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A Study on CO_2 Emissions from Aircraft Taxi at Colombo Airport with Special Reference to a Specific Air Carrier of Sri Lanka

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Abstract

Aviation industry covers almost all aspects of air travel and its subsidiary activities which consist of several operations and activities on both air and ground levels. Thus, the industry may have an impact on the environment at every stage of its value chain, from different sectors such as aircraft operations, maintenance, passenger services, supply chain, etc. Given the anticipated increase in demand and obligations from global regulatory requirements, the aviation industry has been urged to become carbon neutral in the near future by technological innovations and operational advancements. Higher altitude aircraft operations have a greater impact on the atmosphere; nonetheless ground emissions are rarely emphasised due to their relative insignificance. Thus, this study endorses the importance of aircraft ground operations for emission inventories, in line with previous studies on aircraft ground-level emissions. The study mainly focuses on the evaluation of carbon dioxide emissions by aircraft engines during the taxi in and out and is confined to the taxiing at CMB airport with special reference to the flights of a specific air carrier in Sri Lanka. The data collection was carried out on a fleet of 24 aircraft of both narrow body and wide body. The carbon dioxide emission calculation methodology for the taxi phase uses actual operational taxi times from industrial data rather than internationally recognised reference timings. A statistical test has been applied to actual taxi times by referring to ICAO recommended TIM (Time in Mode) values as population means. The average emissions were calculated under 5 types of operated aircraft, separately for taxi out and taxi in for the airborne flights from and to CMB airport during the mentioned period. Thus, the findings identify that the cumulative estimated emissions of the total taxi phase of both arrivals (11,031) and departures (11,031) for the year 2022 contribute around 9 958 metric tonnes of CO_2 and have a considerable impact on the local air quality as well as on climate change, despite their less significance compared to cruise level emissions. This forewarns that the anticipated growth in aviation traffic and aggregated impact of CO_2 emissions from other airlines operating at CMB airport, could result in notable air quality issues and potential health concerns for the local community, as well as long-term climatic effects, unless proactive measures are implemented to mitigate the repercussions.

Keywords: CO_2 emissions, Aircraft taxi, Ground operations, CMB airport, Air carrier