

Point of View

An Opinion Paper on Information Technology



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Climate Change Solution for the Airline Industry - Pankaj Narayan Pandit

SUMMARY

The global Airline industry is exploring ways to reduce air pollution caused by carbon emissions from aircrafts, especially after the failure of the Copenhagen Summit held in 2009. Even though aviation contributes only 2-3% to the total GHG emissions, their impact is estimated to be 2-4 times more severe as these gases are emitted at very high altitudes. The UNFCCC has urged the ICAO and IATA to agree on a global framework to manage the Aviation industry's GHG emissions. Sonata, with its deep understanding of aviation as well as climate change regulations, is ideally suited to help airlines evolve strategies towards climate change.

COMPANY PROFILE

Sonata Software, headquartered in Bangalore, India, is a leading IT consulting and services company. Sonata's customers are located across the US, Europe, Middle East and the Asia-Pacific region. Its portfolio of services includes IT Consulting, Product Engineering Services, Travel Solutions, Application Development, Application Management, Managed Testing, Business Intelligence, Infrastructure Management and Packaged Applications. As per the industry rankings released by NASSCOM for 2008-09, Sonata Software figured among the Top 20 IT Software Services Exporters in India for the second consecutive year. Sonata Software has also been ranked Global #2 in the 2008 Top Ten ESO: Outsourced Software Development in The Black Book of Outsourcing.

Introduction

Before the climate change debate began, the Airline industry successfully reduced its noise pollution levels. Airports levied higher landing charges on noisier aircrafts, thereby forcing airlines to modernize their aircrafts with new and quieter engines that also have higher fuel efficiency. Now, the focus has shifted from noise pollution to air pollution caused by carbon emissions from aircrafts, especially after the failure of the Copenhagen Summit held in 2009.

The global Airline industry has been reeling under losses worth \$23 billion due to unviable costs, slowdown and unhealthy competition, as a result of deregulation. As per the International Air Transport Association (IATA), the Airline industry is unlikely to emerge profitable till 2011.

Even though aviation contributes only 2-3% to the total Green House Gas (GHG) emissions, their impact is estimated to be 2-4 times more severe as these gases are emitted at very high altitudes.

Although, aviation as well as maritime industries were excluded from original Kyoto protocol, the United Nations Framework Convention on Climate Change (UNFCCC) urged the International Civil Aviation Organization (ICAO) and IATA to agree on a global framework to manage the Aviation industry's GHG emissions. Though the Aviation industry was not covered under the Kyoto Protocol, analysts identified it as the most vulnerable for facing the Kyoto Protocol's climate change legislations.

Airlines have been forced to embark on climate change initiatives as the European Union (EU) parliament has voted to bring the industry under the purview of the EU Emission Trading Scheme (ETS) with effect from 2011. However, after the 15th session of the Conference of the Parties (COP-15), the Airline industry got a reprieve, with no new taxes, levies or emission targets imposed.

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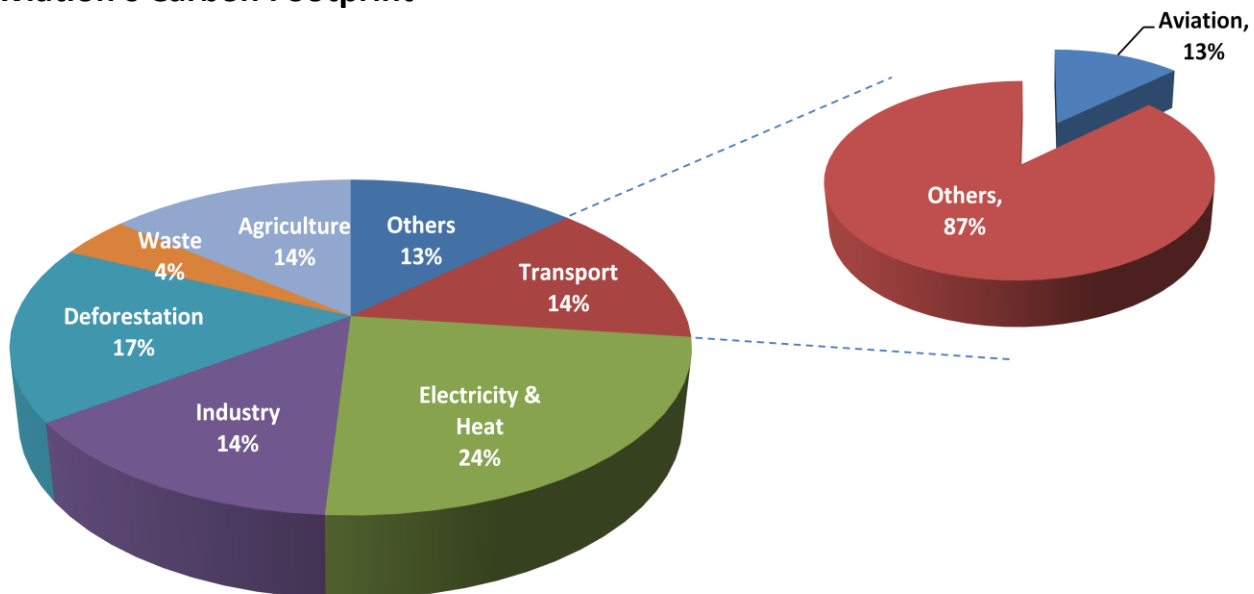
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The IACO / IATA plans to work on a global framework agreement with airlines and their governments at its assembly in September 2010. Thus, climate change initiatives in the Airline industry, in the near future, may be voluntary, guided by pressure of public opinion and not legally binding.

