REDUCING IMPACT

- TECHNOLOGY
- DESIGN
- OPERATIONS
- REGULATION

WHAT ARE THE PRIORITIES?

- HOW CAN GBD HAVE MOST IMPACT?
- UK, EUROPE, WORLD
NOISE

- ENGINE TECHNOLOGY
- ENGINE DESIGN
- AIRFRAME TECHNOLOGY
- OPERATIONS
- PHASE OUT OF NOISIER TYPES
- LAND MANAGEMENT

- Exposure predicted to fall to a minimum between 2010 and 2020 and then rise again with growing traffic
LOCAL AIR QUALITY

- COMBUSTOR TECHNOLOGY
- ENGINE DESIGN
- PHASE OUT OF DIRTIER TYPES

- Conflict between reducing fuel burn and reducing $\text{NO}_x$
CLIMATE CHANGE

- CO$_2$
- NO$_x$
- CONTRAILS AND CIRRUS

- Most serious long term threat to continued growth of air transport
- Conflicts
REDUCING CO$_2$

- TECHNOLOGY
  - Reduce drag
  - Reduce weight
  - Increase propulsive efficiency

- DESIGN
  - Design range
  - Cruise Mach number
  - Cruise altitude
  - Advanced propellers

- INCENTIVES??
REDUCING NO\textsubscript{X} IMPACT

- TECHNOLOGY
  - Low NO\textsubscript{X} combustors

- DESIGN
  - Trade NO\textsubscript{X} for CO\textsubscript{2}
  - Design for minimum environmental impact

- OPERATIONS
  - Optimise cruise altitude

- INCENTIVES

- ATMOSPHERIC SCIENCE
REDUCING IMPACT OF CONTRAILS AND CIRRUS

- TECHNOLOGY
  Nothing to offer
- OPERATIONS
  Avoid cold moist air
- DESIGN
  Reduce economic impact of avoidance strategy
- INCENTIVES??
- ATMOSPHERIC SCIENCE
QUESTIONS FOR GBD

- UK PRIORITIES?
- RELATION TO EU PROGRAMMES?
- TECHNOLOGY v DESIGN v OPS
  - Relative potential?
  - In what timescale?
  - Is a change of mind set needed?
  - What incentives would work?
  - Is the atmospheric science solid enough to help focus design thinking?