FLYING GREEN - MORE THAN JUST A CAMPAIGN

BY PEDRO SCORZA (GOL)

Prompted by GOL's adoption of the Brazilian Greenhouse Gas (GHG) Protocol Program, we started a corporate program in 2011 to reduce the carbon footprint of our operations. We had learned how to measure our GHG emissions, and time have come to exert control over these emissions. In this learning curve, it was understood the decisive role of biojetfuel in the mitigation of CO_2 emissions, and that we would have to work with renewable fuels, in conjunction with the other CO_2 mitigation measures, to reach our corporate sustainability goals, the voluntary goals of IATA and the aspirational goals of ICAO.

A momentum was being created with the preparations for the RIO+20 Conference and the natural Brazilian focus on biofuels. This led GOL to take part in the *"Flightpath to a Sustainable Future – The ICAO Rio+20 Global Initiative"*, bridging the fourth segment of the low carbon flight from Montreal, Toronto, Mexico City, Sao Paulo into Rio+20. On June 19th, 2012, at 12:40 pm, the first experimental GOL "green" flight 9290, fueled with a blend of biojetfuel made of inedible corn oil and used cooking oil, departed from the city airport of Sao Paulo, bound for the Rio+20 conference. On board, the ICAO Secretary General and his delegation, Brazilian aviation authorities, as well as major supporters and players in the aviation segment. The InterAmerican Development Bank was one of the key partners that made this event happen.

Building on this experience and the launch of the *Plataforma Brasileira de Bioquerosene* at Rio+20, a formal structure to support biojet fuel use for GOL flights was established in August 2013. It gathered the key stakeholders of the industry (Boeing, IADB, UBRABIO. Amyris, ABEAR, universities, research centers, producers, among others). A four-year plan was adopted for the implementation of the "from research to flight" integrated value chain concept, based on multiple sustainable feedstocks, and multi-process bio refineries.

The efforts of the *Plataforma Brasileira de Bioquerosene* culminated with the authorization to operate commercial flights in Brazil using a biojetfuel blend.

To give visibility to the biojetfuel program, low carbon flights were used to connect with the key sports events in Brazil, such as the Copa América (2013) and the World Soccer Cup (2014) in Brazil, which was the opportunity to launch the "Flying Green Programme". Rio de Janeiro International Airport was selected as the base for this Program because it offered appropriate infrastructure, logistics, blending and fit-for-purpose certification for the blend. In addition, it is a major hub for the destinations relevant to the tournament, thus reducing the additional pressure of the increased flight volume during the World Cup.

Several new operational procedures that had never been undertaken by GOL or BR Aviation, the fuel distribution company, were incorporated into the special "Flying Green Program". This was done to allow for the expeditious fueling of specific "green" flights, in spite of the new procedures.

We faced a new logistic challenge due to Brazilian regulations, which led us to perform segregated fueling operations: the percentage of biofuel in the blend had to be tracked at all times, in order to allow for possible fiscal incentives linked to the volumes of biofuel used. This became a barrier against streamlined operational flow, demanding special procedures to keep track of the neat percentage and a segregated operation which goes against the drop-in concept, essential to the aviation industry.

Forced into segregated operations, tank trucks were needed rather than pumps to perform fueling independently from the hydrant fueling, posing the challenge of fueling the planes for "green" flights in different slots, without delay. Punctuality is an operational cornerstone at GOL, and despite the added efforts required to perform the segregated operations, all flights during the World Cup were fueled in a timely manner.

Furthermore, the main objective of this effort was to demonstrate to the public and authorities that renewable fuels are an

GOL Linhas Aéreas Inteligentes S.A is a Brazilian airline based in São Paulo, Brazil. The company is the largest low-cost airline in South America and the largest Brazilian airline company in number of passengers transported.

According to the National Civil Aviation Agency of Brazil (ANAC), between January and December 2015 GOL transported 35 million passengers and had 35.9% of the domestic and 13.6% of the international market share in terms of passengers per kilometer flown, making it the second largest airline in Brazil, after TAM.

attainable goal, and not just a dream. The challenge became to explain to our passengers what we were doing something new and different in a way that they would understand. To do this, a carefully planned on board communication campaign was undertaken for every "green" flight. Thus marketing logistic had to be inserted into the new operations and fueling logistics, while continuing to provide a high level of client services.

The Flying Green campaign was kicked off on International Environmental Day (June 5th 2014). It was a low carbon flight using HEFA (hydroprocessed esters and fatty acids) blend that took off from the Rio de Janeiro Airport.

