INDUSTRIAL RESEARCH PROJECT ON

Environmental impact of aviation

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ACKNOLEDGEMENT

The success and final outcome of this assignment required a lot of guidance and assistance from many people and I am extremely fortunate to have got this all along the completion of our assignment work. Whatever I have done is only due to such guidance and assistance and I would not forget to thank them. I respect and thank Mr. Dinesh Kumar Pandey for giving an opportunity to do this assignment work and providing me all support and guidance which made me complete the assignment on time, I am extremely grateful to her for providing such a nice support and guidance.

Saket Taneja

CONTENT

Environmental impact of aviation

The environmental impact of aviation occurs because aircraft engines emit heat, noise, particulates and gases. Like other emissions resulting from fossil fuel combustion, aircraft engines produce emissions, rising environmental concerns over their global impact and their local air quality effect. Airplanes emit gases (CO_2, water vapour, nitrogen oxides or carbon monoxide − bonding with oxygen to become CO_2 upon release) and atmospheric particulates (incompletely burned hydrocarbons, sulfur oxides, black carbon), interacting among themselves and with the atmosphere. While the aviation industry is more efficient, halving the amount of fuel burned per flight compared to 1990 through technological advancement and operations improvements, overall emissions have risen as the volume of air travel has increased.

Climate change Factors

The aviation industry is encouraged to account and reduce its global warming contribution beyond direct CO_2 emissions. While the main greenhouse gas emission from powered aircraft is CO_2, jet airliners contribute to climate change in four ways as they fly in the tropopause

Carbon dioxide (CO_2)

CO_2 emissions are the most significant and best understood contribution to climate change .The effects of CO_2 emissions are similar regardless of altitude. Airport ground vehicles, those used by passengers and staff to access airports, emissions generated by airport construction and aircraft manufacturing also contribute to the greenhouse gas emissions from the aviation industry.

Nitrogen oxides

In the tropopause, emissions of NO_x favour ozone (O_3) formation in the upper troposphere. At altitudes from 8 to 13 km (26,000 to 43,000 ft), NO_x emissions result in greater concentrations of O_3 than surface NO_x emissions, and these in turn have a greater global warming effect. The effect of O_3 surface concentrations are regional and local, but it becomes well mixed globally at mid and upper tropospheric levels. NO_x emissions also reduce ambient levels of methane, another greenhouse gas, resulting in a climate cooling effect, though not offsetting the O_3 forming effect. Aircraft sulphur and water emissions in the stratosphere tend to deplete O_3, partially offsetting the NO_x-induced O_3 increases, although these effects have not been quantified.Light aircraft and small commuter aircraft fly lower in the troposphere, not in the tropopause.

Contrails and Cirrus clouds

Fuel burning produces water vapour, which condenses

at high altitude, under cold and humid conditions, into visible line clouds: condensation trails (contrails). They are thought to have a global warming effect, though less significant than CO_2 emissions. Contrails are uncommon from lower-altitude aircraft. Cirrus clouds can develop after the formation of persistent contrails, and can have an additional global warming effect. Their global warming contribution is uncertain, and estimating aviation's overall contribution often excludes cirrus cloud enhancement.

Particulates

Compared with other emissions, sulphate and soot particles have a smaller direct effect: sulphate particles have a cooling effect and reflect radiation, while soot has a warming effect and absorbs heat, while the clouds' properties and formation are influenced by particles. Contrails and cirrus clouds evolving from particles may have a greater radiative forcing effect than CO_2 emissions. As soot particles are large enough to serve as condensation nuclei, they are thought to cause the most contrail formation. Soot production may be decreased by reducing the Aromatic compound of jet fuel

Other effects

Increased CO_2 concentrations also develop ocean acidification

in the Southern Ocean. An ecological tipping point is projected to occur by the year 2030 and no later than 2038.

Contrails decrease the daytime temperature and increase the night-time temperature, reducing their difference. In the southern US, the difference was diminished by about 3.3 °C (6 °F), and by 2.8 °C (5 °F) in the US Midwest.

Types of pollution caused by an aircraft

1. Air pollution
2. Noise pollution
3. Water pollution

Air pollution

Earlier studies had assumed that people were harmed only by the emissions from planes while taking off and landing. The new research is the first to give a comprehensive estimate of the number of premature deaths from all airline emissions.

Airplane exhaust, like car exhaust, contains a variety of air pollutants, including sulphur dioxide and nitrogen oxides.

