

What's Next in Aircraft Certification under 14 C.F.R. Part 36?

Presentation to:
Airport Noise Abatement Committee



December 15, 2011

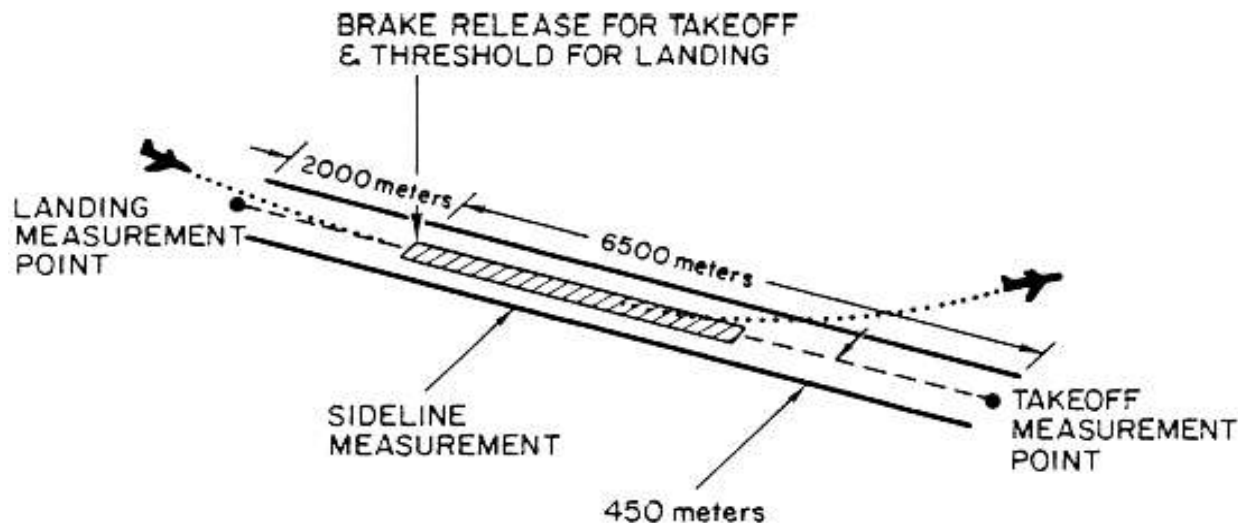
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14 C.F.R. Part 36: “Noise Standards: Aircraft Type and Airworthiness Certification”

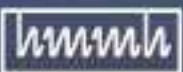


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- **Airplanes must meet Part 36 standards to receive new or revised U.S. operating certificates**
 - Jets are categorized into Stages 1, 2, 3, and 4
- **Certification is based on three measurements**
 - Landing, sideline, and takeoff



- Uses Effective Perceived Noise Level (EPNL, in units of EPNdB), which includes a penalty for discrete pure tones



