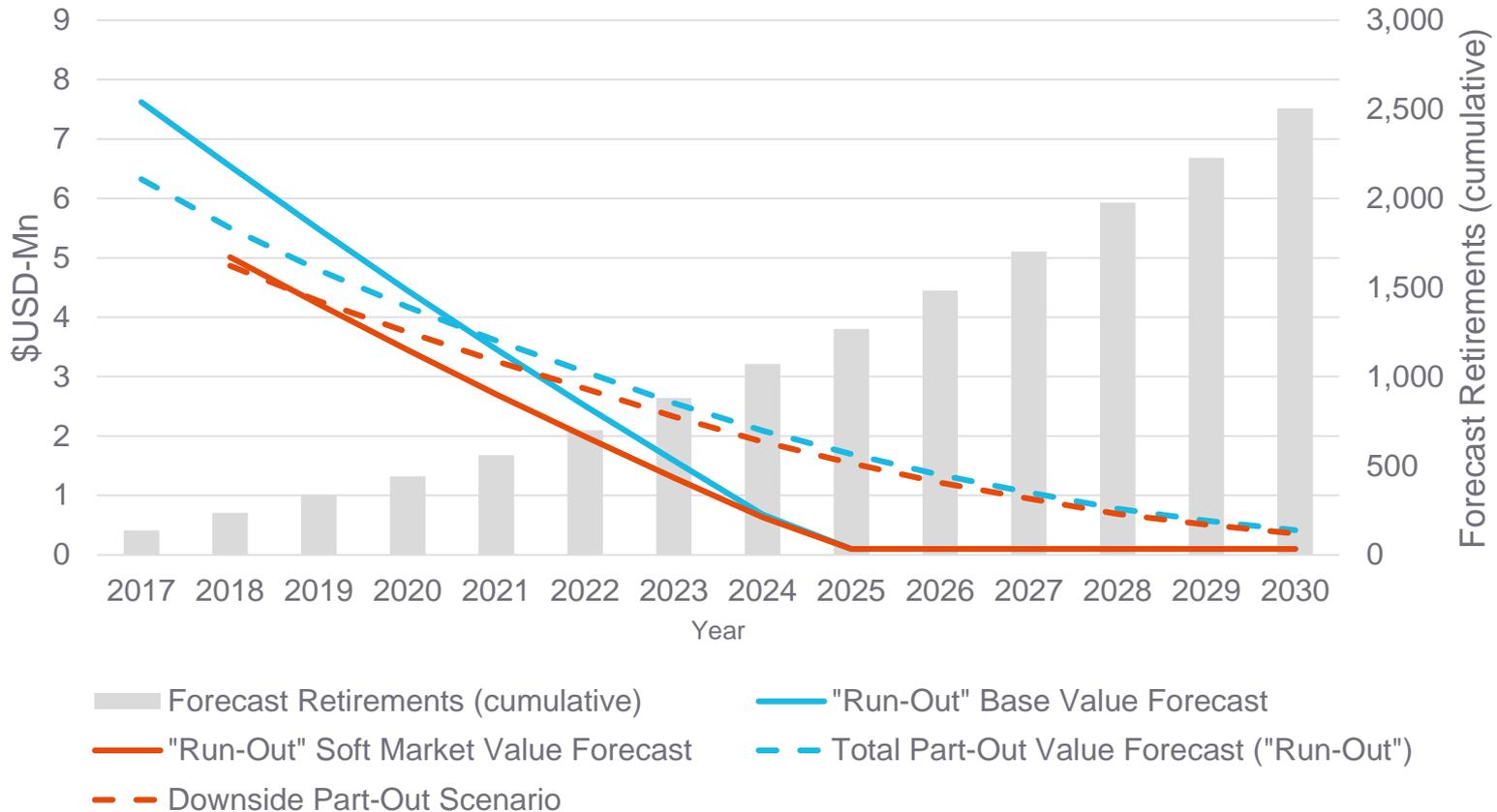


Source: Flight Ascend Part Out Tool, Flight Ascend Values, FlightGlobal Fleets Forecast (2016)  
 "Total Part-Out Value Forecast" includes airframe (incl LG + APU) and engine shipset

# Flight Ascend Part-Out Value Forecast



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 "Total Part-Out Value Forecast" includes airframe (incl LG + APU) and engine shipset

