

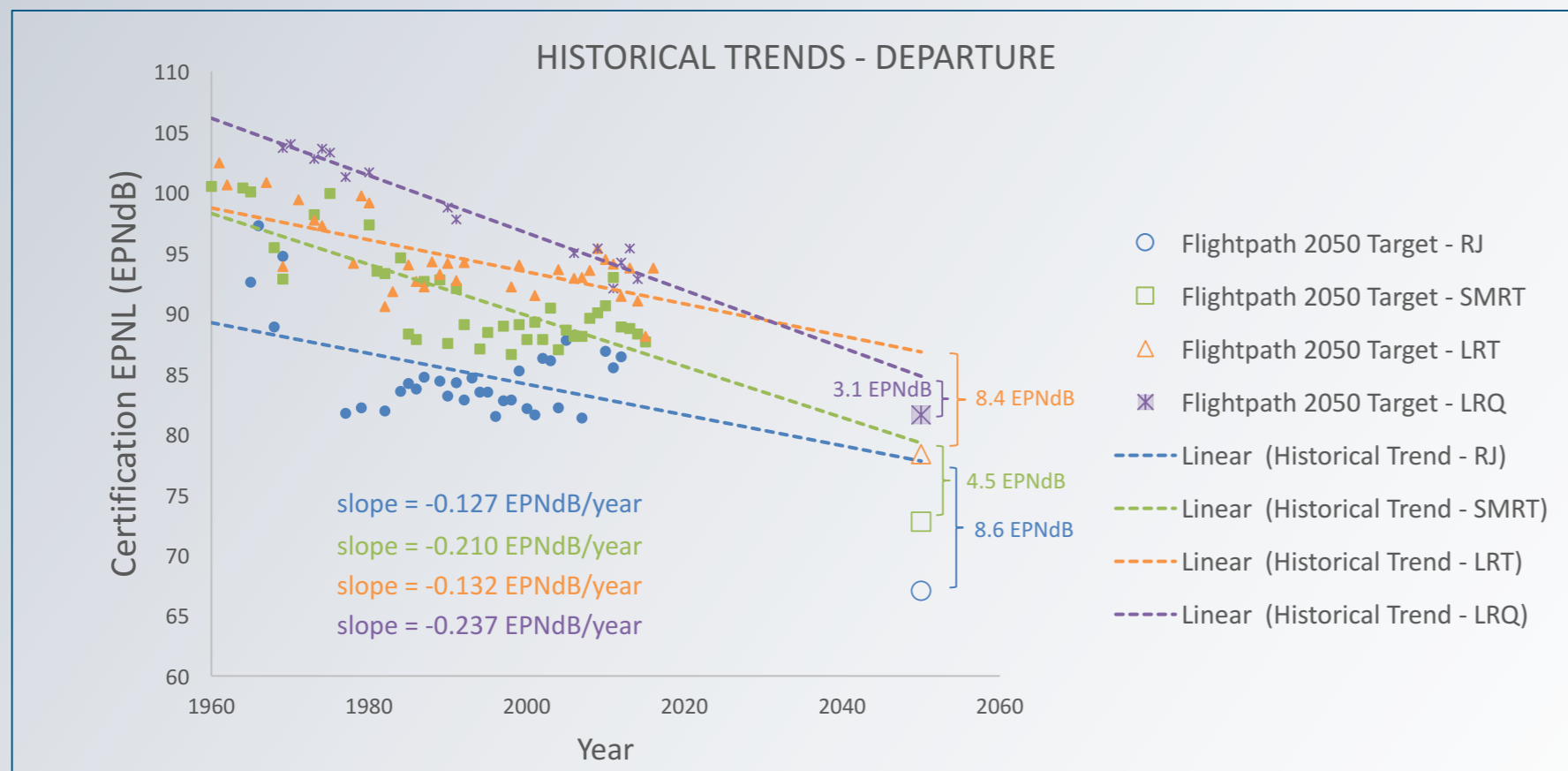
Noise Study

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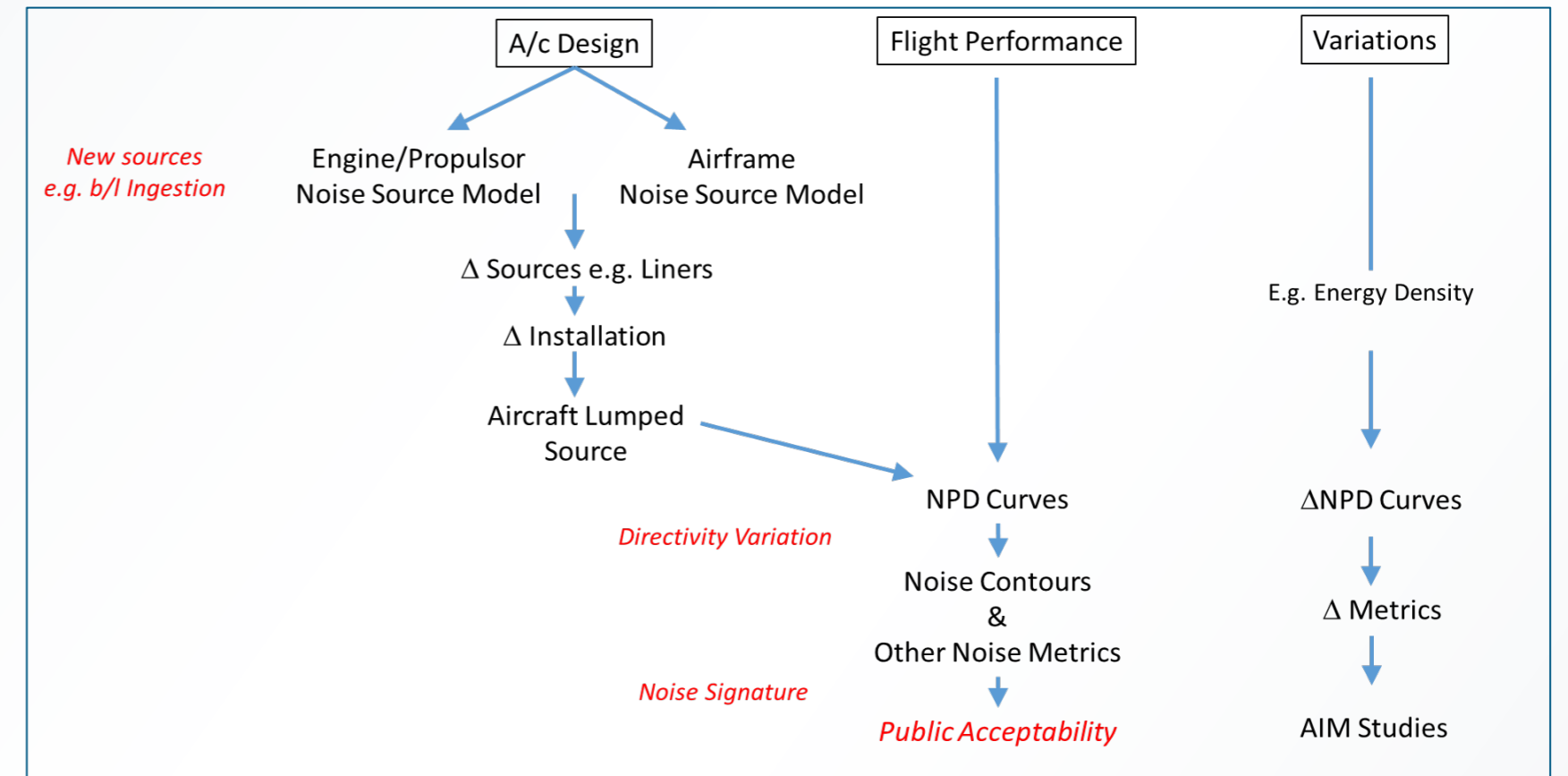
Objective

This study concentrated on undertaking a preliminary study of the likely noise impact of operating electric aircraft and of identifying gaps where further research is required.

