



Seminar on International Aviation and Environment, and State Action Plans

Lima, Peru – April 7-10, 2014

IDB Initiative on Biofuels for Aviation in Latin America & the Caribbean (LAC)

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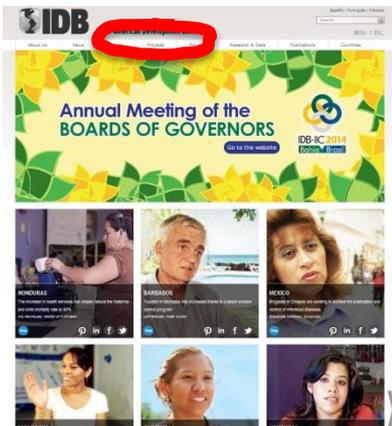
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- IDB experience in supporting aviation biofuels, and biofuels in general
- Next steps

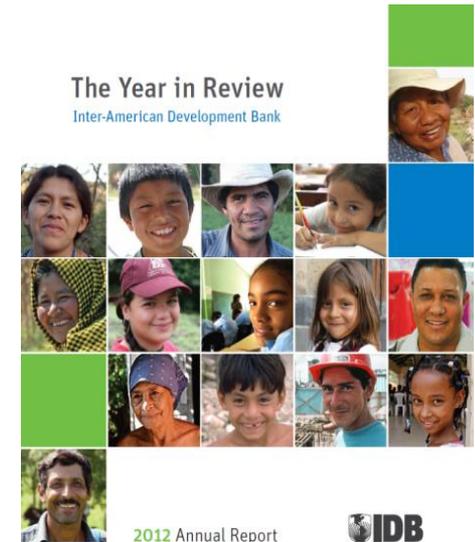


Inter-American Development Bank - IDB

- **Oldest regional development bank (1959):** 48 member countries - 26 borrowers (with >50% votes in the Board); HQs in Washington, DC, offices in all borrowing countries; finances both private and public sector projects, with or without sovereign guarantees. The IDB Group encompasses 3 institutions: the Inter-American Development Bank, the Inter-American Investment Corporation – IIC and the Multilateral Investment Fund - MIF.
- **Main source for LAC* regional financing** (1961-2013)
 - ✓ Approved loans/guarantees since its creation: US\$ 226 billion (US\$12 billion/yr)
 - ✓ Overall leveraged investments (project costs): US\$ 500+ billion
 - ✓ Non-reimbursable technical cooperation (grants): US\$ 6 billion
- **Loans/guarantees to Energy Sector** (1961-2013): US\$ 31 billion
 - ✓ Now 25% of total portfolio (US\$ 3 billion/yr) for clean energy/climate change



www.iadb.org



Note: * Latin America and the Caribbean





Inter-American Development Bank – IDB

News Releases

December 15, 2009



Peru Biofuel project to receive US\$25 million from the IDB

Combined ethanol refinery, sugar plantation and electricity plant will generate 500 permanent jobs for local communities in the Department of Piura, Peru.

An initiative of Maple Energy Plc, an energy company that has focused solely on [Peru](#) since 1994, listed on the London Stock Exchange's Alternative Investment Market and on the Lima Stock Exchange. The project is known as Maple Etanol, requires a **total investment of \$245.5 million** and will receive assistance from Netherlands development agency SNV, with extensive experience in developing inclusive businesses.

The project includes construction of a **130 million liters per year** sugarcane ethanol destilery. It includes 7,800 hectares of sugarcane on a 14,000-hectare property that Maple Energy purchased from the government of Piura and private individuals. The land comprises desert and/or arid areas that Maple Etanol will convert into highly productive land.

