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THE FUTURE OF COMMERCIAL AVIATION

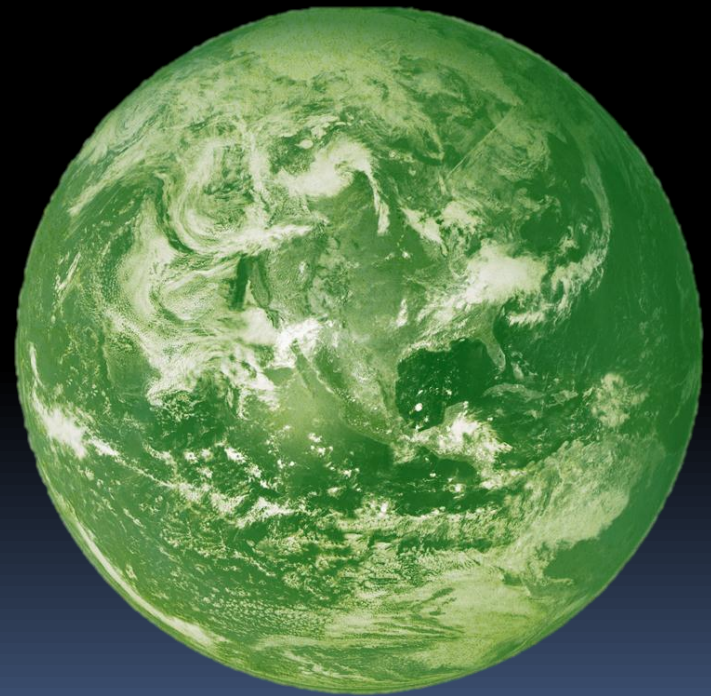
The Future: My Aspiration Statement

The experience of commercial aviation should become one that is comfortable, affordable and respectful.



Factors to be Considered

- Demographics (Population)
- Environment
- Politics
- Economics
- Culture and Society
- Technology



If No Changes Are Made...

Table (i): A summary of aircraft emission scenarios and forecasts for the UK: 1990-2050

	1990	2000 (*=2002)	2010	2020	2030	2040	2050
<i>Digest of UK Energy Statistics</i> bunker fuel and kerosene emissions (MtC)	5.1	9.7	-	-	-	-	-
UK total aviation emissions (DfT, 2004, <i>Aviation and Global Warming</i> central case, paragraph 3.57; +3 SE runways by 2030) (MtC)	4.6	8.8	10.8	14.9	17.7	18.2	17.4
UK total aviation emissions (Tyndall, 2005, no infrastructure constraints) (MtC)	-	8.1*	12	17	21	26	32
UK air passengers (DfT, 2004, <i>Aviation and Global Warming</i> central case, +3 SE runways by 2030) (mppa)	-	180	263	379	480	577	670
UK air passengers (Tyndall, 2005, no infrastructure constraints) (mppa)	-	169*	277	445	615	851	1,178

Table from the Tyndall Centre for Climate Change Research in the UK in 2005



Expected Future*

- Air traffic is expected to **double** by 2035
- By the year 2030, if advancements in sustainable energy and energy efficiency continue to progress and receive more support, there will be **less demand for the use of fossil fuels.**
- Since technologies such as solar and wind energy are temperamental, it seems **unlikely that commercial airplanes will cease to produce carbon emissions.**

* Based of f conversations with Environmental Engineers from Skanska

Expected Future Continued

- If more stationary powerhouses such as factories and power-plants become more energy efficient and **stop using natural oil, its value will decrease**. In this case, airplanes will be able to still run on kerosene and other fuels and still remain **cheap**.
- If air travel is cheaper, than the **process of going to the airport will hopefully more hassle free**. Already there are breakthroughs in terms of security; technology is being developed so that it detects weapons as well as respects the privacy of people.
- By 2040 it should be "run of the mill."



New Materials: Enabled Aerospace Advances

Engineering, Operations & Technology | Boeing Research & Technology

Global Technology

1970's – 1990's

- High Strength, Damage Tolerant Al
- 7050, 7150, 7055
- Fiberglass
- CRES
- Ti

2000's

- Carbon Thermoset Composites
- Ti

1940's – 1960's

- Low Strength Al
- 2024, 7075



- To 1940's
- Wood and Fabric



Tremendous strides in Material Science over the last century

Higher performance at lower cost

Timeline: Technology

- 2020: **Plans** are made federally to reduce the emissions of planes.
- 2030: These technologies are **manufactured**
- 2040: These technologies are **implemented** in airlines



Horizon 2020

- Primarily concerned with decreasing the environmental impact in the aviation sector.
- Environmental Data Models and Interface Development in Aviation (ENDAMI) set up an advisory board of supplying companies for the aviation sector to use their knowledge and **create new materials and programs** that are more environmentally friendly.
- **Building new software** to guide change and are partnering up with other organizations to make it happen.