Sonata believes that “what makes ecological sense may also help save costs.” So, there is every reason to urgently embark on such initiatives as Next-Gen flight planning tools, lighter aircrafts, and fuel conservation policies which help save fuel. Such solutions for climate change will auger well for ecology as well as airlines’ economy.

Aviation’s Carbon Footprint



* Ref. United Nations Intergovernmental Panel on Climate Change (UN IPCC)

The Transport industry is the second largest contributor to the global carbon emissions, while Aviation accounts for about 13% of the Transport industry’s total carbon emissions. Thus, Aviation sector contributes less than 2% to global (13% of 14%) carbon emissions.

However, jet engines also pump out nitrogen oxides, other GHGs that form ozone, soot and water vapors at high altitudes. At such high altitudes, these emissions cause more damage than carbon emissions from other modes of transport at the ground level. Thus, the Airline industry’s real impact on global warming is at least 2 to 4 times more than what would be caused by the same amount of carbon emissions from surface transport.

With 6-8% annual growth, the impact of the Aviation industry’s GHG emissions on global warming could be more severe, unless it takes significant measures to reduce its carbon footprint.



Who Accounts for a Major Portion of the Airline Industry's Emissions?

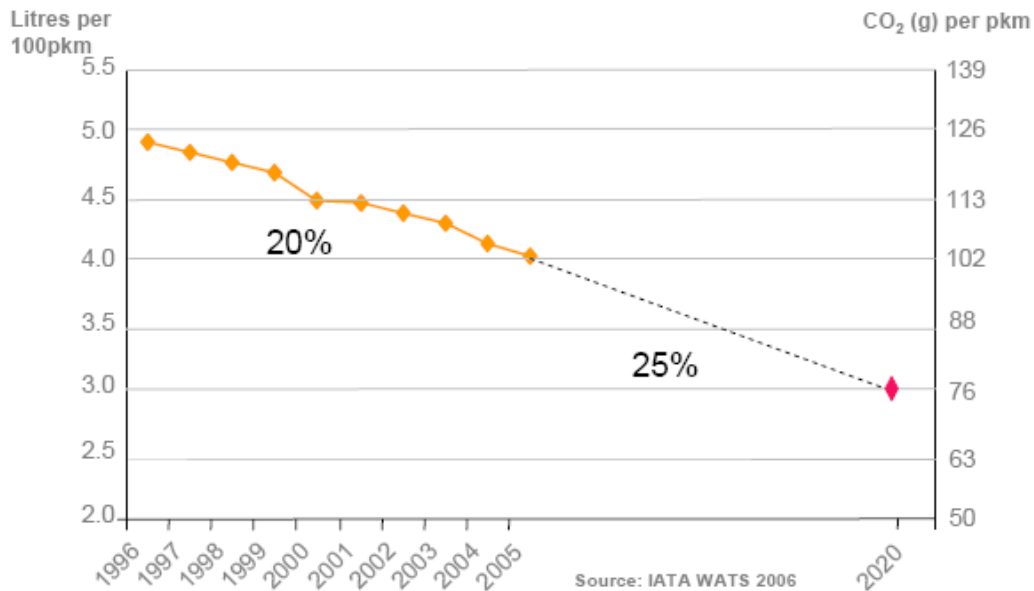
International flights originating from Annex I countries of the Kyoto Protocol account for more than two-thirds of the Airline industry's total carbon emissions. One ton of Aircraft Turbine Fuel (ATF), which is a type of kerosene, generates 3.157 tons of CO₂.