Mechanization, along with the use of efficient drip irrigation, will enable Maple Etanol to achieve yields of up to 153 tons of sugarcane per hectare. The project will also include a **37MW cogeneration plant** selling excess electricity to Peru's interconnected power system. In addition to the \$25 million from the IDB, Maple Etanol will receive cofinancing from other multilateral agencies and a private commercial bank. The Andean Development Corporation (CAF) will finance \$65 million, the Entrepreneurial Development Bank of the Netherlands (FMO) will finance \$25 million and Interbank \$25 million. The IDB loan will **have a term of 12.5 years with a 2.5-year grace period.**





Inter-American Development Bank – IDB

Press Release

July 23, 2008

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IDB lends \$269 million for three Brazilian ethanol plants

The Inter-American Development Bank will lend \$269 million for three new ethanol plants in south-central Brazil, in the **largest biofuel investment ever made by a development bank**. The Board of the Bank unanimously approved the financing today.

The three plants are being developed by Companhia Nacional de Açúcar e Álcool (CNAA), a joint venture formed by Brazilian sugar producer **Santelisa** Vale, U.S. private equity firms and **Global Foods**, a holding company registered in the Netherlands Antilles.

The **three new plants** are being built in the states of **Minas Gerais** and **Goiás**, far from the Amazon or any protected areas. Instead of purchasing land outright, CNAA will lease it from owners of medium to small-sized plots who decide they can earn a better return from sugar cane than they can from low-intensity pasture—the area's predominant land use at present.

The new plants will use **mechanized harvesting** for more than 90 percent of their acreage, and they will provide some 4500 high-quality permanent jobs. The plants will produce up to **420 million liters of ethanol** for the domestic market each year, and will generate their own electricity by burning bagasse (**56 MW each**).



IDB Scorecard for Sustainable Biofuels

ENVIRONMENTAL

General

Yield (liters oil/ethanol per ha)
above 6000
above 4500
between 1500 and 4500
below 1500

Yield (GJ per hectare per year)
above 100
between 50 and 100
below 50

Cultivation

Former land use
No land area (algae and waste)
Degraded land
Under-utilized land or husbandry
Marginal land
Displaced cultivation or husbandry
Rainforest, primary forest
Peat land
Wetland
Ecological sensitive/protected area - Biological corridors

Crop Lifecycle
Replant greater than 3 years
Replant every year, no-till
Replant every year, low till
Replant, 1-3 years
Replant every year

Crop rotation/Crop mix
Nitrogen fixing crops used in rotation
Inter-cropping
No crop rotation

