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The Chinese Market for Energy Conservation / Emissions Reduction in Aviation

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The Energy Conservation / Emissions Reduction Market in Chinese Aviation

A. Market in the Sector and Host Country

In April of 2011, the Civil Aviation Administration of China (CAAC) issued guidance intended to accelerate ECER in the aviation industry. This guidance included the following stated goals:

- ❖ Lower the energy consumption and carbon dioxide emissions rate to below the industry growth rate through technology and management innovation; and
- ❖ Cut 22% of energy consumption and emissions in air transport by 2020 relative to 2005 baseline levels.

The CAAC goals targeted three stages of achievement, including:

- Stage 1: (2011 - 2012) - Improve the organizational structure of energy saving and emission reduction mechanisms. By 2012, achieve an 11 percent reduction of energy consumption and emissions in air transport relative to 2005.
- Stage 2: (2013 - 2015) - By 2015, achieve a 15 percent reduction.
- Stage 3: (2016 - 2020) - Actively promote alternative fuels and new types of aviation engines and enhance aviation technology. Make China close to the leading aviation countries in ECER. By 2020, achieve the full 22 percent reduction of energy consumption and emissions.

The CAAC guidance encourages airlines to factor energy reduction measures into their business models by:

- Optimizing route network and capacity,
- Improving fleet structure,
- Strengthening alliances to improve efficiency,
- Improving the internal fuel saving policy and incentive fuel-efficient flight operations,
- Vigorously promoting fuel-efficient technologies and practices,
- Investing in R&D, and
- Actively carrying out international exchanges and cooperation.

The CAAC also aims to incorporate energy saving practices into the construction of airports and ground services. CAAC will:

- ❖ Ensure airports are build and expanded using energy-saving technology. ECER

index and valuation will be added to the airport construction approval process. Airport noise monitoring will be further strengthened to benefit the surrounding environments of airports.

- Increase the speed at which airport facilities and equipment are upgraded to be more energy efficient. Energy-saving technical standards will be established and consumption admittance thresholds will be raised.
- Improve the management efficiency of airport operations and reduce emissions in ground operations. Civil aviation authorities will establish mechanisms for coordination and communication and airport, airlines and air traffic control sector collaboration. This will optimize ground operations.

The CAAC and the NRDC have developed special funding for ECER projects; the total is approximately RMB 1 billion each year with about RMB 700-800 million from CAAC and the other funding from Ministry of Finance.

In 2012, CAAC approved about RMB 300 Million, and in 2013, CAAC approved about RMB 460 Million in specific ECER budgets. The CAAC's 2012-2013 Civil Aviation ECER Project Catalogue below illustrates the commitment on ECER.

<u>CAAC's 2012-2013 Civil Aviation ECER Project Catalogue</u>

1. Civil aviation ECER technologies
    1) Installation of winglets projects
    2) Aircraft weight loss project (Electronic Flight Bag, Selection of lightweight materials food carts, Seats and ULD, replace lightweight material for oxygen bottles and safety equipment)
    3) Aircraft engine modification project
    4) Aircraft engine washing project
    5) Aircraft engine monitoring project
    6) Aircraft RNP, PBN, ADS-B installation
    7) The surface of the aircraft fuselage drag reduction project
    8) The bridge onboard power /air conditioning alternative APU project
    9) The distant parking ground power and aircraft dedicated air conditioning renovation projects
    10) Airfield lighting system renovation project
    11) New materials and new technology building energy-saving application project
2. Civil Aviation Management Energy Saving
    1) Flight operations system optimizing project
    2) Flight data / energy consumption data monitoring system
    3) Terminal building energy management system (Heating, refrigeration, lighting, elevator etc.)

    4) Building energy management system
    5) To shorten aircraft ground waiting taxiing time system
3. Energy-saving products and new energy applications
    1) Solar energy application projects
    2) New energy-saving lamps / Lighting control system
    3) Efficient boiler project
    4) New heating and cooling technology and pipeline laying reconstruction project
4. New energy and energy-saving ground support vehicle purchase and replacement
    1) New energy and energy-saving ground support equipment for flight
    2) operation support.(Power supply vehicles, Aircraft ground air conditioning equipment vehicle, Aviation static variable power supply, Aircraft Tractor, Ground guided vehicles, passenger elevator car, Self-propelled aerial assembled unit loader, Mobile bulk Luggage, Cargo loaders, Aircraft sewage trucks, Aviation refuse trucks, Airport dedicated sweeper vehicle)
    3) New energy ground support vehicles (battery or electric drive) equipment construction and renovation (including charging stations, pile construction)
5. Route optimization
    1) The Civil Aviation temporary route management system
6. Airport waste, sewage treatment and water reuse facility improvement
    1) New technology on waste classification and recycling
    2) New technology on Sewage treatment
    3) Water reuse facility improvement project
    4) Environmentally friendly deicing fluid and recycling project
7. Civil aviation energy saving and emission reduction standards, statistical, monitoring and evaluation system
    1) Civil Aviation energy-saving equipment/ construction standards
    2) Energy-saving design standards research for airport construction / renovation
    3) Civil Aviation energy saving operation standards research
    4) Bio fuel / Alternative fuel technology standards research & study
    5) Aircraft engine emissions validation standards
    6) Civil Aviation saving data acquisition system
    7) Civil Aviation ECER Inspection center set up
    8) Airport aircraft noise monitoring project
8. Basic and Strategic study on Aviation ECER
    1) Civil Aviation ECER policy /theory / technology track research and study
    2) ECER and aviation development strategic research project (carbon transactions studies, bio fuel/ alternative fuel's impact etc.)
    3) China's aviation and environmental management, energy saving evaluation system implementation methods study

4) Air traffic management technology application research projects (fuel saving PBN, approach, Aircraft ground taxiing and gate allocation optimization, complex weather forecasting technology etc.)