Many of these particles of pollution are tiny, about a hundred millionths of an inch wide, or smaller than the width of a human hair.

So-called particulate matter that's especially small is the main culprit in human health effects, especially since the particulates can become wedged deep in the lung and possibly enter the bloodstream, scientists say.

Effects of Air pollution

Emission of Greenhouse Gases:-

Aircraft engines combust fuel to emit carbon dioxide, water vapor, nitrogen oxides, carbon monoxide, and soot. Nitrogen oxides emitted by aircraft contributes to global warming and is a pollutant in the lower atmosphere whereas it destroys the stratospheric ozone layer in the high altitudes.

The impact of carbons released by airplanes is no small issue considering that the emissions are realized at a higher altitude and faster.

Emissions at higher altitudes pose a greater danger because they trigger a series of chemical reactions and atmospheric effects cover wider areas. It is even recorded that traveling by air has a greater environmental impact per kilometre as compared to other forms of transport such as driving. Even as other industries receive significant improvements on emission levels; that of the aviation industry stagnates.

Noise pollution

Aircraft noise is seen by advocacy groups as being very hard to get attention and action on. The fundamental issues are increased traffic at larger airports and airport expansion at smaller and regional airports. Aviation authorities and airlines have developed Continuous Descent Approach procedures to reduce noise footprint. Current applicable noise standards effective since 2014 are FAA Stage 4 and (equivalent) EASA Chapter 4.Aircraft with lower standards are restricted to a time window or, at many airports, banned completely. Stage 5 will become effective between 2017–2020. Quantification and comparison of noise effects per seat distance takes into account that noise from cruise levels usually does not reach the earth surface (as opposed to surface-transportation) but is concentrated on and in proximity to airports.

Affect of noise Pollution caused by an aircraft

as a result of the aviation industry can be regarded as debatable. This is because noise produced by airplanes is short-lived. However, to those residing or those near airports are affected hugely by the noise.

Some of the adverse effects that these people face include sleeping disturbances, performance effects, and interference with communication along with cardiovascular and psycho-psychological effects.

Water Pollution

Fuel and chemical spills

Airports can generate significant water pollution due to their extensive use and handling of jet fuel, lubricants and other chemicals. Airports install spill control structures and related equipment (e.g., vacuum trucks, portable berms, absorbents) to prevent chemical spills, and mitigate the impacts of spills that do occur.

Affect of water Pollution caused by an aircraft

In cold climates, the use of de-icing fluids can also cause water pollution, as most of the fluids applied to aircraft subsequently fall to the ground and can be carried via stormwater runoff to nearby streams, rivers or coastal waters. Airlines use de-icing fluids based on ethylene glycol or propylene glycol as the active ingredient. Airports also use chemical de-icers on runways, taxiways and other paved surfaces, which tend to run off into nearby bodies of water. Pavement de-icers may contain potassium acetate, glycol compounds, sodium acetate, urea or other chemicals.

Ethylene glycol and propylene glycol are known to exert high levels of biochemical oxygen demand (BOD) during degradation in surface waters. This process can adversely

affect aquatic life by consuming oxygen needed by aquatic organisms for survival. Large quantities of dissolved oxygen (DO) in the water column are consumed when microbial populations decompose propylene glycol.

Sufficient dissolved oxygen levels in surface waters are critical for the survival of fish, macroinvertebrates, and other aquatic organisms. If oxygen concentrations drop below a minimum level, organisms emigrate, if able and possible, to areas with higher oxygen levels or eventually die. This effect can drastically reduce the amount of usable aquatic habitat. Reductions in DO levels can reduce or eliminate bottom feeder populations, create conditions that favour a change in a community's species profile, or alter critical food-web interactions.

Air quality

Particulate emissions

Ultrafine particles (UFPs) are emitted by aircraft engines during near-surface level operations including taxi, take-off, climb, descent, and landing, as well as idling at gates and on taxiways. Other sources of UFPs include ground support equipment operating around the terminal areas. In 2014, an air quality study found the area impacted by ultrafine particles from the take-offs and landings downwind of Los Angeles International Airport to be much larger than previously thought.

Typical UFP emissions during take off are on the order of 1015–1017 particles emitted per kilogram of fuel burned. Non-volatile soot particle emissions are 1014–1016 particles per kilogram fuel on a number basis and 0.1–1 gram per kilogram fuel on a mass basis, depending on the engine and fuel characteristics.