Efficiency of Airlines Comparable with Surface Mode of Transport

Over the last 15 years, the fuel efficiency of air transport has improved by 20%. In 1996, 5 liters of fuel was required per 100 Passenger Kilometers (PKMs), while as of 2010, only 4 liters of fuel is required to fly the same distance. In other words, one liter of ATF gives a mileage of 25 PKMs. An aircraft generally travels at a speed of 600-700 km per hour. Yet its carbon emissions are better than those of surface transport, which travels at much lower speeds. This is because air transport's average load factor is in excess of 75%, while most surface vehicles are never driven to their full occupancy.

Most cars have, on an average, 1.5 occupants against a capacity of 5, which implies a load factor of 30%. A 1000 cc petrol car, thus, typically carries 1.5 passengers for a distance of 12 kms per liter (or 28.5 miles per US gallon) of petrol. Thus, for 100 PKMs, a mid-size car will require 5.5 liters of fuel, 25% more than the amount of fuel required by air transport for the same distance.

With the invention of composite materials and bigger aircrafts like the Airbus A380, air transport's fuel efficiency is expected to improve further to 3 liters per 100 PKMs.

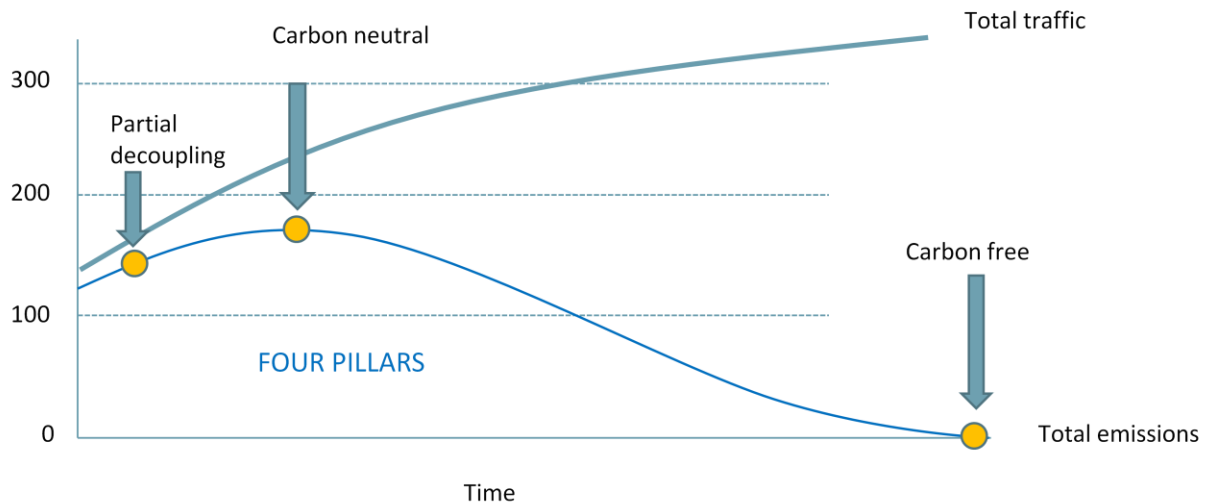




Airline Industry's Vulnerability to Climate Change

Aviation, with high flying jets making contrails in the sky, is the most visible among the Transport industry. According to data from the Airline Business World Airline Rankings, the Airline industry's net loss from 1999-2009 was \$68 billion, while the losses for 2009 alone are estimated to be \$10 billion. Only three times during the decade has the industry been marginally profitable -- in 2000, 2005 and 2007. Given these circumstances, the Airline industry is ill equipped to bear additional costs of complying with climate change regulations.

Emissions index



Four Pillars of Strategy for Climate Change Solutions for Aviation

1. Technology
 - a. Airframe
 - b. Engine
 - c. Cleaner / Renewable fuels
2. Infrastructure
 - a. Improved navigation efficiencies
 - b. Airport procedures
3. Aircraft Operations
 - a. Reduced tare weight, additional galley, meals and cabin crew baggage
 - b. Next-gen flight plans, single-engine taxi on departure and arrival, continuous climb-out and descent, optimized routing and a "tailored arrival."
 - c. Full recycling of cabin waste
 - d. Conservative policies for consumption of fuel and economic tinkering



4. Carbon offset program (CER)
 - a. Offer carbon offset program that emotionally bonds with passengers, with initiatives like preserving tropical forests, planting trees, etc.

