



ICAO

TRANSFORMING THE GLOBAL AVIATION SECTOR: EMISSIONS REDUCTIONS FROM INTERNATIONAL AVIATION



GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET



Empowered lives.
Resilient nations.



PROJECT DELIVERABLES

Since 2010, the International Civil Aviation Organization (ICAO) has been working on a comprehensive strategy to strengthen its Member States' capacities on environment and specifically, to reduce the impact of international civil aviation on the global climate. A key element of this strategy is to encourage and support Member States to voluntarily prepare national Action Plans for CO₂ emissions reduction from international civil aviation and submit them to ICAO. By November 2017, 105 Member States had submitted an Action Plan to ICAO.

Building on this experience and in response to Member States' requests for assistance for action on environmental protection, ICAO established, in 2014, a partnership with UNDP with financing from the GEF, to support capacity building in developing States for implementing technical and operational measures for reducing CO₂ emissions from international aviation.

Under the "Transforming the Global Aviation Sector: Emissions Reduction from International Aviation" Assistance Project, ICAO is implementing a global capacity building programme, which includes the implementation of a pilot project on renewable energy in a Small Island Developing State (SIDS).

THIS ASSISTANCE PROJECT IS COMPRISED OF FOUR COMPONENTS

**1 IMPLEMENTING AVIATION LOW EMISSIONS MEASURES:
COSTS AND ENVIRONMENTAL BENEFITS ASSESSMENT**

**2 DEVELOPMENT OF 4 GUIDANCE DOCUMENTS TO FACILITATE
LOW EMISSIONS AVIATION IN DEVELOPING STATES AND SIDS**

3 ICAO INTEGRATED ENVIRONMENTAL TECHNICAL PLATFORM

4 PILOT PROJECT ON AVIATION LOW EMISSIONS MEASURES



PROJECT HIGHLIGHTS

ICAO GLOBAL CAPACITY BUILDING PROJECT – WITH THE UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP) AND FINANCED BY THE GLOBAL ENVIRONMENT FACILITY (GEF)

- Marginal Abatement Cost (MAC) curves to support developing States and SIDS assess the costs and CO₂ emissions reduction benefits associated with the measures selected in their State Action Plans.
- Four unique publications to assist ICAO Member States to enhance the regulatory and organizational structures in place to support environmental policy and decision-making, including on the use of sustainable aviation fuel and renewable, clean sources of energy as a means to reduce aviation emissions, and to inform States on the various financing mechanisms and programmes that can be accessed to support the implementation of aviation-related emissions reduction measures.
- An online platform to enable knowledge-sharing which will share over 1,000 measures to reduce CO₂ emissions from aviation, allowing solutions to be replicated and readily integrated into existing processes.
- A pilot project for “solar-at-gate” in Jamaica to reduce aircraft CO₂ emissions while parked at gate.

REPLICABLE PILOT PROJECT

- The “solar-at-gate” pilot project is easily replicable
- Through this pilot project, direct emissions reductions at the gate are demonstrated and documented
- The electrical gate units are retrofitted to existing jet bridges and the solar power system can be located on available airport-secured lands
- Documentation related to the pilot project will be shared with all ICAO Member States
- All States can implement similar projects using a variety of possible financing mechanisms, including through their own GEF national allocation



- A project combining solar and electric gate power is a unique solution
- The replacement of carbon intensive electricity from the use of jet fuel-powered APUs and diesel-fueled GPUs with a gate electrification retrofit project powered by solar energy is an effective, measurable and easily replicable way to reduce emissions

THE 4 COMPONENTS OF THE PROJECT

1 IMPLEMENTING AVIATION LOW EMISSIONS MEASURES: COSTS AND ENVIRONMENTAL BENEFITS ASSESSMENT

A marginal abatement costs (MAC) curve has been developed to assess **the costs and benefits** associated with the implementation of the aviation low emissions measures in developing States and SIDS.