# Maintenance reserves are key to closing the book value vs market value gap



## Importance of lessor (end-of-life) management:

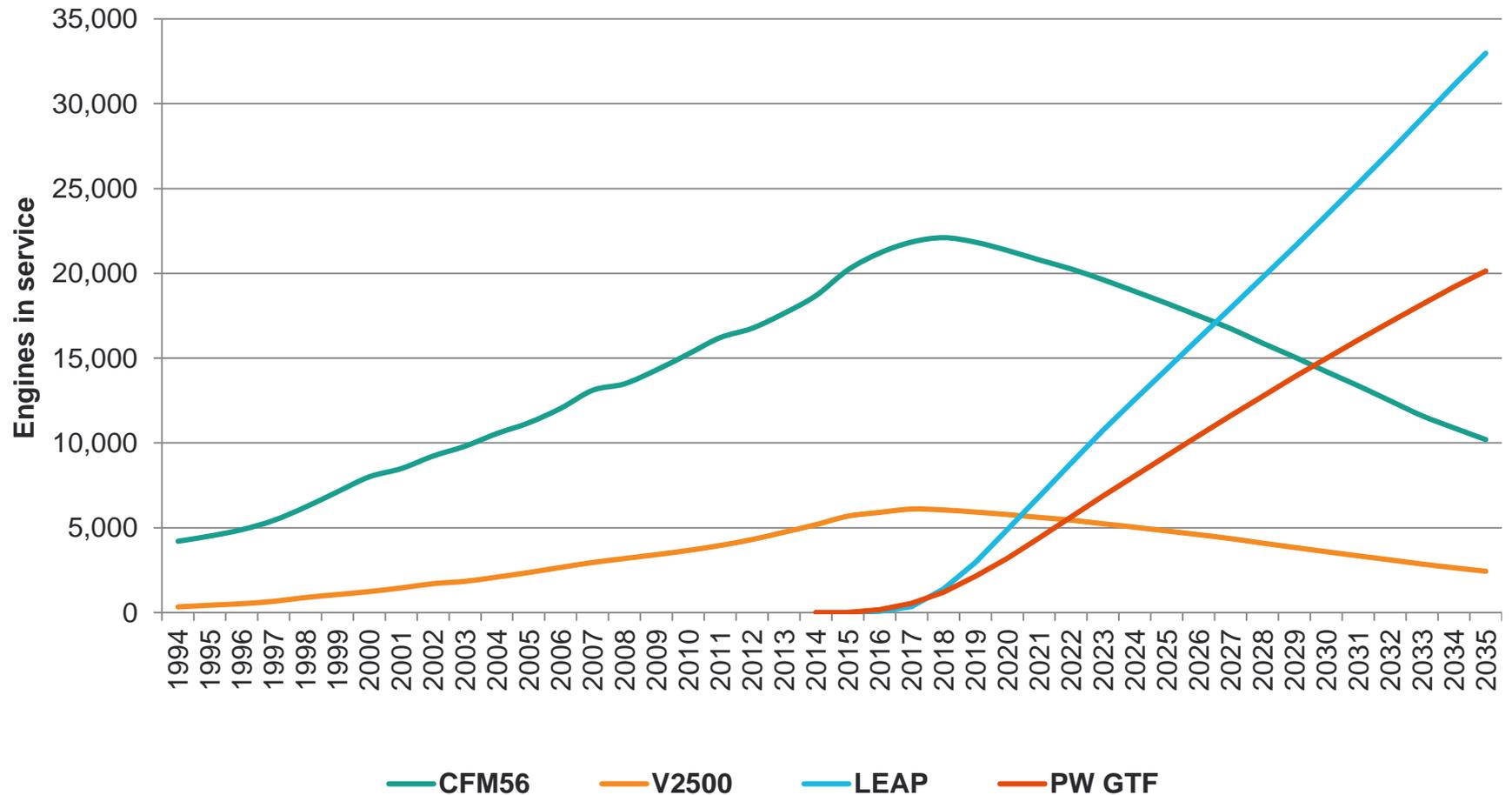
- ✚ In Q4 2012 Aerotron Ltd parted out an ex-Aircastle (former LATAM) V2500-powered A320 (1997-YOB; MSN 0758).
  - ✚ Ascend (“half-life”) CMV \$10.5 million
  - ✚ Book value \$16.5 million
  - ✚ Aircraft “disposal” via part-out:
    - ✚ **Maintenance reserves \$6.5 million**
    - ✚ Engine ‘sales’ \$8.4 million
    - ✚ Airframe sale \$2.3 million
  - ✚ Net sales value \$17.2 million
  - ✚ **Lessor realized net profit of \$0.7 million**
- ✚ Aircraft realized \$24-m rental over six years of ownership and an unlevered IRR of ~10%