The Airline Industry, Kyoto Protocol and the COP

Since the UNFCCC was enforced in 1995, the parties i.e. the countries which had signed the convention have been meeting annually in COPs. The objective of such COPs has been to assess the effectiveness of initiatives and programs to deal with climate change.

The Kyoto Protocol on climate change will expire at the end of 2012, after which it will be replaced by COP 16, to be held in Mexico in 2010.

Initially, the Aviation as well as Maritime industries were excluded from the Kyoto Protocol. It was expected that the developed countries and their airlines would work under the umbrella of ICAO to reduce their carbon emissions. However, the Airline industry is yet to agree on modalities of its collective responsibility for climate change.

A few airlines like KLM, Air France and Delta have voluntary emission control programs in place. These airlines offset carbon emissions per individual traveler by charging extra taxes from them. Such extra levies go towards the UNFCCC-approved Clean Development Mechanism (CDM) projects in developing countries. Some airlines have also adopted green ideology in fuel conservation programs, effective recycling of waste, aircraft renewal programs and several other measures that reduce the impact of airlines on climate changes.

EU Takes Lead

Since the EU parliament has voted to bring the Airline industry under ETS by 2011, airlines are likely to be granted limits that are 90% of the average of actual emissions from 2004 to 2006. Such practice, known as grandfathering, seems unfair to airlines, which have more fuel-efficient aircrafts or have already implemented fuel saving initiatives. This is because it may work in favor of bigger airlines, which have more than 80% of market share.

The champions of environment in the Airline industry, led by LCCs, want such emission quotas to be auctioned, which will ensure that large, older airlines have no advantage over smaller, newer airlines. If aviation emissions are auctioned, revenues to the tune of \$8-12 billion can be generated (@ CER prices ranging from \$30-45), which can be used for financing CDM projects in developing countries.

All airlines operating within / to / from the EU are likely to be brought under the ETS, while airlines in the US are likely to resist such move as the US has not yet ratified the Kyoto Protocol. However, the US and Canada may have to ratify the Protocol to enable their airlines to operate in the EU countries.

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Emission Calculations

The first step for reducing emissions is to calculate the amount of emissions scientifically.

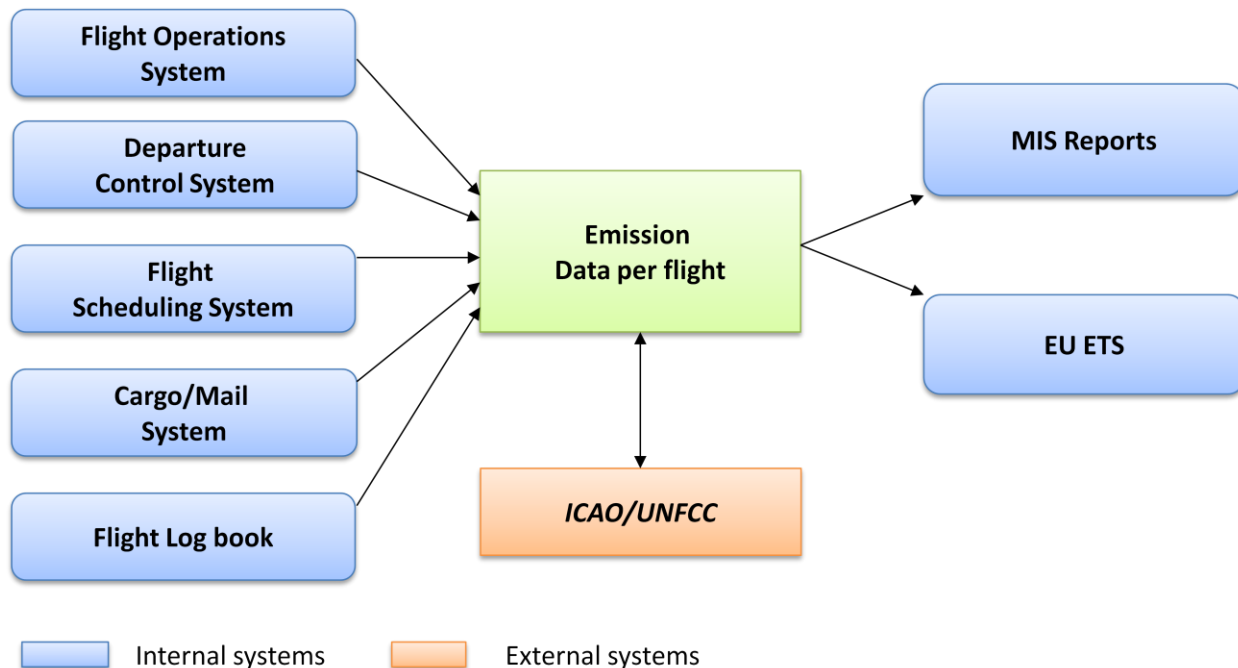
There are five types of aircrafts, each with typical fuel burn standards. The amount of carbon dioxide emissions from an aircraft is calculated from the fuel burned by it on a given route. As this methodology assesses the amount of emissions pertaining to passenger carriage only, the emissions associated with mail, freight, etc., have to be deducted from the total emissions. Again, historic carriage of passenger load factor, mail, freight, etc., is used to work out such calculations.