Evolution of Part 36 Stages for Jets 1969 to 2006

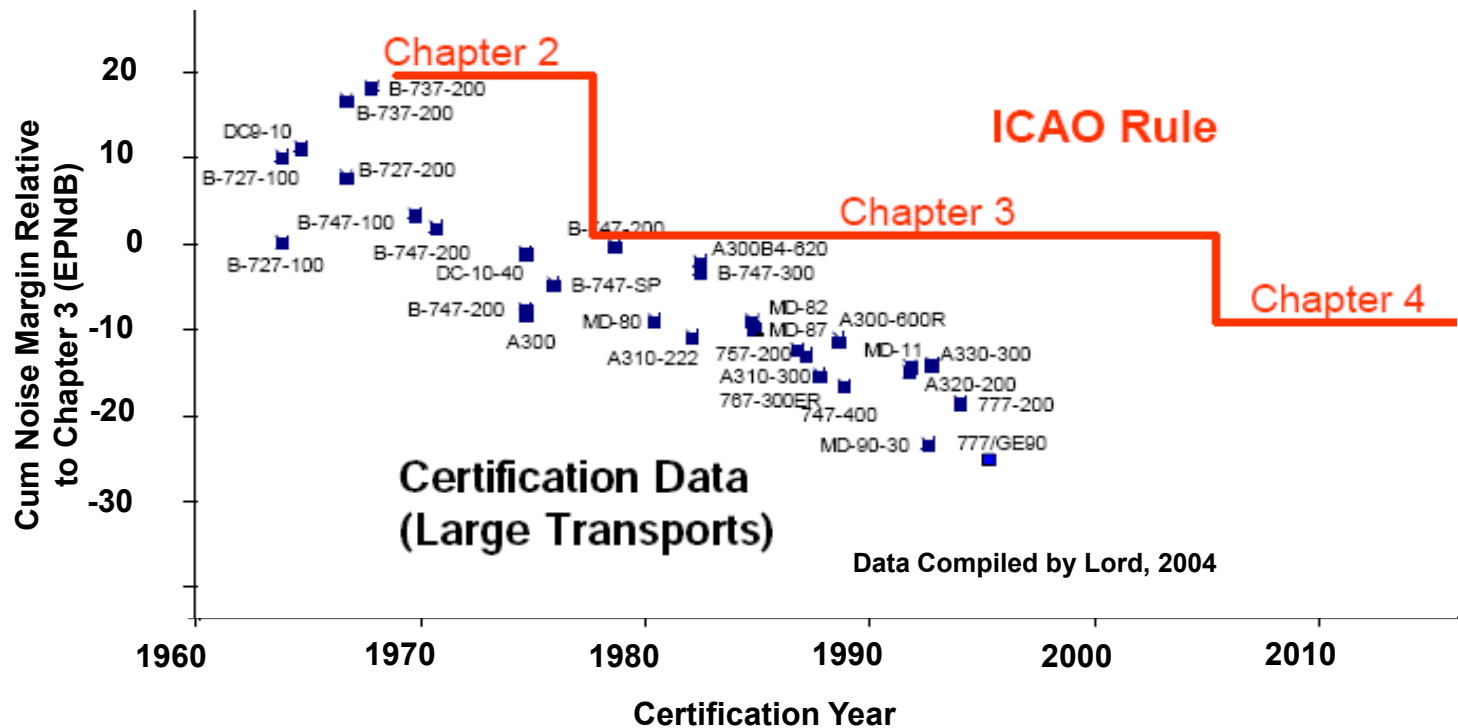


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- **1969: Established initial Part 36 standards**
 - Aircraft were certificated or uncertificated – no stages
- **1977: Increased stringency and introduced stages**
 - “Stage 1” aircraft have never been shown to meet any noise standards (either by failing or never having been tested)
 - “Stage 2” aircraft meet original 1969 limits
 - “Stage 3” aircraft meet more stringent 1977 limits
- **Congress required FAA to phase out Stage 1 and 2 jets**
 - Stage 1 jets – mid-1980s
 - Stage 2 jets – January 1, 2001
- **2005: Added Stage 4 (effective January 1, 2006)**
 - No Stage 3 phase out proposed to date

Part 36 is closely related to the International Civil Aviation Organization (ICAO) Annex 16

- **ICAO categorizes jets into Chapters 1, 2, 3, and 4**
 - Almost exactly the same as Stages 1, 2, 3, and 4
 - Standards have forced noise levels down over time
 - Stage 4 aircraft must be 10 EPNdB quieter than Chapter 3 standards summed across all three measurement locations