B. Foreign Competition

The ACP was established in 2004 for the purpose of consolidating the U.S. effort in China while facing the other foreign competition and for developing a rapport with the CAAC and other stakeholders.

Modeling after the successful collaboration of ACP, the Europeans have also formed a similar organization to ACP, the Marco Polo Program, to provide large scale training programs to China starting in 2007. Marco Polo Program is also focusing on both the CAAC and ATMB. The Marco Polo program is a joint government-industry organization, similar to the U.S. ACP program. The purpose of the Marco Polo program is to counter the success that ACP has established in China. Its goal is to provide training and other assistances to China.

Competition between the U.S. and European aerospace industries has intensified as China moves closer to making fundamental decisions about its aviation strategy. In order to take advantage of this movement, the European Union (EU) organized the EU-China Civil Aviation Cooperation Project. This public-private cooperation agreement has been very successful in promoting European products and standards in the aviation sector. As a sign of its success, the EU extended their program beyond its initial four-year term. Continued participation by USTDA of the ECER Technical Assistance Program may assist to counter act the EU advantage.

C. U.S. Export Potential

The export potential in this market centers on updates in the project catalogue published by the CAAC and the focuses of investment in ECER projects. As mentioned, CAAC and the NRDC have developed special funding for ECER projects; the total is approximately RMB 1 billion each year (about RMB 700-800 million from CAAC, other funding comes from Ministry of Finance). In 2012, CAAC approved about RMB 300 Million, and in 2013, CAAC approved about RMB 460 Million in ECER budgets.

Hard numbers for U.S. exports are difficult to estimate for energy conservation and emission reductions services, products, and systems since improvements in these areas are typically components of systems and not stand alone products (i.e., more efficient aircraft engine, or better terminal HVAC system).

This specific market addresses the three (3) overarching aviation elements of aviation-related ECER, which will conserve energy and reduce emissions including:

1) ECER related to airlines;
2) ECER related to air traffic management (ATM) and airspace; and
3) ECER related to airport development and operations.

Overviews of these market potentials for U.S. vendors include:

1) Airlines - Energy efficiency and emissions reductions will be a major consideration of aircraft fleet purchases in China.
2) Air Traffic Management - These systems include communications, avionics, navigation, surveillance, air traffic flow management systems, airport systems and airline systems. The estimated budget for development, acquisition, installation, and implementation of these systems for the period 2012 to 2017 is more than $1.2 billion.
3) Airports - For a given airport project, energy efficient equipment, systems, and services could vary from 5% to 50% of a budget for new or expanded airport project. A rough estimate using only 5% of the US$65 billion airport development budget for energy and emissions reduction products would be $3.25 billion.

Specific U.S. export examples include:

a) Market demand is fueled in part by airlines replacing their older fleet with new, more fuel-efficient airplanes. China will continue to lead the way in total airplane deliveries. On a geographical basis, Asia Pacific region will have the most demand of around 12,820 new airplanes over the next 20 years, with robust demand projected from China, and from low-cost carriers and airlines from emerging markets. In the last year, the company projected a demand of 12,030 new planes for this region over the 20 years.
b) The number of airports in China serving more than 30 million passengers a year was only three in 2009, but was five in 2012 and is forecast to increase to 13 by 2020. The new China airports are expected to cost an estimated total of RMB 450 billion. In addition, there will also be several airport expansion projects underway in the near future.
c) Based on the past several years of aviation investment, the estimated budget for development, acquisition, installation, and implementation of new technologies that address aviation growth and goals for the coming period from 2012 through 2017 is in the range of $1.2 Billion (USD), of which at least 30% to 50% could be required to satisfy ECER standards, depending on standard that could become requirements of ECER implementation.

d) The CAAC and the NRDC have developed special funding for ECER projects; the total is approximately RMB 1 billion each year (about RMB 700-800 million from CAAC, other funding comes from Ministry of Finance).
e) In 2012, CAAC approved about RMB 300 Million, and in 2013, CAAC approved about RMB 460 Million in ECER budgets.

Additional information regarding export potential related to ECER was derived from news articles, which highlight:

- In general aviation industry China will invest over 1.5 Trillion Yuan ($232 Billion) in the aviation industry in the next five (5) years.
- In March 2012, the Boeing Company and the Commercial Aircraft Corporation of China Limited (COMAC) signed a cooperative agreement to jointly establish an Aviation Energy-Conservation and Emission-Reduction Center in Beijing.
- China Plans to Actively Join in Talks on Aviation Emission Cuts during China Briefing in UN climate talks. “Increasing energy efficiency and energy savings can also play a role in reducing emissions in the aviation and shipping industries, Xie said.”
- In October 18, 2012, China commercial aircraft, Boeing air energy saving and emission reduction technology center in Beijing recently launched the first research project. The research project will explore the use of waste vegetable oil ("drainage oil refining") sustainable aviation biofuels opportunity.