Sonata's Value Proposition

IT Solutions for Keeping a Record of Aircraft Emission Data

Airlines are required to keep a record of emissions per passenger payload (passenger-ton-KMs). For this, they need a Monitoring, Reporting and Verification (MRV) system to collect information on payload and fuel consumption.

Emission Data System in relation to other systems

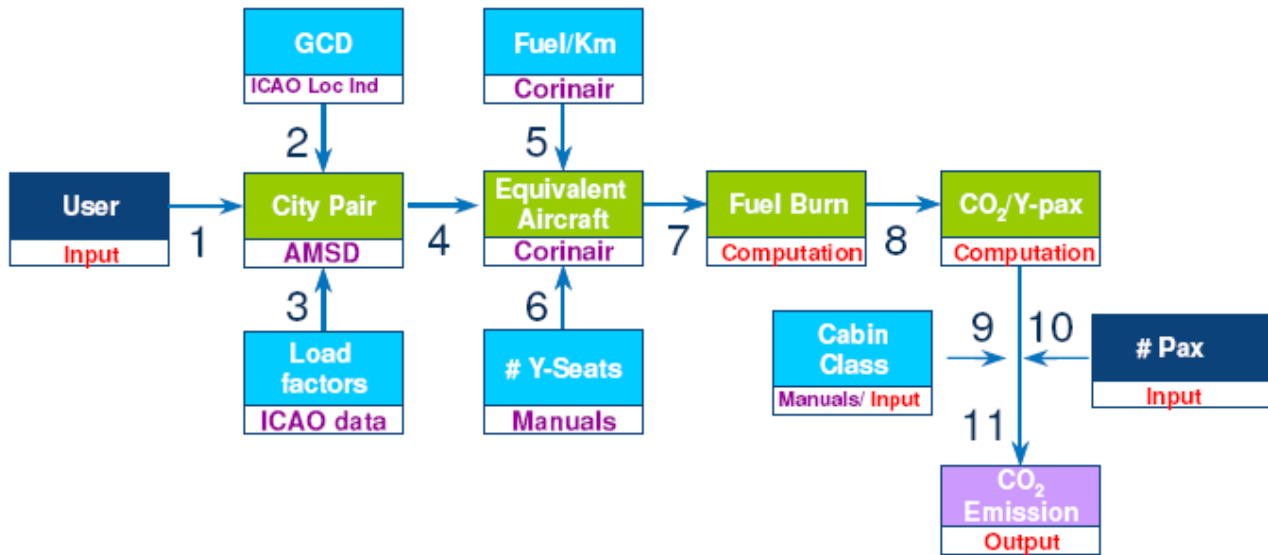


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Sonata works as an IT partner with the EU's largest leisure airline, Thompson Fly. As a result, Sonata has deep knowledge of data points from load sheet, flight plan, aircraft log book, etc., for calculating an airlines' carbon footprint most accurately and reporting it to the authorities on a periodic basis.



Producing Payload Reports

The year 2010 will serve as a benchmark for establishing the amount of carbon each airline will be allowed to produce between 2012 and 2020. The EU has already determined the maximum amount of carbon emissions that can be allowed for airlines operating within the region. However, the total amount of emissions now needs to be divided among all individual aircraft operators, which will be determined by payloads reported by them in 2010.

The regulatory definition of 'fuel consumed' is quite different from the one airlines use for operational purposes. Under the new requirements, airlines need to calculate fuel consumption not only over EU airspace but for the whole sector to / from the point of destination / origin outside the EU. Now airlines will need to use fuel consumption calculations, which will ensure that the fuel used by the Auxiliary Power Unit (APU) at the gate is also included.