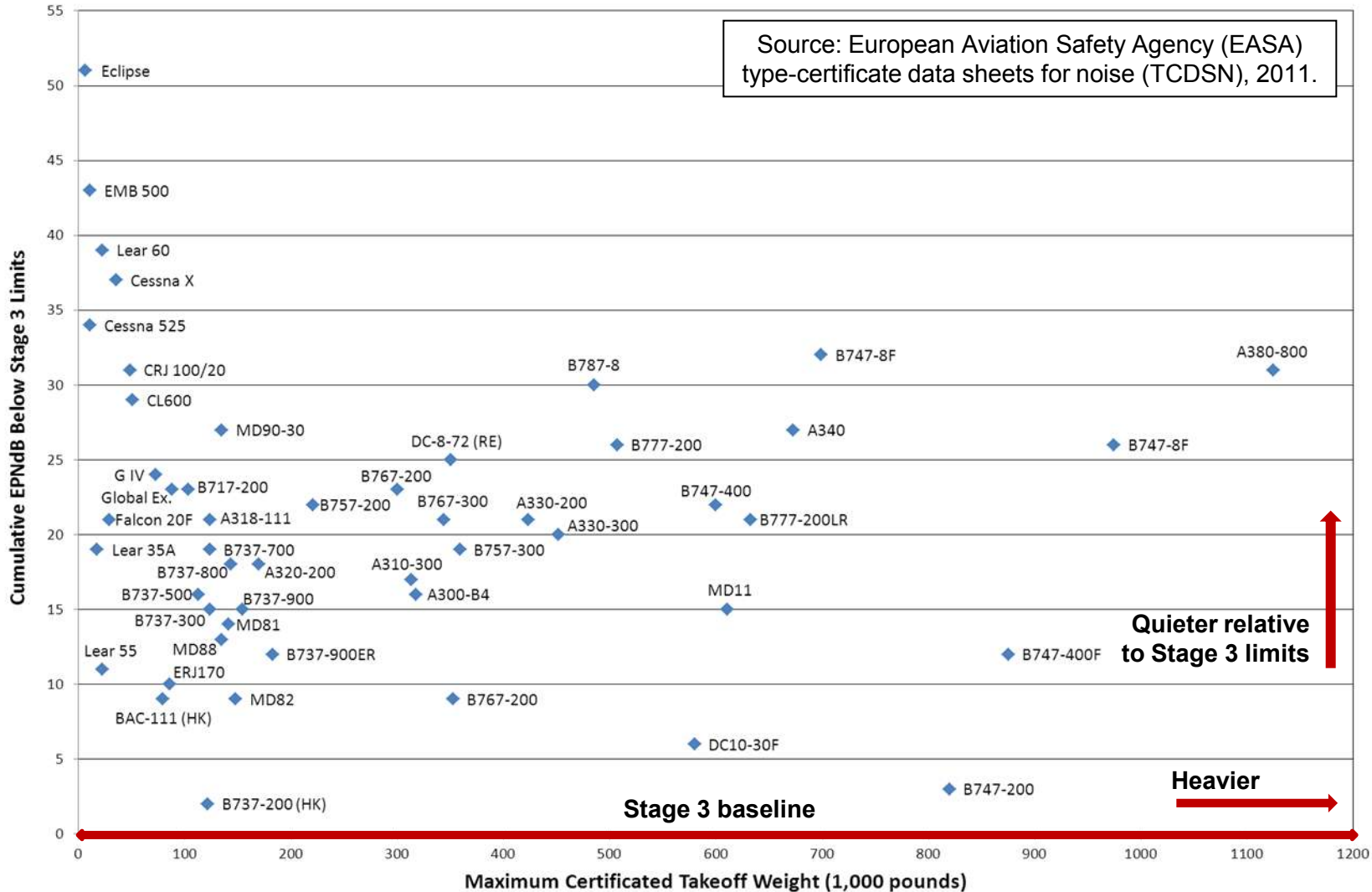


Margin of compliance with Stage 3 for selected Stage 3 and 4 aircraft



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Cumulative EPNdB under Stage 3 Limits versus Maximum Certificated Takeoff Weight