Source: Aircastle Investor Presentation (April 2013), Flight Ascend Consultancy

# CFM56 will remain largest installed engine fleet until 2027



## LEAP & GTF have combined fleet of 29,500 engines by 2027

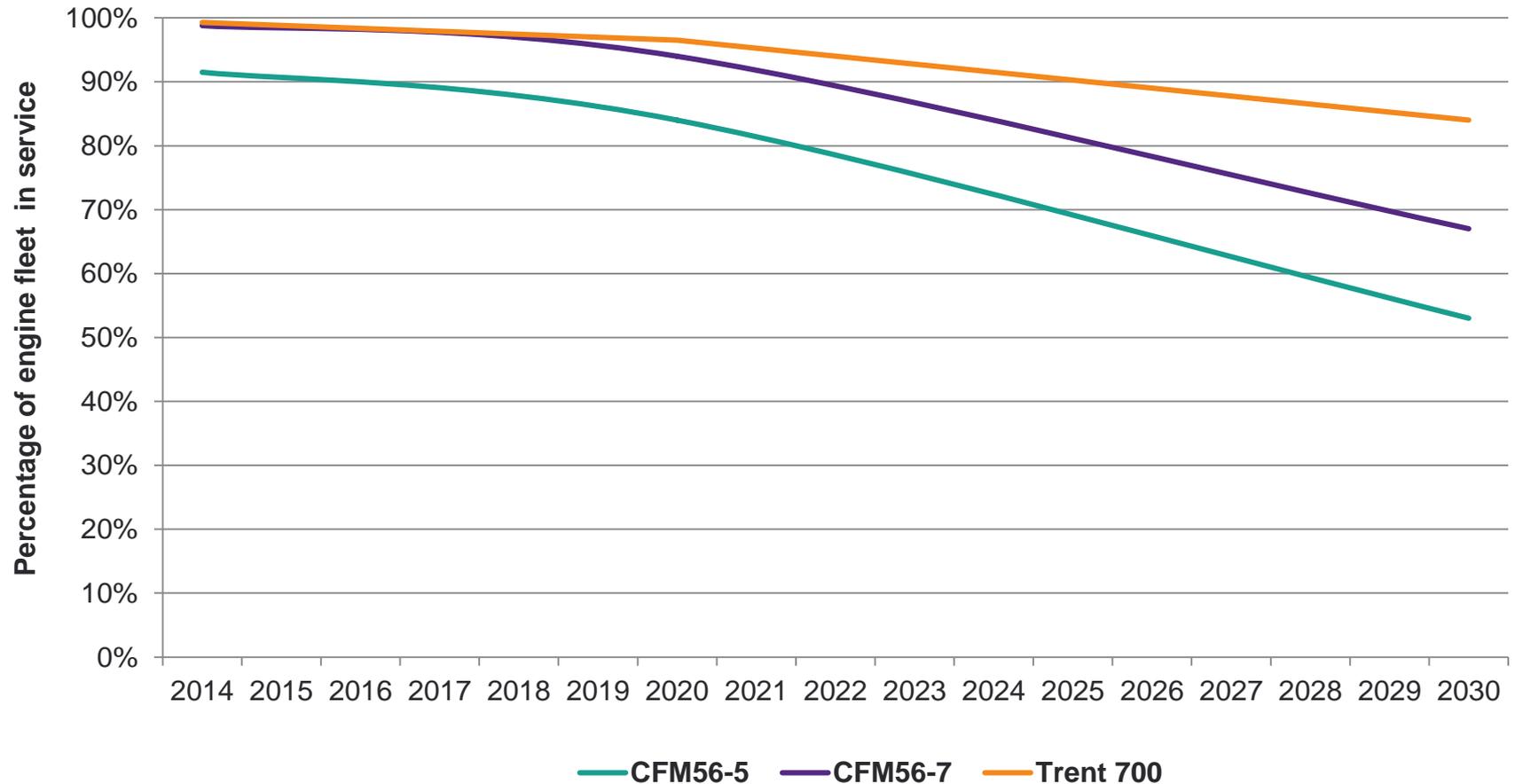


