CDM METHODOLOGIES

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The Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change (UNFCCC) was established as part of the 1997 Kyoto Protocol. It incentivizes the implementation of emission-reductions projects in developing countries, which earn saleable certified emission reduction (CER) credits for each tonne of CO_2 that the project reduces. During the first commitment period of the Kyoto Protocol (2008 to 2012), more than 1,650 projects were initiated under the CDM, producing CERs amounting to more than 2.9 billion tonnes of CO_2[1].

Baseline and monitoring methodologies are agreed by the UNFCCC Executive Board in order to provide a consistent means for determining the emissions reductions associated with the project. They are required to establish a project's emissions baseline, or expected emissions without the project, and to monitor the actual ongoing emissions once a project is implemented. The difference between the baseline and actual emissions determines what a project is eligible to earn in the form of CERs, as shown in Figure 1.

Methodologies exist for nearly every conceivable type of project, but prior to 2015 there were none in the aviation sector. Following the successful collaboration of the ICAO and UNFCCC Secretariats, today two aviation-related methodologies are recognized within the CDM programme: AM0116, "Electric taxiing systems for airplanes" and AMS-I.M., "Solar power for domestic aircraft at-gate operations." These methodologies are available for use on projects related to domestic aviation, as international aviation emissions are outside of the scope of the CDM programme.

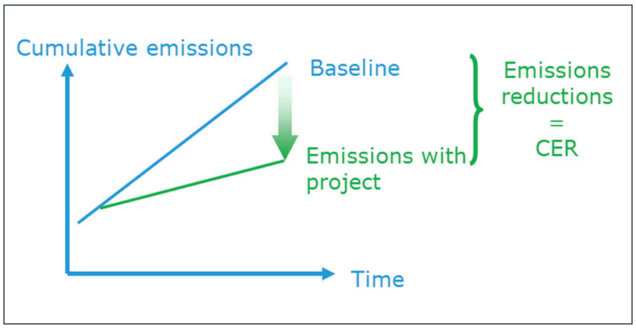

Figure 1. How a CDM project generates a CER.

Electric Taxiing Systems for Airplanes (E-Taxi)

Electric taxiing, or E-taxi, systems allow aircraft to move on the surface without requiring any power from the main engines. Instead, electric motors that are powered by the on-board Auxiliary Power Unit (APU), which consumes significantly less fuel, are used, as shown in **Figure 2**. One of the aims of the CDM programme is to accelerate the implementation of new measures. Since this technology is not yet widely deployed, it was identified as a candidate.

The methodology requires the definition of a baseline scenario, which will be the basis against which the benefits are measured. This baseline is defined based on the standard operating procedures for the project aircraft and may include any combination of multi multi-engine taxi, single-engine with APU taxi, and even the use of towing operations. The CO_2 emissions savings delivered from the project are the difference between the fuel consumed by the APU powering the E-taxi system and the baseline. An aircraft with an E-taxi system installed will burn slightly more fuel while airborne, due to the approximately 300 kg mass of the system. An adjustment factor is included in the methodology to account for this.

33 kg of CO_2 per minute saved

The use of electric taxi systems can save 33 kg of CO_2 per minute on a typical narrow body aircraft while the aircraft is taxiing. For flights of 9 hours or less, the benefits are positive, even when considering the fuel burn penalty from the weight of the system.

Figure 2. An aircraft with an e-taxi system installed taxiing using only the power from the APU.
Source: http://articles.sae.org/12662/

Figure 3. Solar panels at an airport and an aircraft receiving pre-conditioned air and power while parked at a gate.
Source: http://www.passengerterminaltoday.com/viewnews.php?NewsID=36516

Solar Power for Domestic Aircraft At-Gate Operations

Whenever aircraft are being serviced, loaded, and unloaded, they require power to operate their electrical systems as well as the internal heating, ventilation, and air conditioning systems. Most passenger aircraft are able to generate their own power using the APU, or receive power and pre-conditioned air, either from a ground power unit or directly from the gate. The solar power for domestic aircraft at-gate operations methodology aims to replace CO_2 intensive sources of energy for parked aircraft with renewable solar energy as illustrated in **Figure 3**.

The infrastructure in place at airports can vary widely, from a fully equipped gate that includes power and pre-conditioned air, to a stand with no service, thereby requiring the aircraft to run its APU. As a result this methodology provides guidance for defining baseline emissions based on the systems serving parked aircraft. Each minute that an aircraft does not need to run its APU while parked saves an average of 5.6 kg CO_2.

5.6 kg of CO_2 saved per minute

Sustainable Development Goals

Looking to the Future

The successful development of these two CDM methodologies have paved the way for projects related to domestic aviation to generate CERs. The ICAO and UNFCCC Secretariats are continuing to investigate other potential projects within the sector for which methodologies could be developed.

References

1. Source: http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php