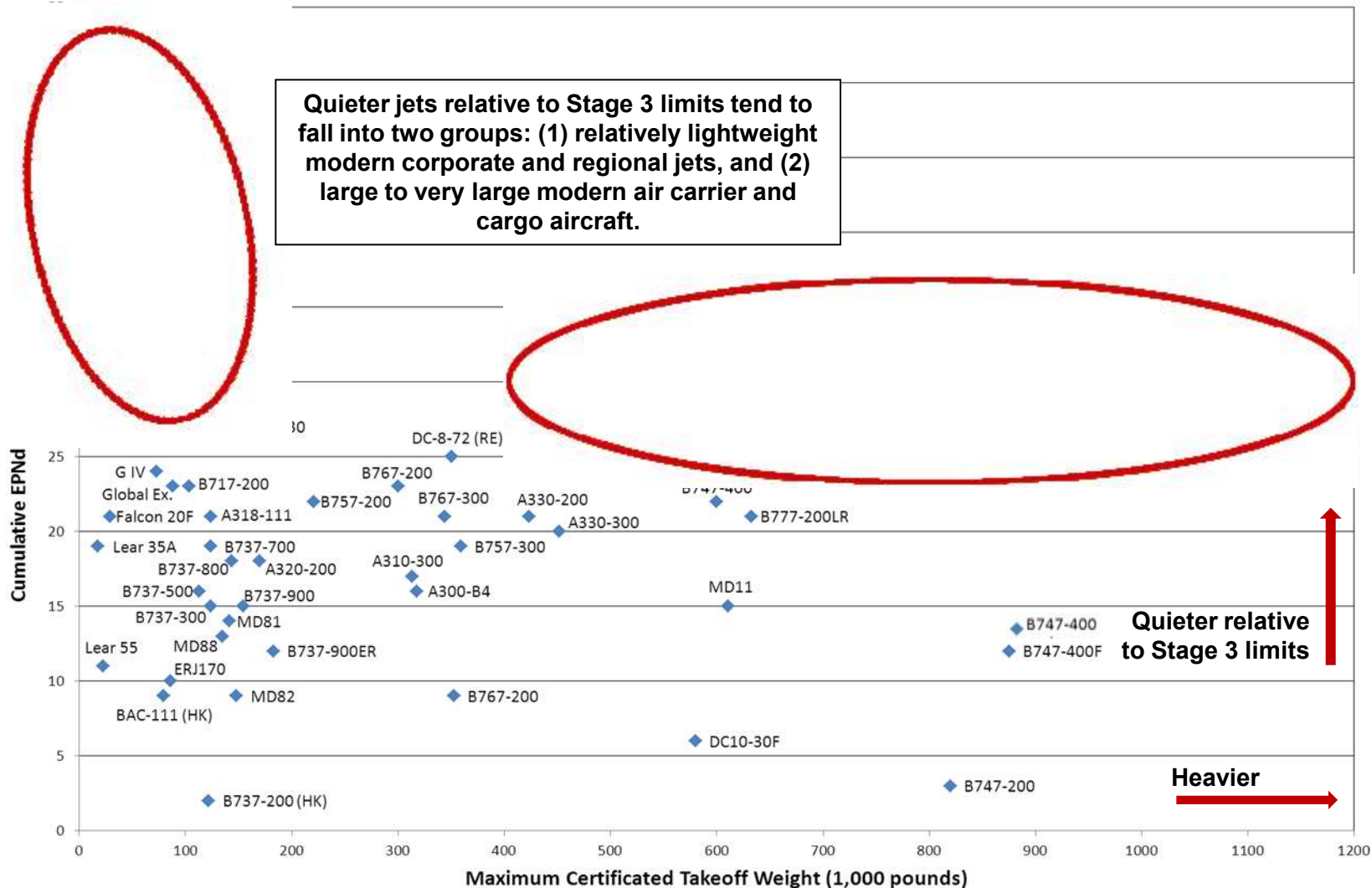


Newer jets are significantly quieter, whether large or small



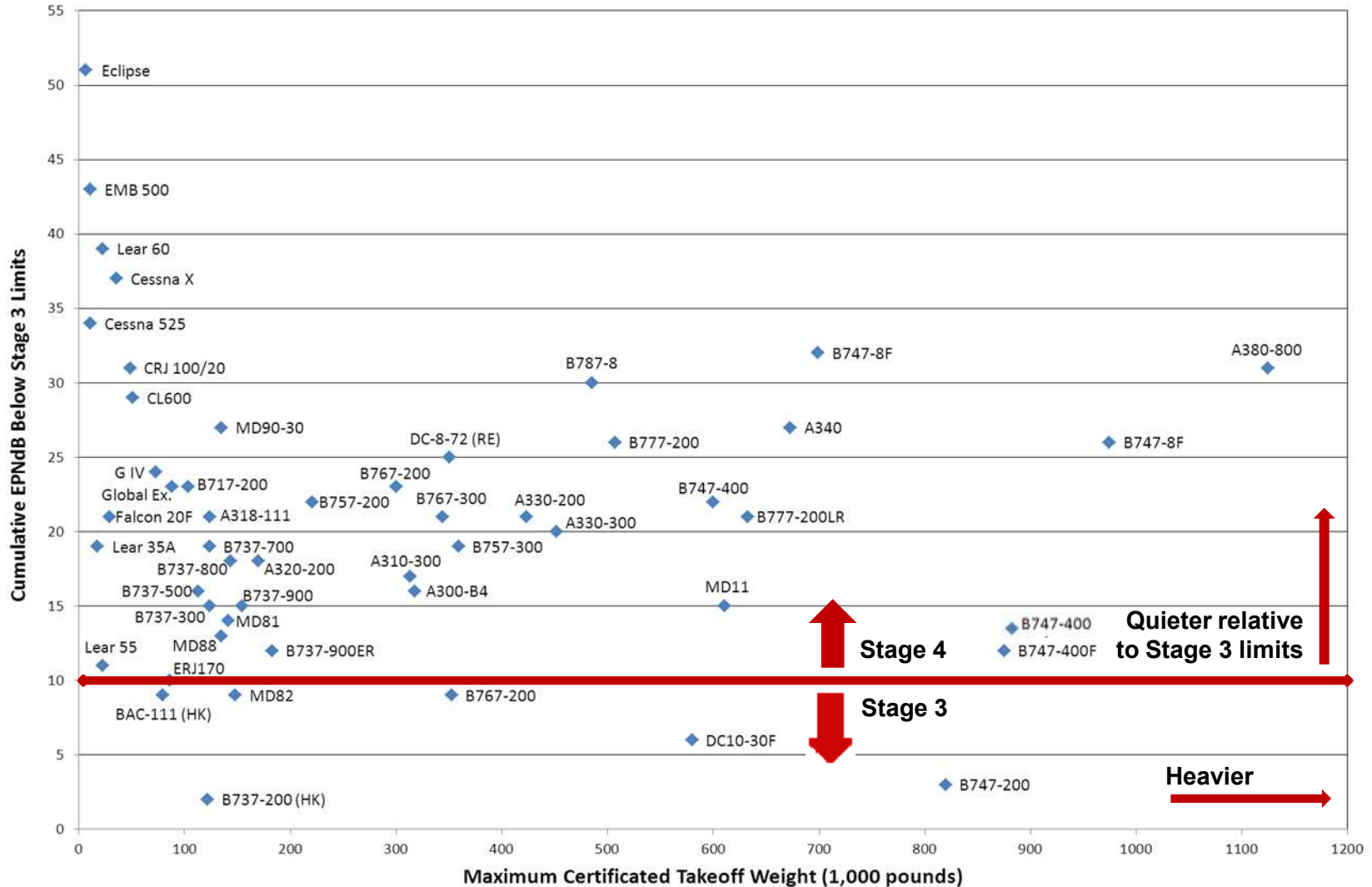
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Stage 4 affected few aircraft in production