www.iadb.org/biofuelsscorecard

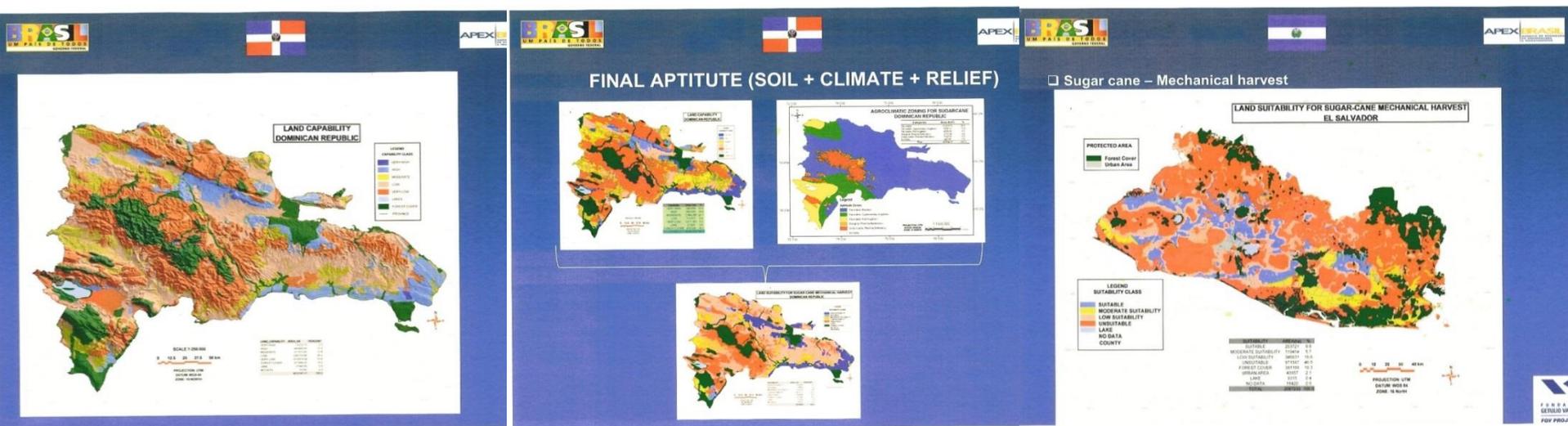


Support to BR-US MOU on biofuels

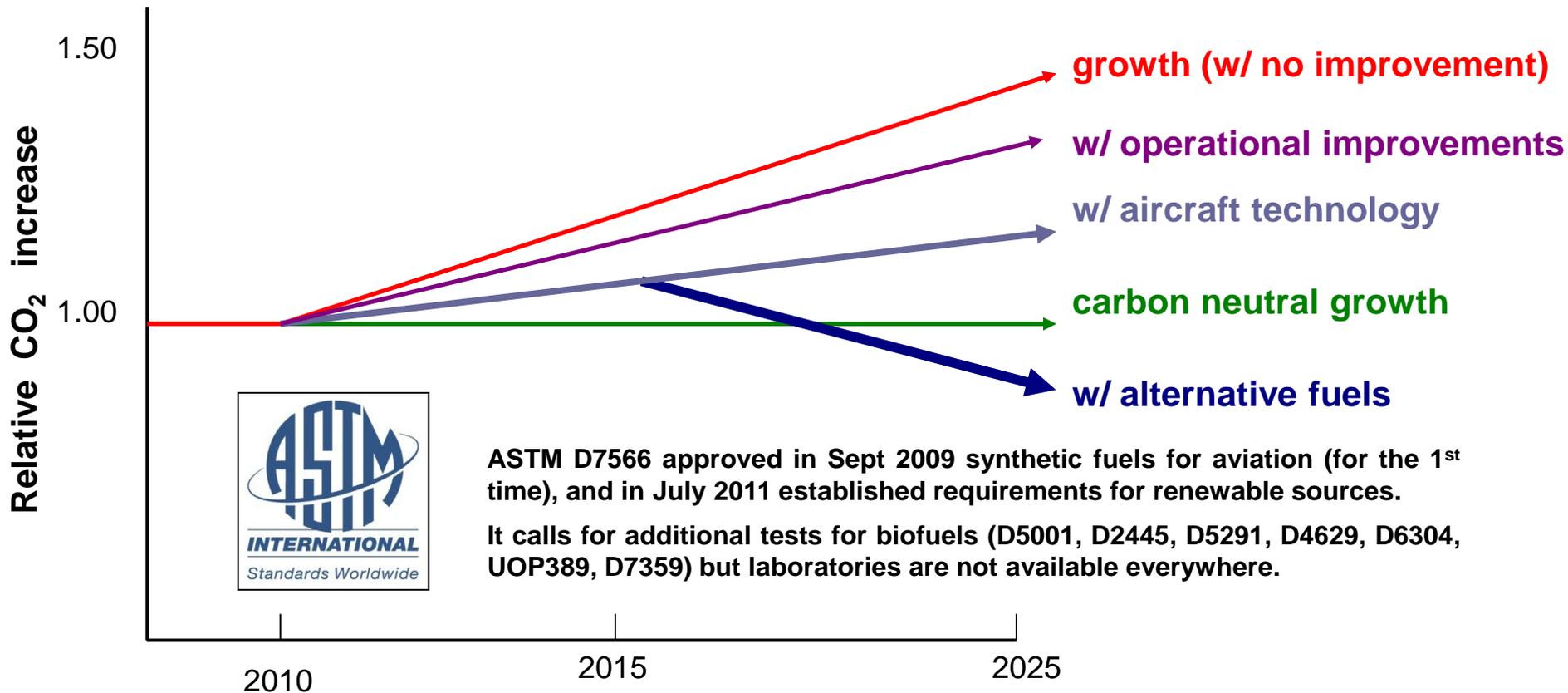
Technical assistance (US\$1,500,000 SECCI funds) to implement studies and evaluations to support National Biofuels Programs in:



