

Avoiding Greenhouse Gas Emissions The Essential Role of Chemicals



Aircraft materials (CFRP, Carbon Fibre Reinforced Plastic) for weight reduction

A JCMA case study

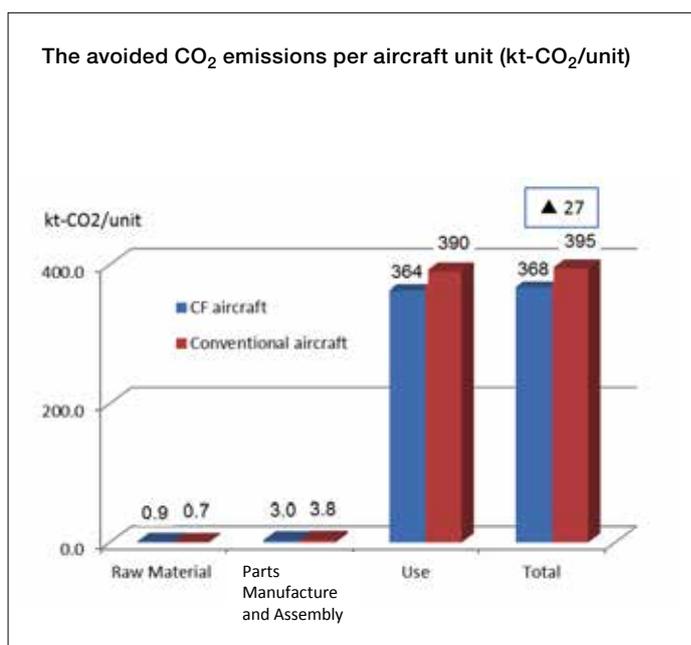
The Japan Carbon Fiber Manufacturers Association

The use of Carbon Fibre Reinforced Plastic (CFRP) reduces the weight of the aircraft while maintaining the same strength and safety. As with automobiles, weight reduction in aircraft directly leads to improved fuel consumption, thereby significantly contributing to reduction in CO₂ emissions in the transportation sector.

The study compares two alternative aircrafts, one consists of 3 wt% CFRP based on Boeing 767 (called "conventional aircraft"), the other consists of 50wt% CFRP, where metal materials are replaced with CFRP (called "CFRP aircraft"). Consequently, CFRP aircraft has a reduced Body weight of 20%.

A comparison of the two alternatives demonstrates that the CFRP aircraft has a lower carbon footprint and reduced CO₂ emission: the avoided emissions amount to 27 kt-CO₂/unit over a 10 year use period, calculated as the difference in CO₂ emissions over the aircraft's life cycle. The CO₂ savings are dominated by the use phase of the aircraft.

Full study available at: www.icca-chem.org/energy-climate



| | CFRP Aircraft | Conventional Aircraft |
|--|---------------|-----------------------|
| CO ₂ emissions during the stages of raw material procurement - manufacture of materials of body structure materials (ktCO ₂ /unit) | 0.9 | 0.7 |
| CO ₂ emissions during the stage of manufacture - aircraft assembly of body structure parts (kt-CO ₂ /unit) | 3.0 | 3.8 |
| CO ₂ emissions during the usage stage (kt-C ₂ /unit 10 years) | 364.0 | 390.0 |
| CO ₂ emissions over the entire life cycle (kt-C ₂ /unit 10 years) | 368.0 | 395.0 |
| CO ₂ emissions abatement (kt-C ₂ /unit 10 years) | ▲ 27 | |