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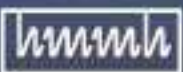


Where do we go next?



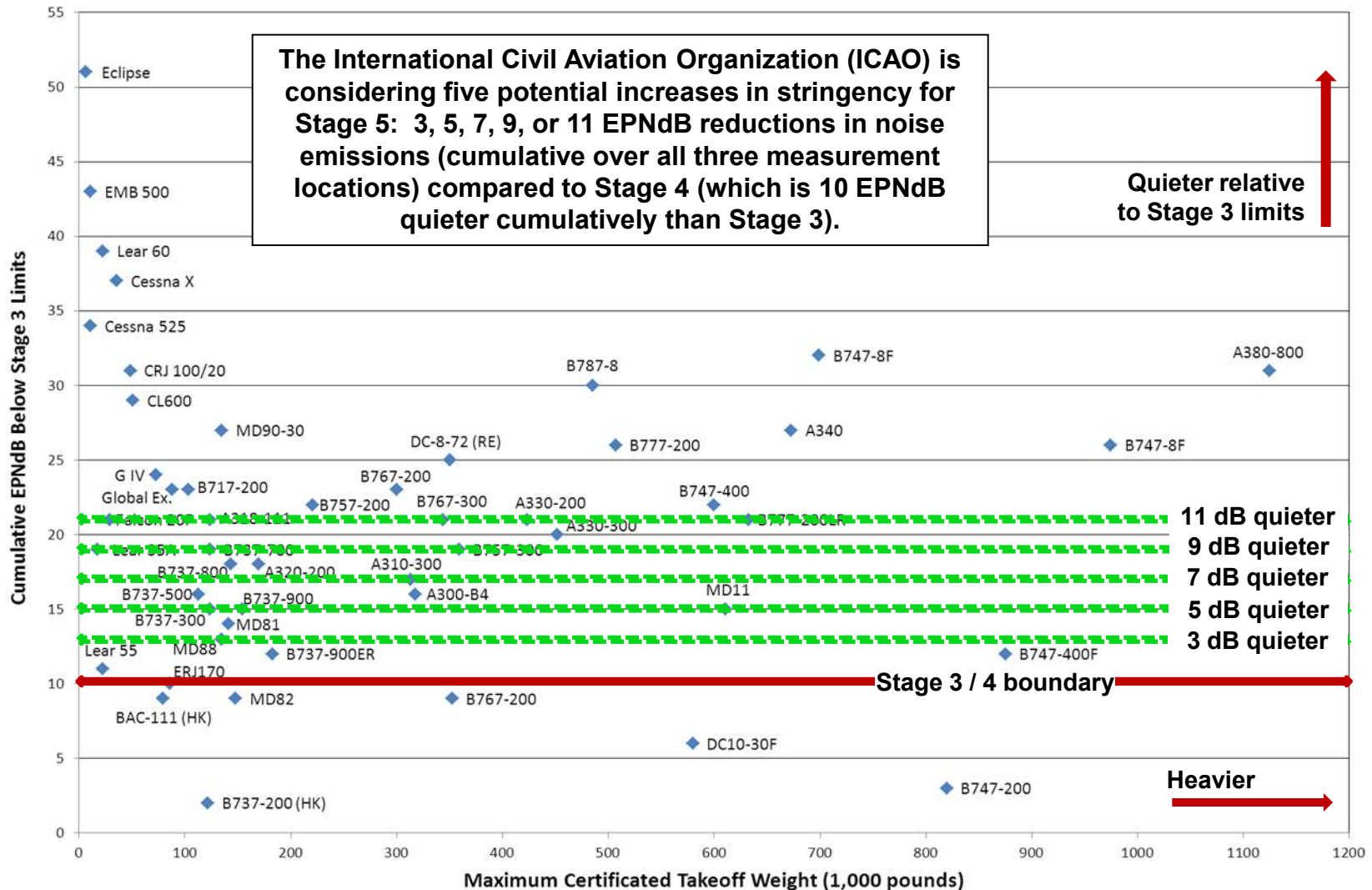
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- **House version of FAA reauthorization includes phase out of Stage 1 and 2 corporate jets**
 - Final act likely to include
- **Likely to be pressure over time for a Stage 3 phase out**
- **Senate version establishes “Consortium for Continuous Low Energy, Emissions, and Noise” (CLEEN) research**
 - Research objectives by 2016 include certifiable 32 EPNdB reduction relative to Stage 4
- **In the interim, ICAO is considering adoption of Stage 5 standards**
 - Target date is 2020
 - U.S. would almost certainly follow suit
 - Multiple noise reductions under consideration (next slide)



