Reducing aircrafts carbon emissions

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Introduction

- Air travel is a rapidly growing contributor of greenhouse gas emission globally
- Globally, the commercial airplane fleet emits over 600 million loads of carbon gas, world's major greenhouse gas
- Crowded skies reflects more working airplanes which is equivalent to increased fuel burning and waste
- Consequently, increased fuel consumption in the aviation industry reflects increased carbon dioxide emissions which ultimately, contribute to global warming
- Airline carbon footprint is growing spontaneously. If not addressed, airplane carbon emissions could amount to at least 15% of the global carbon emissions (Capoccitti, Khare, & Mildenberger, 2015)

Approaches to reduce airplane carbon emissions-Alternative Energy Solution

- The more fuel aircrafts burn, the more greenhouse gases are emitted into the atmosphere. As a result, airlines industries should consider using alternative sources of energy
- Energy sources such as biofuels, solar cells and fuel cells emit less carbon into the atmosphere
- Biofuels use liquid kerosene fuels to power the planes. Biofuels are less pollutant and are much cleaner
- Fuel cells convert hydrogen into energy without burning which reduces carbon emissions
- Solar cells convert sunlight energy into electricity which is a cleaner source of energy (Koch, 2015)

Increase number of passengers per flight

- Statistically, a passenger travelling at least 3000 miles generates approximately 2 tons of carbon dioxide
- Increasing the number of passengers on every flight by 2% saves the airline company over 200million operation costs and reduces carbon emissions by 0.3% per flight (Kisska-Schulze & Tapis, 2015)

Engine technology

- Reductions in carbon emissions can be reached by corresponding the improvements in engine technology to advanced aerodynamic form and using lighter materials to minimize drag.
- Engine development and improvement must increase efficiency which reduces carbon dioxide emissions while reducing water vapor and other air pollutants
- Using an engine that has a light weight carbon fiber fans reduces fuel per passenger by 20% which also reduces the carbon emissions per passengers (Capoccitti, Khare, & Mildenberger, 2015)

Non-stick coatings that repel bug guts

- When a bug hits an aircraft and bleeds, the blood changes chemically making it stickier
- When the raptured blood accumulate on the wings, the cause the airplane to drag increasing the fuel burn
- Non-stick coating are designed to slide off insect residue off the aircraft wings (Koch, 2015)

Designing the craft in new shapes and smaller vertical tails

- Smaller vertical tails reduces the weight of the craft and the drag reducing the fuel consumption and emissions
- According to NASA tests, reducing the vertical tail size by at least 17% percent reduces fuel usage by approximately 0.5% significantly reducing the carbon emissions
- Designing the craft with a wider double fuselage can improve fuel efficiency
- the design incorporates the engines into the fuselage so the wings are made from lighter and thinner materials reducing the weight of the craft (Kisska-Schulze & Tapis, 2015)

Using electric wheels

- Considering the time allocation of a mission, an aircraft spends only 85% of the allocated time on air, and the 15% of the time s spent on the ground
- Instead of using jet fuel to run aircrafts on the ground, taxiing could be facilitated by an electric motor in the landing gear
- Using electric wheel to propel the plane on the ground reduces up to 2.8% of carbon emissions per flight
- Planes on the ground can also use a single engine to taxi the plane on the tarmac (Epstein & O'Flarity, 2019).
- Planes using a single engine taxiing on tarmac reduces fuel burns by 37%

Reduce idle time before takeoff

- When a plane sits idly on the tarmac, it is burning more fuel which increases its carbon emission
- To address this issue, the control should hold back the plan to avoid the excessive congestion and only release the plane when it can go to the runway quickly
- Reducing airplane congestions reduces at least 0.8% of the carbon emissions (Epstein & O'Flarity, 2019)

References

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