The notion of "payload" also differs from what airlines use internally, as cargo, mail, etc., are isolated from passenger payload. Eliminating these differences may result in a substantial loss in terms of carbon allowance to receive.



Monitoring Emissions

Sonata offers Aircraft Emissions Measurement (AEM) as a hosted service to accurately measure carbon emissions and ton-kilometers for aircraft operators. AEM is also designed to support airlines subject to ETS implemented by countries / regions other than their own. It reduces the administrative burden of compliance and therefore, removes the risk of punitive 'carbon taxes' for airlines, while keeping their operational and financial overheads to the minimum.

Timelines for Environmental Regulatory Compliance

The European Parliament has voted to include aviation emissions from all flights (for EU as well as non-EU airlines) originating and landing in the EU in the region's ETS from 2012. Consequently, these airlines are required to:

- Monitor ton-kilometers and CO2 emissions from January 01, 2010
- Report ton-kilometers data by March 31, 2011
- Report CO2 emissions data by March 31, 2011
- Apply for free emission allowances by March 31, 2011
- Surrender allowances for 2012 emissions by April 30, 2013

Beyond Emission Calculations

Post COP-15, the Airline industry has got a reprieve, as there are no levies or timelines to meet the climate change targets. The ICAO will help governments of various countries to agree on a global framework at its next assembly in September 2010. Even though the Airline industry does not have an obligation, airlines need to adopt a green culture encompassing their business, using the Ecology-Economy matrix. "What benefits ecology should also offer economic benefits" is the simple philosophy behind this matrix.

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Ecology-Economy Matrix

<p>Positive ecological payoff (reduces the net carbon emissions)</p>	<p style="text-align: center;">Box no I</p> <ul style="list-style-type: none"> - Voluntary tax to offset emissions - Sponsorship of UNFCCC-approved programs in developing countries <p style="text-align: center;">Subsidy from carbon credits </p> <ul style="list-style-type: none"> - Bio-fuels and renewable fuels 	<p style="text-align: center;">Box no II</p> <ul style="list-style-type: none"> - Reducing tare weight of aircraft using lighter cabin materials, meal uplifts and lighter baggage - Recycling waste - Reducing the use of aircraft APU while on ground - CDM- Green, renewable power - Better flight navigation for reducing taxi times and fuel wastage due to airport congestion - Flight planning for fuel-efficient routes / altitude / speed - Reduce aerodynamic drag with better weight distribution - Use CNG or battery-powered cars for Ground Handling - Minimize non-revenue flying
<p>Negative ecological impact (increases carbon emissions)</p>	<p style="text-align: center;">Box III</p> <ul style="list-style-type: none"> - Bio-fuels like Corn - Deforestation caused by meat export and cattle ranches - Carbon sequester schemes for storage and capturing carbon 	<p style="text-align: center;">Box IV</p> <ul style="list-style-type: none"> - Fleet renewal program - Composite materials for aircraft - Better engines and navigation aids <p style="text-align: right;"> Technology Transfer / Carbon credit subsidy</p>
	<p>Negative Economical Benefits (Negative ROI)</p>	<p>Positive Economical Benefits (Positive ROI)</p>

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Activities that are beneficial to ecology as well as help save costs must be initiated immediately. Some of such activities are:

1. Effective recycling of organic as well as inorganic waste both on ground as well as on board the aircraft
2. Fuel conservation by reducing weight and taxing times, and controlling Air Traffic Controller (ATC) delays
3. Usage of fuel-efficient aircraft and ground vehicles by Ground Handling Agencies (GHAs)
4. Curtailed use of Auxiliary Power Unit (APU) on ground
5. Offer carbon offset program to travelers, by allowing them to choose from UNFCCC-approved projects in developing countries
6. Offer incentive programs to the operating crew for cutting fuel burn and thus, save money for the airline

Role of Sonata Consultants

Sonata, with its deep understanding of aviation as well as climate change regulations, is ideally suited to help airlines evolve strategies towards climate change. In addition to the tool that measures carbon emissions, Sonata can isolate the activities that have questionable business case either on ecological or economical criteria should not be considered, particularly as airline industry is now going through challenging times. Sonata believes that strategies to reverse airlines' carbon footprint must have positive economical payoff, as illustrated in Box II in the table above. Sonata can help airlines focus on initiatives that have a clear economical business case and are also ecologically desirable.

The views expressed in this article are the personal views of the author.

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