Effect on local ecosystem

Airport buildings, taxiways and runways occupy part of the local ecosystem. Most of aircraft movement however is in air at altitude and so is away from direct interaction with sensitive natural surface features or human detection. This is different from roads, railways and canals, which are very significant in use of land

and the dividing of ecological zones.

Solutions and remedies to Reduce Impact of Aircraft pollution on the Environment

1. Setting up of Regulations

as a solution to environmental degradation as a result of air travel, the regulation of the industry is needed. International Civil Authority (ICAO) in 2016 proposed the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) which gives airline restrictions on carbon emissions. If the limit is exceeded, then airlines will buy offsets from other sectors. This, however, did not perform as expected proving to the complexity of regulating airlines, therefore, leaving the responsibility of regulating the number of carbon emissions to Kyoto Protocol whose responsibility is limited to

domestic flights.

The issue of regulating the aviation industry should, therefore, be treated as other transport policy and its consistency maintained so as to protect the climate. In order for regulations and policies to take place, international cooperation should be enhanced to achieve its efficiency.

2.Use of Technology

To deal with the problem of climate impact by the aviation industry, technology can be used in the design and systems of planes to make them more efficient. A breakthrough in the use of another type of fuel that is greener, like biofuels, hydrogen, solar panels, and batteries, could save the world from the degradation of the environment by aircraft engines running on kerosene.

However, the rate at which this progress is made cannot be compared to the rate at which the number of passengers are buying tickets. Also, the fact that aircraft have to carry their own fuel is one that should be dealt with and have such engineering problems looked into and a solution is reached.

3.Carbon Offsetting Programs

Charging the number of greenhouses emitted into the air by aircraft could go a long way in discouraging pollution. These charges should be made payable by airlines for every ton of greenhouses emitted. Like other transport operators, it obliges airlines to pay for the pollution they cause thereby limiting them to lower amounts of emission because it comes at a price.In addition to emission costs, the government can also add environmental and social costs. Most airplanes have embraced this and have

been coming up with projects that help offset their carbon footprints.There is a mechanism that helps in the calculation of the amount of carbon footprint created by a flight and the money generated in offsetting allows the airplane companies to start projects that protect the environment.

4.Using Alternative Means

One of the most effective ways to reduce the amount of carbon footprint is by flying less often. This means in the case where other forms of transport are available, it is not a must for an individual to fly.

Instead, driving or taking the train to the destination as a preference for the majority of the people would mean airlines burn less fuel. Taking holidays that are not so far away could also help in the reduction of greenhouse gas

emissions.

5. Use of Computer Programs to Reduce Noise Pollution As a means of preventing noise pollution by airports to its neighbourhood, computer programs can be used to simulate aircraft operations to identify areas that are prone to such disturbances.Virtually predicting the extent of noise levels using the International Noise Model can be used to address the issue. The model is widely used to come up with aircraft noise footprints for a certain number of aircraft at average weather conditions

6.Optimization of Flight Routes In a bid to protect the climate, optimizing flight routes can reduce the negative effects of flying. Having a flight plan that avoids weather conditions, which results in the creation of

clouds is among the best strategies.By limiting the formation of clouds, it aids in the release of earth's radiation into space resulting in a cooling effect. With the proper formulation of routes, climate protection by aircraft can be achieved. Plus, airlines with routes that pollute less can be charged less money for pollution certificates.

7. Invention of Alternative Energy Sources

Aircraft engines, unlike other engines, have no other greener alternative such as the use of solar or other renewable energy. Technological advancement in the sector might lead to electric planes that emit less and are more fuel efficient. However, the sector remains negligent in matters of the environment.For instance, most airline websites mention little about environmental protection or have completely nothing to do with the environment. Also, NGOs that deal with

the environment are reluctant on the matter. Such negligence can be attributed to a huge concentration on profits earned by airlines that have seen the industry continue to grow irrespective of how bad flying is for the planet.

Conclusion

Air travel generates noise, causes air pollution and contributes to global warming. Without additional policy measures, the share of aviation in each of these problems will continue to rise in the years ahead, even though a reduction in greenhouse gas emissions is essential to combat climate change.