Source: Flight Fleets Analyzer & Flight Fleet Forecast 2016

# Part-out value driven by fleet decline



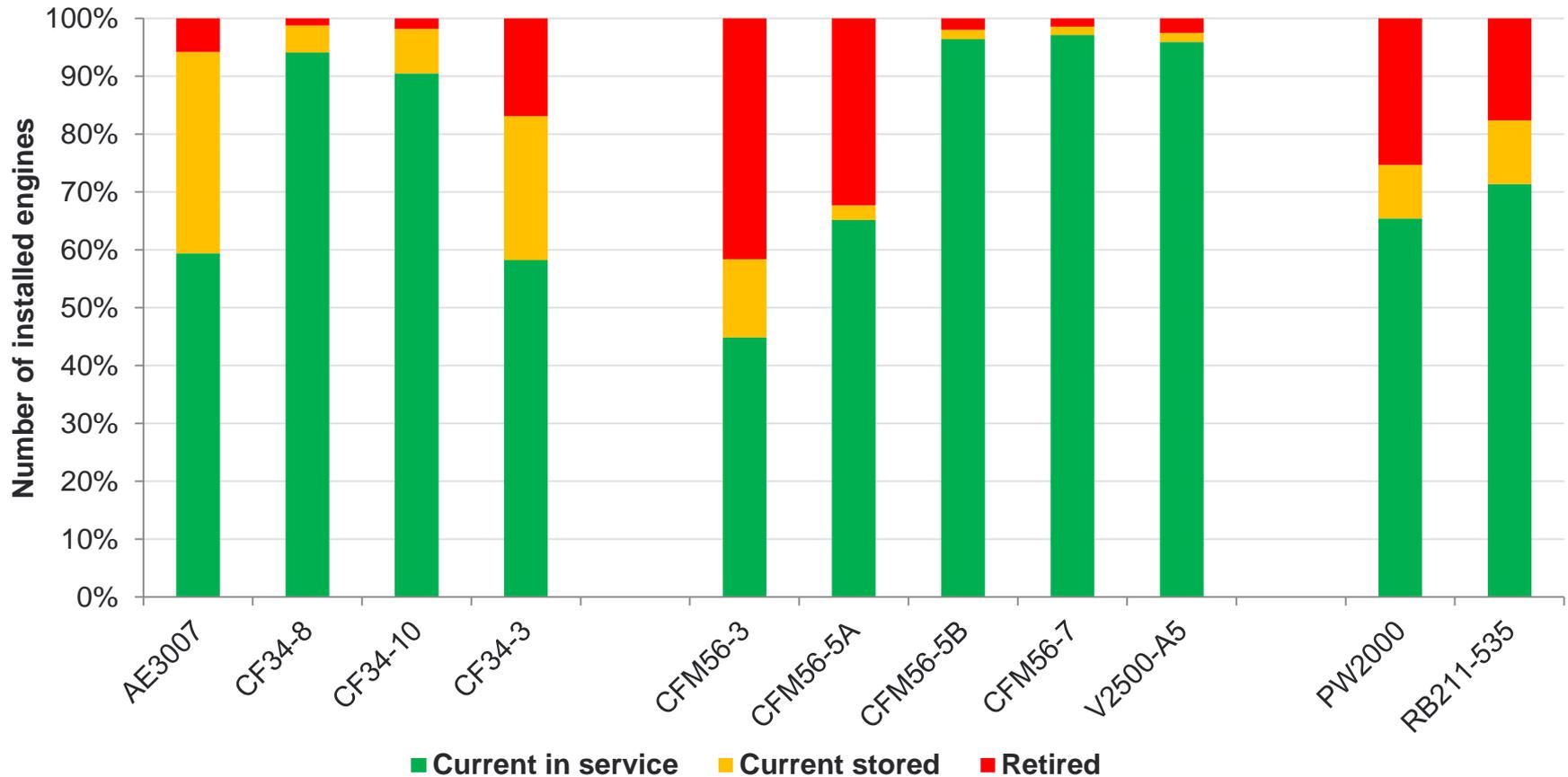
## Strong demand for spare engines until significant part-outs occur