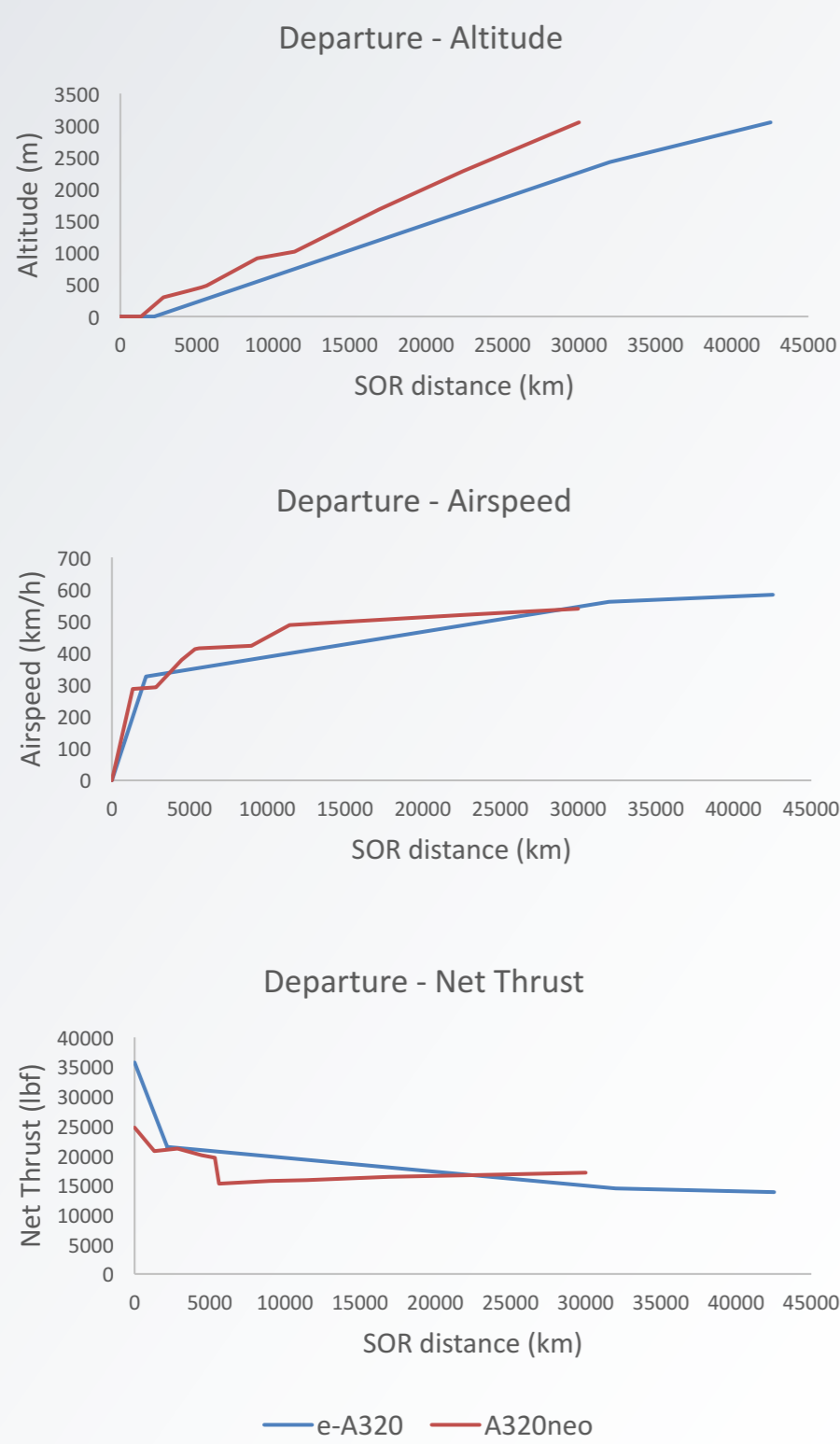
Motivation



Rationale

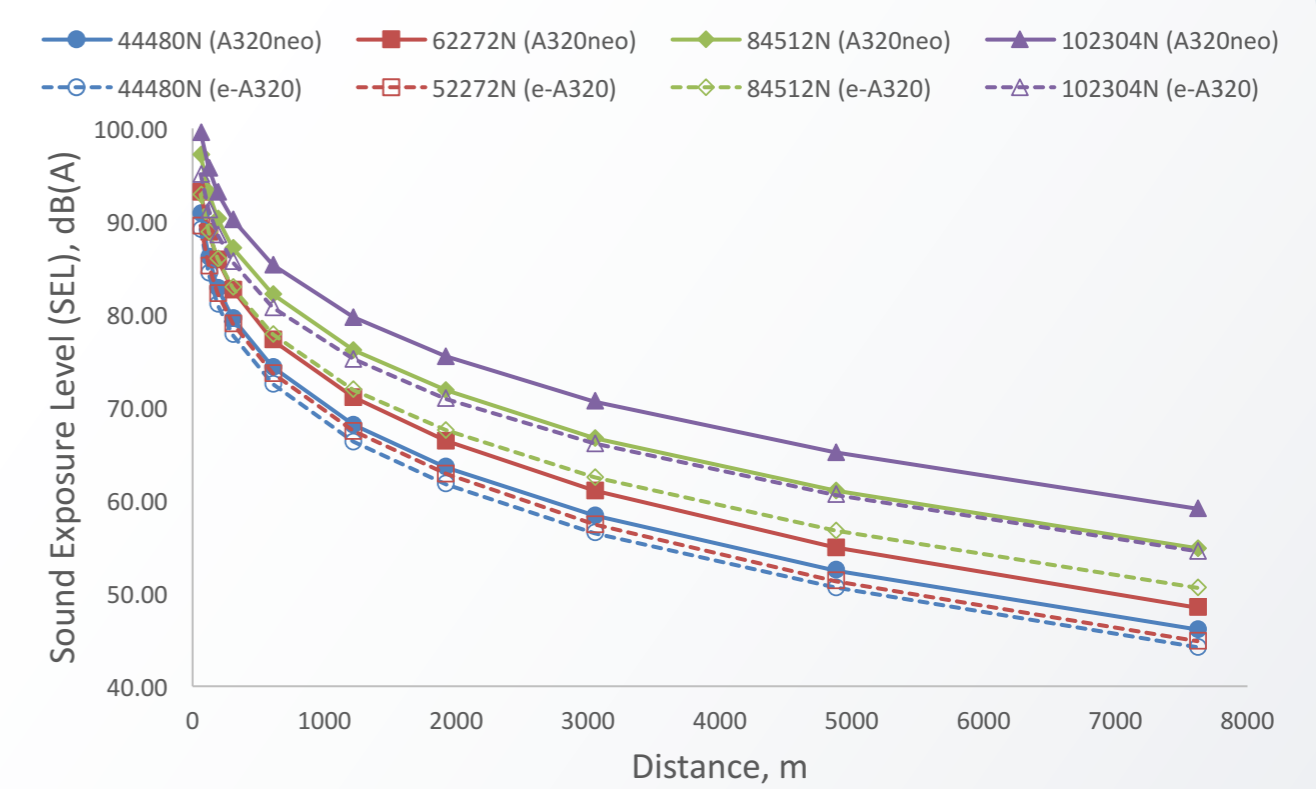


Noise Estimation

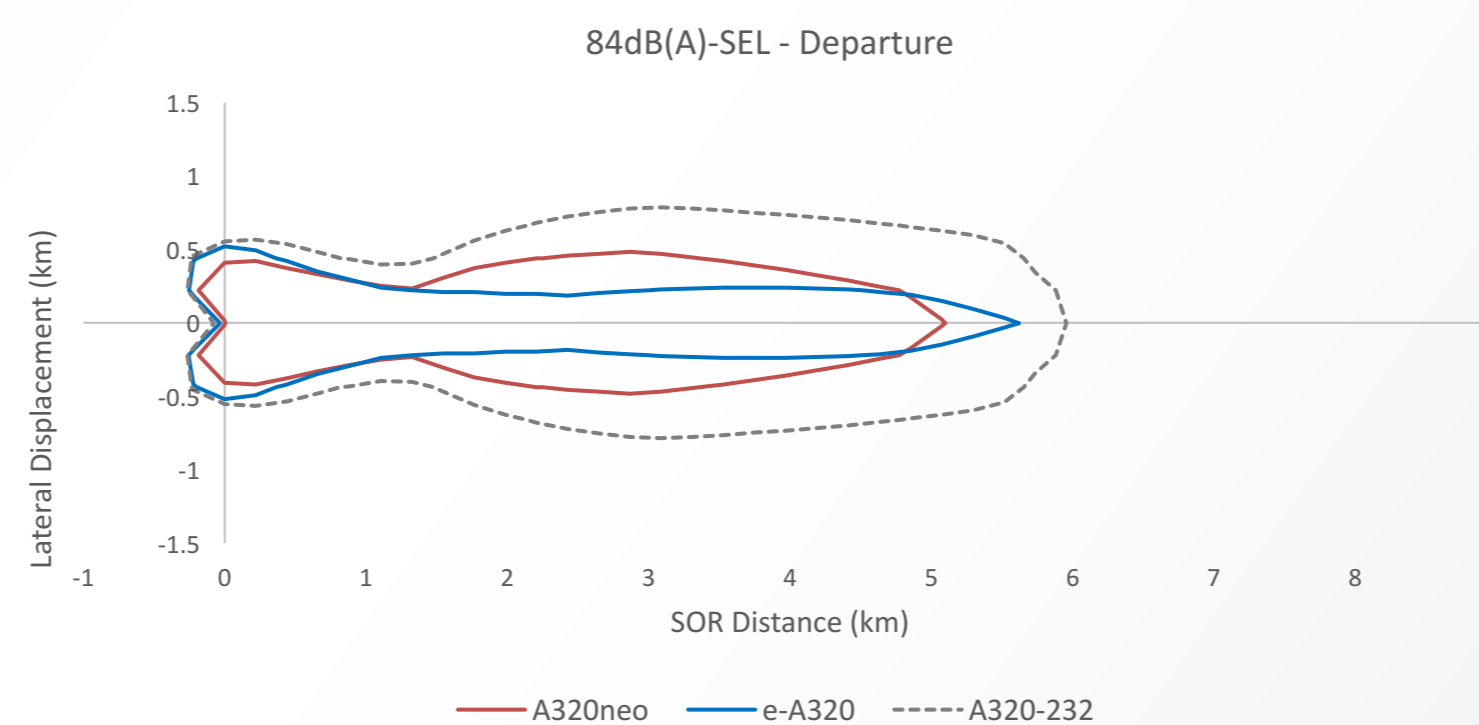


	A320neo	e-A320*
Number of propulsors	2	2
Fan diameter (m)	1.98	3.12
Rated thrust (kN)	120.64	159.01
Airflow at rated thrust (kg/s)	470**	995.44
Nozzle area (m ²)	0	5.14
Fan speed (rpm)	3894	2767**
FPR	1.43	1.2
BPR	11	0

Noise-Power-Distance (NPD) curves: Input parameters for calculation



Noise-Power-Distance (NPD) curves: A320neo vs. e-A320 (MIT design)