2030:D Double Bubble Aircraft



About the Double Bubble

- Designed to **use 70% less fuel**. Will reduce noise, lower nitrogen oxide emissions and can use shorter runways
- Engines **sit at rear** of fuselage rather than wings to let slower moving air enter the engines (meaning less fuel consumption)
- Slightly longer flight time and more stress on engines
- Hopes to be in the sky by **2035**

Airport Security

- The ideal is that the TSA generate technology that is **thorough** yet **non-invasive**
- Danger is **racial profiling** and intrusive scanners
- By **2030**, hopefully a balance between security and respect for privacy will be established



Politics/Population

- As the population increases, there will be **more demand for commercial flights**
- Like the EU, the United States needs to implement a future program like Horizon 2020 to **outline guidelines.**
- Plans should be finished by 2020 and carried out in 2030 and 2040





Economics



- It is most likely that the **prices will decrease** over time as flights will become more popular
- 2020: Fuel is slightly more expensive due to supply and demand, but newer technologies are in the process of being developed
- 2030: Investments are made in environmentally technologies.
- 2040: Flights are cheaper since planes use less fuel.

Culture and Society

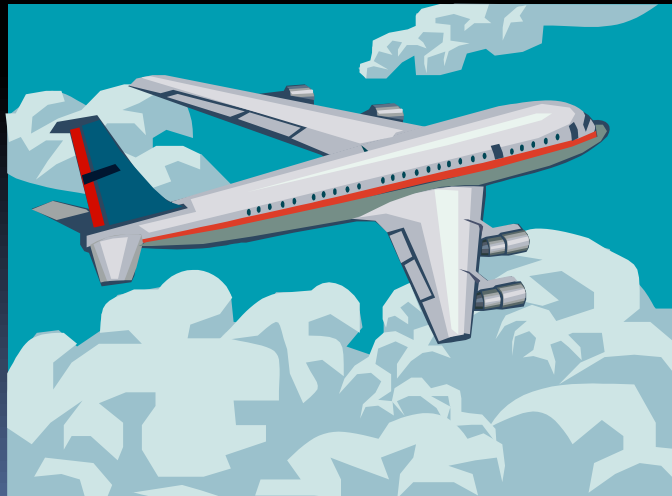
- **Danger:** If sensationalism of a “war on terror” creates panic
- **Danger:** If simple questioning becomes racial profiling/harassment
- **Preferred:** People of lower socioeconomic status will be able to access flights if prices decrease
- Check-in will probably become completely automated.
- **Likely:** More multimedia entertainment will be available on planes for those who pay extra

Negative Future

- Another **threat to national security** creates more security at airports.
- The government gives permission for airport security to **racially** and **ethnically** profile passengers, creating tension and frustration as well as violation of privacy
- The growing demand of flights exceeds environmentally friendly technology and **pollution increases exponentially.**

Preferred Future

- Cheaper flights
- Effective security that does not violate the privacy of passengers
- Environmentally friendly technology





EU "Clean Sky" Concepts

Airbus



NASA/Bowing



NASA/MIT



NASA / Lockheed Martin



NASA / Northrop Grumman



NAAS / Boeing



Future Airliner Study



EADS

- http://cordis.europa.eu/fetch?CALLER=ICT_UNIFIEDSRCH&ACTION=D&DOC=4&CAT=PROJ&QUERY=0135f54508c3:da2e:2197179d&RCN=101281
- <http://www.youtube.com/watch?v=xoiDFA2Mc7Y>
- <http://www.gizmag.com/mit-double-bubble-green-aircraft/15142/>
- <http://www.youtube.com/watch?v=gd4gAHmRJWo>
- http://www.foe.co.uk/resource/reports/aviation_tyndall_research.pdf
- <http://www.youtube.com/watch?v=gZgC8Fln-FQ&feature=related>
- <http://www.aeroconf.org.il/events/missing%20papers/50.pdf>
- <http://www.youtube.com/watch?v=YyCTpZvjW1U>
- <http://www.youtube.com/watch?v=rouOrvftl4c>