Chapter 5 / Stage 5 alternatives

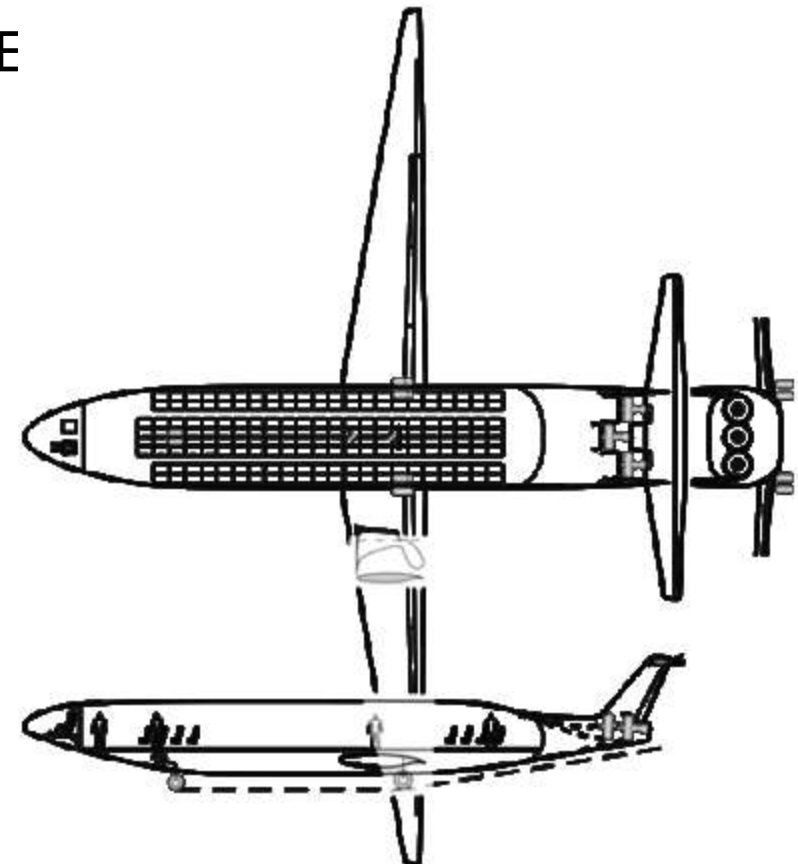
Cumulative EPNdB under Stage 3 Limits versus Maximum Certificated Takeoff Weight



What is on the distant horizon?

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- **NASA is considering dramatic changes in technology**
 - E.g., “double-bubble” modified tube and wing with lifting body
- **Similar in size to B737-800**
 - Could be cumulative 40 to 60 E
- **2030 – 2035 timeframe**



Thank you for your attention.

Questions?