ICAO REPORT ON COSTS AND ENVIRONMENTAL BENEFITS (MAC CURVE ANALYSIS)



1. To support developing States and SIDS to obtain the necessary information on the financial costs and CO₂ emissions reduction benefits associated with the basket of mitigation measures selected in their State Action Plan
2. To provide technical support and practical guidance to developing States and SIDS to enable them to identify feasible emissions reduction measures
3. To make informed decisions relating to the implementation of CO₂ mitigation measures

3 ICAO INTEGRATED ENVIRONMENTAL TECHNICAL PLATFORM

A platform to support the implementation of low emissions measures in the aviation sector.

Sharing knowledge and resources, as well as other **outreach** initiatives through an integrated **environmental technical platform**.

LOW-CARBON AVIATION KNOWLEDGE-SHARING PLATFORM



This interactive “Low-carbon Aviation Knowledge-sharing Platform” provides informative resources and ICAO tools, as well as relevant guidance documents on aviation and environment to ICAO Member States. It will be accessible through the ICAO public website.

2 DEVELOPMENT OF 4 GUIDANCE DOCUMENTS TO FACILITATE LOW EMISSIONS AVIATION IN DEVELOPING STATES AND SIDS

Enhancing States' **policy framework** and **strengthening their national capacities** through a series of guidance documents.

4 UNIQUE GUIDANCE MATERIALS FOR ICAO MEMBER STATES:



1. Renewable Energy for Aviation: Practical Applications to Achieve Carbon Reductions and Cost Savings
2. Financing Aviation Emissions Reductions
3. Regulatory and Organizational Framework to Address Aviation Emissions
4. Sustainable Aviation Fuels Guide

4 PILOT PROJECT ON AVIATION LOW EMISSIONS MEASURES

Implementation of a pilot project for emissions reduction in Jamaica

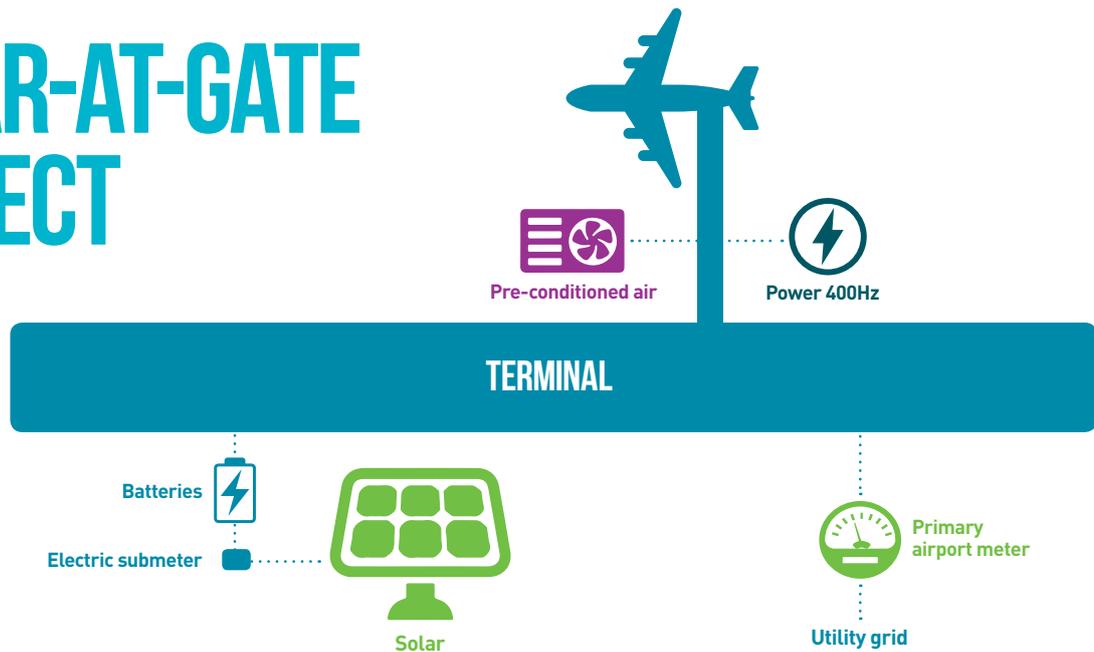


1. Installation of gate electrification equipment with energy supplied by solar power to replace jet fuel-powered Auxiliary Power Units (APUs) and diesel-fueled Ground Power Units (GPU) at two international airports in Jamaica
2. Facilitate the replicability of this solar technology at airports, thus equipping developing States and SIDS with tools to carry out similar projects