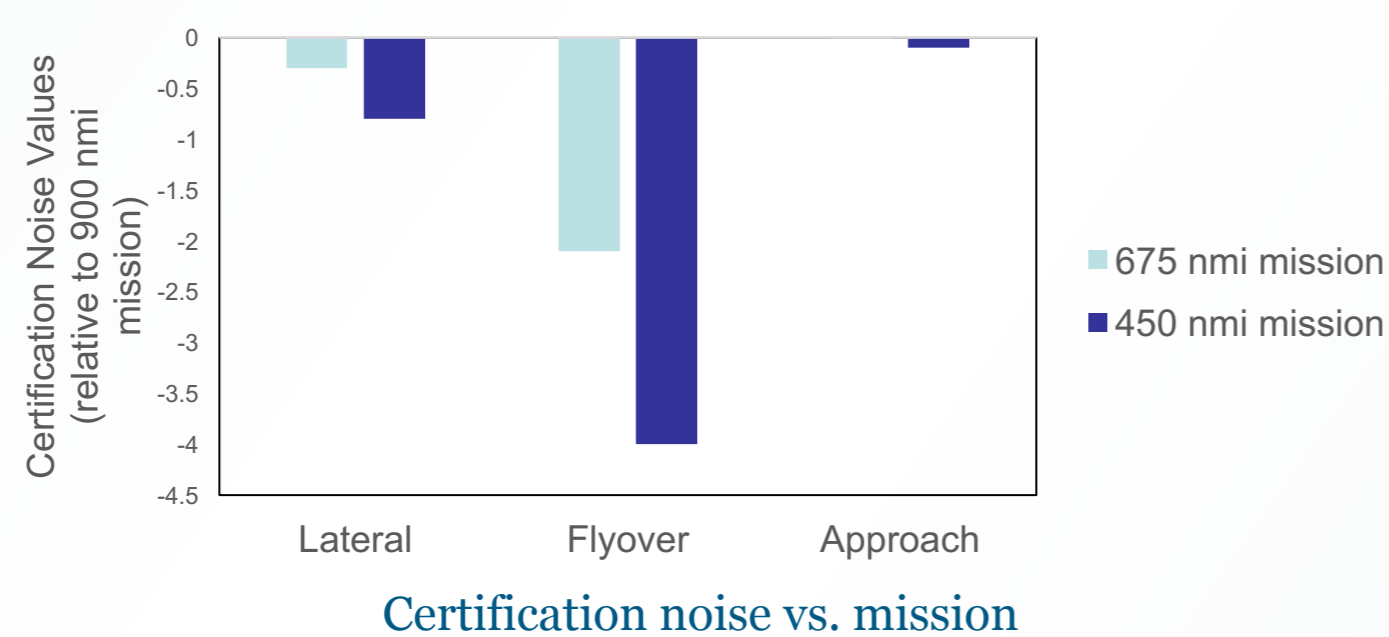


Aircraft	Noise Contour Area (84dB(A)-SEL)*
A320-232	7.4 km ² (+102%)
A320neo	3.7 km ²
e-A320	2.8 km ² (-23%)

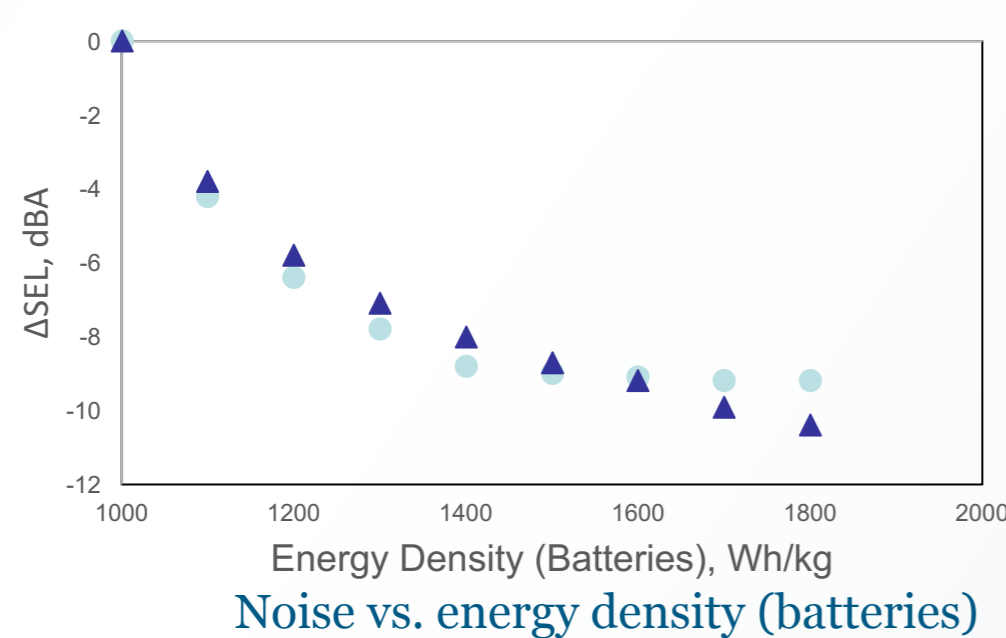
Noise Contour: A320neo vs. e-A320 (MIT design)

Operational profiles (position, altitude, airspeed and net thrust): A320neo vs. e-A320 (MIT design)

Parametric Studies



Certification noise vs. mission



Noise vs. energy density (batteries)

Conclusions & Research Needs

- This preliminary study focussed on a conventional aircraft design with turbo-fan engines replaced by battery powered electric ducted propulsors.
- Electric aircraft have the potential to achieve significant noise benefits – especially on short missions.
- Noise is highly dependent on operational procedures and constraints (e.g. flight profiles & recharging strategy).
- Approach noise can be higher than conventional aircraft. (However, the current study did not include potential reductions in airframe noise common to all aircraft types.)
- Further research is required to extend the present study to novel airframes and hybrid designs. E.g. installation effects and new sources such as those from b/l ingestion fan noise and flows close to surfaces.
- A study on fleet noise is currently being undertaken using the Sustainable Aviation noise tool and shows significant noise reduction around airports.