Source: Flight Fleets Analyzer & Flight Fleet Forecast 2016

# RJ & NB fleet engines – proportion remaining in service

<5% of CFM56-5B, -7, V2500-A5 retired to-date

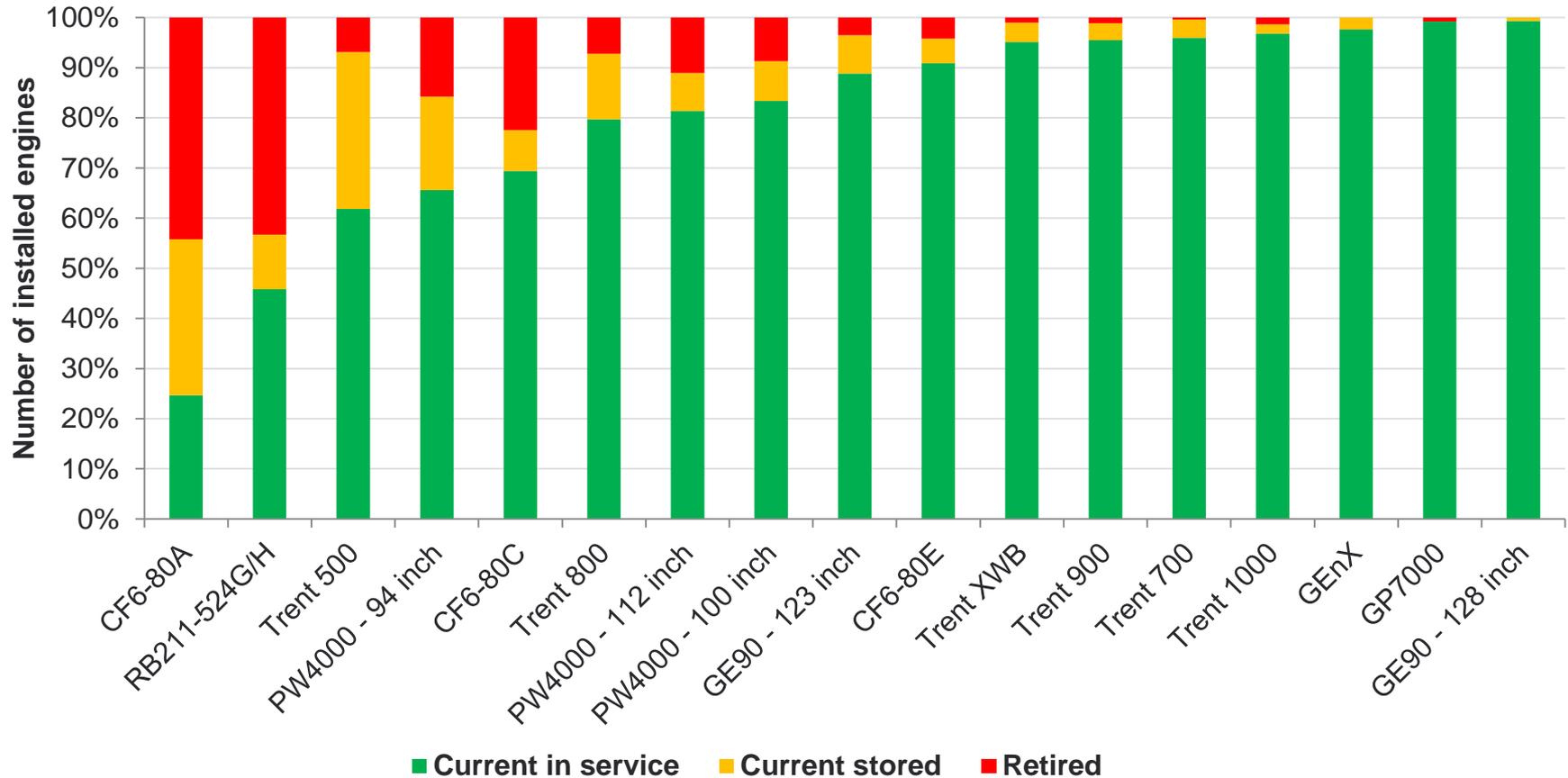


Source: Flight Fleets Analyzer

# WB engine fleets – proportion remaining in service



## Still a lot of opportunity even for those in 'sunset' phase



Source: Flight Fleets Analyzer

# Panel Discussion



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