THE PILOT PROJECT IN JAMAICA

The purpose of the pilot project is to demonstrate how a specific aviation emissions reduction measure can be successfully implemented at an international airport in a developing State or SIDS. The project will be the first demonstration of the UN Clean Development Mechanism small-scale methodology “Solar Power for Domestic At-Gate Operations”. Once the project is completed, the process, lessons learned, best practices and collected data will be disseminated to all ICAO Member States.

SOLAR-AT-GATE PROJECT



To power on-board systems and provide heating and cooling, most aircraft use their Auxiliary Power Unit (APU), typically located on the aircraft tail. The “Solar-at-Gate Project” is a two-step process to eliminate these emissions through a 100 per cent carbon-free solution:

1. gate equipment must be installed to allow the aircraft to obtain power and air conditioning from the terminal
2. a clean energy facility must be built to supply carbon-free electricity to power the aircraft when docked at the gate. A solar photovoltaic facility is built and sized to meet the electricity demand associated with the airport’s gate power facilities

This methodology aims to replace carbon intensive sources of energy for parked aircraft with renewable solar energy

The pilot project will eliminate emissions from jet fuel-powered APUs and diesel-fueled GPUs that provide power to aircraft while parked at the gate and replace it with new electric units powered by a solar photovoltaic facility.

The project will install pre-conditioned air and 400 hz ground power frequency converters for one gate at two international airports in Jamaica, as well as solar power generation facility. The solar power component for one airport will be developed through a supplemental public-private partnership project to demonstrate alternative financing models.

- By tailoring the size of the solar project to meet the aircraft's electricity needs and incorporating meters to validate that the solar power is being consumed at the airport, the project will demonstrate how carbon intensive gate power can be eliminated through its replacement with at-gate solar power.
- States can customize the design of their projects as appropriate to the size and needs of their airports.



Zero emissions gate electrification retrofit



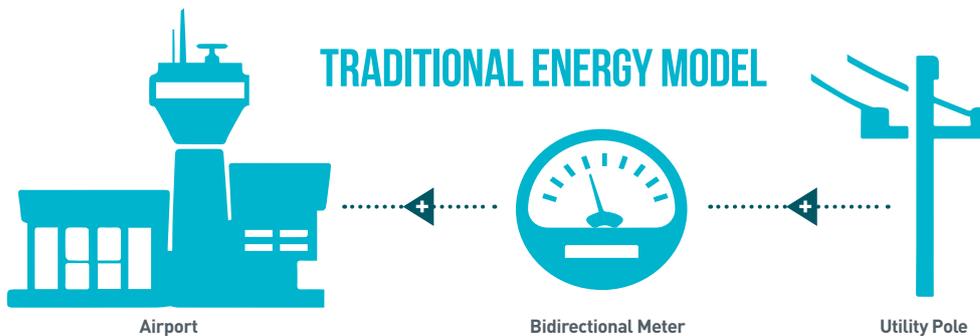
Gate electrification retrofit project powered by clean renewable energy that can be replicated elsewhere



Disseminate information to demonstrate emissions reduction success and lessons learned



Implementation of the first solar project to use the UN Clean Development Mechanism small-scale methodology "Solar Power for Domestic At-Gate Operations"



▶ Excess energy not used by airport that goes back to the grid ▶ Energy used by airport from the grid or battery



SUSTAINABLE DEVELOPMENT GOALS

ICAO's work on environment contributes to **14 out of the 17** United Nations SDGs



WEBSITE: www.icao.int/environmental-protection/Pages/ICAO_UNDP.aspx

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For more information on ICAO's environmental programme, please visit: www.icao.int/environmental-protection/Pages/default.aspx