The first low carbon flight from the International Airport of Belo Horizonte to Brasilia departed on June 6th, 2014. It was the key event of the launching of the *Plataforma Mineira de Bioquerosene e Renováveis*, a joint effort of GOL and the Minas Gerais State Government to establish the first highly integrated "from research to fly" biojetfuel value chain in Brazil.

The Flying Green Program during the 2014 World Cup allowed GOL to transport more than 47,000 passengers in 364 low-carbon flights domestic flights, including the chartered flights of the Brazilian Soccer Team, with GOL as the official carrier. It was the first World Cup involving low-carbon flights, and there was significant media coverage of the efforts made by the GOL operational team in organizing and implementing the program. It is seen as a first step towards the long-term challenge of introducing biojetfuel to mitigate the GHG emissions of the aviation sector, as proposed by ICAO and IATA.

Later the same year, GOL and Amyris, with the support of Boeing and IADB, operated the first international regular passenger flight using SIP (synthesized iso-paraffins) produced by Amyris in Brazil. It departed from Orlando, Florida and flew to Sao Paulo, via Santo Domingo. The experience of the segregated fueling procedure pioneered at the World Cup was replicated in this first ever international low-carbon flight by a Brazilian carrier originating in the USA.

These initial successes have motivated GOL to address the huge challenge of sustainable biomass production, the starting point of the integrated value chain. The current price of fossil oil around US$ 50 a barrel poses an additional economic barrier for renewable fuels, increasing the need for a synergetic collaborative action involving all stakeholders to promote the highly integrated value chain concept. It must be optimized logistically, with a competitive fit-for-purpose distribution cost in the different airports of Brazil.

Brazil is a country of continental dimensions, and 90% of GOL's operations are domestic flights which serve more than 50 airports. GOL is driving the implementation of the *Plataforma Mineira de Bioquerosene e Renovaveis* with the State of Minas Gerais government and local municipalities, since the International Airport of Belo Horizonte, CNF, is both a major domestic hub for GOL, and the site of its Maintenance Platform.

The objective going forward is to promote sustainable Green Economy projects through regional biomass production. This will be done by family farmers and agribusiness in the State of Minas Gerais to feed into a biorefinery in the Metropolitan area of Belo Horizonte for a large scale integrated value chain proof of concept. This pilot value chain is designed to demonstrate the technical and economic viability of the biofuel and renewables program for the de-carbonization of the aviation sector and how such a project can promote socio-economic development.

Results of the domestication program of the Macauba (*Acrocomia aculeata*), a Brazilian native palm, have been encouraging. The program is being conducted by the Federal University of Viçosa, EPAMIG, and EMBRAPA (a leading agricultural research institution in Brazil). This prolific oil bearing native palm was selected as a strategic biomass alternative that integrates both family farming and agribusiness. The Ministry of Agrarian Development is highly interested in developing Macauba as an alternative to diversify the feedstock for biofuels, aiming at the inclusion of family farmers in the production efforts. The Round Table on Sustainable Biomaterials (RSB) is already establishing certification evaluation for small land holders engaged in the cultivation of Macauba in the Montes Claros region of Minas Gerais.

Being a native species, Macauba can be used to recuperate river bank areas to stimulate water production. It can also be used in recovery of Permanent Protection Areas and Legal Reserve areas (under the Brazilian Forest Code, all agricultural properties must reserve a minimum of 20% of land for legal reserve conservation). These types of areas could use the Macauba plant for the reforestation projects, thus contributing to the Brazilian Nationally Determined Contribution under the UNFCCC Paris Agreement of a reforestation goal of 12 million hectares, without indirect land use change issues.

The Ministry of Agrarian Development will be implementing 30 demonstration units in Minas Gerais, with family farmers intercropping Macauba with cash crops in six regions of the State of Minas Gerais in 2016 to start the Macauba value chain. Additional concrete actions will include using Macauba in the recuperation of the Permanent Protection Areas and Legal Reserves of the Rio Doce Basin.

Conclusion

In the longer-term, GOL expects that all its efforts in developing and using sustainable alternative fuels will eventually lead to the carbon neutral growth of its operations sometime between 2023 and 2025, thus contributing to the industry goal for international operations.

GOL has invested much in this biojet fuel development as an important part of its corporate history. The next steps on this path are expected to confirm the participation of GOL and the Brazilian Biojet fuel Platform as important players in the global history of biojetfuel development.