BIBLIOGRAPHY

➢ https://ortec.com/en/dictionary/

➢ https://www.glship.com/services/

➢ https://larustt.com/en/post/68/AirTransportation ➢

https://fas.org/sgp/crs/homesec/RL32022.pdf ➢

http://www.utdallas.edu/~metin/aircargo.pdf ➢

https://www.swissairroadcargo.com/ and-disadvantages/

➢ https://en.wikipedia.org/wiki/_airline

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Environmental impact of aviation
The environmental impact of aviation happens as a result of craft engines emit heat, noise, particulates and gases. Like alternative emissions ensuing from fuel combustion, craft engines manufacture emissions, rising environmental considerations over their world impact and their native air quality result. Airplanes emit gases (CO_2, vapour, gas oxides or carbon monoxide gas carbon monoxide gas with O to become CO_2 upon release) and atmospherical particulates (incompletely burned hydrocarbons, sulfur oxides, black carbon), interacting among themselves and with the atmosphere. whereas the aviation business is additional economical, halving the quantity of fuel burned per flight compared to 1990 through technological advancement and operations enhancements, overall emissions have up because the volume of aviation has inflated.

Climate change Factors
The aviation business is inspired to account and scale back its heating contribution on the far side direct CO_2 emissions. whereas the most gas emission from battery-powered craft is CO_2, jet airliners contribute to global climate change in four ways in which as they fly in the layer

Carbon dioxide (CO_2)
CO_2 emissions square measure the foremost important and best understood contribution to global climate change .The effects of the results square measure similar despite altitude. landing field ground vehicles, those employed by passengers and employees to access airports, emissions generated by landing field construction and craft producing conjointly contribute to the gas emissions from the aviation business.

Nitrogen oxides
In the layer, emissions of NO_x favour gas (O_3) formation within the higher layer. At altitudes from eight to thirteen kilometre (26,000 to 43,000 ft), NO_x emissions lead to larger concentrations of O_3 than surface NO_x emissions, and these successively have a larger world
warming result. The result of O_3 surface concentrations square measure regional and native, however it becomes well mixed globally at middle and higher tropospheric levels. NO_x emissions conjointly scale back close levels of alkane series, another gas, leading to a climate cooling result, tho' not antagonistic the O_3 forming result. craft sulphur and water emissions within the layer tend to wipe out wipe out, part antagonistic the NO_x-induced O_3 will increase, though these effects haven't been quantified.Light craft and tiny commuter craft fly lower within the layer, not within the layer.

Contrails and Cirrus clouds

Fuel burning produces vapour, that condenses at high altitude, underneath cold and wet conditions, into visible line clouds: condensation trails (contrails). They square measure thought to possess a world warming result, tho' less important than CO_2 emissions. Contrails square measure uncommon from lower-altitude craft. Cirrus clouds will develop once the formation of persistent contrails, and may have an extra heating result. Their world warming contribution is unsure, and estimating aviation's overall contribution usually excludes cloud improvement.

Particulates

Compared with alternative emissions, salt and soot particles have a smaller direct result: salt particles have a cooling effect and replicate radiation, whereas soot encompasses a warming result and absorbs heat, while the clouds' properties and formation square measure influenced by particles. Contrails and cirrus clouds evolving from particles might have a larger radiative forcing result than CO_2 emissions. As soot particles square measure giant enough to function condensation nuclei, they're thought to cause the foremost cloud formation. Soot production is also attenuated by reducing the hydrocarbon of jet fuel

Other effects

Increased inflated concentrations conjointly develop ocean natural process within the Southern Ocean. associate degree ecological tipping purpose is projected to occur by the year 2030 and no later than 2038.

Contrails decrease the daytime temperature and increase the night-time temperature, reducing their distinction. within the southern US, the distinction was diminished by regarding three.3 °C (6 °F), and by 2.8 °C (5 °F) within the US Midwest.

Types of pollution caused by associate degree craft

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Air pollution

Earlier studies had assumed that individuals were injured solely by the emissions from planes whereas starting off and landing. The new analysis is that the initial to administer a comprehensive estimate of the quantity of premature deaths from all airline emissions.

Airplane exhaust, like automotive exhaust, contains a type of air pollutants, as well as sulfur dioxide and gas oxides. Many of those particles of pollution square measure little, a couple of hundred millionths of an in. wide, or smaller than the breadth of a human hair.

So-called stuff that is particularly little is that the main wrongdoer in human health effects, particularly since the particulates will become compact deep within the respiratory organ and presumably enter the blood, scientists say.

Effects of pollution

Emission of Greenhouse Gases:-

Aircraft engines combust fuel to emit greenhouse gas, water vapour, gas oxides, carbon monoxide gas, and soot. gas oxides emitted by craft contributes to heating and may be a waste material within the lower atmosphere whereas it destroys the stratospheric gas layer within the high altitudes.

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