- El Salvador (APEX-funded)
- Dominican Republic - DR (APEX-funded)
- Haiti, Guatemala and Honduras (IDB-funded)
- DR Phase II required to evaluate specific projects (IDB)



Aviation committed to carbon-neutral growth



Main aspects of biofuels for aviation x passenger cars

- Biojet fuel users (airlines) demand carbon-reduction solution; while passenger cars users only consider price advantage when fueling
- Key decision by aviation stakeholders: “**drop-in**” fuel, i.e., no need for any modification in turbines/storage/distribution systems (as opposed to ethanol for cars that require flex-fuel cars or engine conversion).
- Technical standards, fuel specifications and safety/quality control norms are **uniform worldwide** (non-existent in the ethanol/biodiesel markets):
 - ✓ Smaller number of consumption points (# airports x # gas stations)
 - ✓ Jet fuel less exposed to subsidies/tariff distortions
- Stakeholders **consensus**: airlines, aircraft/turbine manufacturers, fuel producers, government agencies, all joining efforts (not seen in the ethanol/biodiesel market).
- No blending **mandates** for biojet fuel, as seen for ethanol & biodiesel



LAC biojet fuel flights (2010-2014)

Date	Airline/sponsors (country)	Aircraft	Turbine manufacturer	Biofuel producer	Feedstock	Technology
Nov 2010	TAM (Brazil)	A320	CFMI	UOP	Jatropha	HEFA*
Apr 2011	InterJet (Mexico)	A320	CFMI	UOP	Jatropha	HEFA
Aug 2011	Aeromexico (Mexico-Madrid)	B777-200	GE	UOP	Jatropha	HEFA
Sept 2011	Embraer (Brazil)	EMB 170	GE	N/A	Camelina	HEFA
Sept 2011	Aeromexico 29 flights (Mexico-Costa Rica)	B737-800	CFMI	UOP	Camelina	HEFA
Oct 2011	Iberia (Spain-Mexico)	A320	CFMI	UOP	Camelina	HEFA
Mar 2012	LAN (Chile)	A320	CFMI	Air BP Copec	Used cooking oil	HEFA
Jun 2012	GOL/IDB/others (Brazil)	B737-800	CFMI	UOP	Used cooking oil, non-edible corn	HEFA
Jun 2012	Azul/Amyris/GE/Embraer/IDB/others (Brazil)	EMB 170	GE	Amyris	Sugar cane	DSHC**
Jun 2012	Aeromexico (Mexico-Brazil)	B777-200	GE	UOP/SkyNRG	Used cooking oil, jatropha, camelina	HEFA
Aug 2013	LAN (Colombia)	A320	CFMI	Air BP Copec	Used cooking oil	HEFA
Oct 2013	GOL/IDB/Boeing/Curcas/others	B737-800	CFMI	UOP	Used cooking oil, non-edible corn	HEFA
Jun 2014	GOL/IDB/Boeing/Curcas/others	B737-800	CFMI	UOP	Used cooking oil, non-edible corn	HEFA

Notes: * Hydro processed Esters and Fatty Acids ; also known as Bio-Synthetic Paraffinic Kerosene (SPK) or Hydrotreated Renewable Jet (HRJ)

** Direct Sugar to Hydrocarbons



IDB Initiative for Sustainable Aviation Biofuels

- Aviation biofuels will be an important driver of sustainable socioeconomic development in LAC (land, water, climate, labor, etc)
 - ✓ **1st activities: Life cycle** assessment of the production of biojet fuel from sugar cane (DSHC), **> 82%** carbon emissions reduction; and **Benchmarking** of Biofuels Sustainability Standards; co-financed with Boeing and Embraer





Benchmark of cane-derived renewable jet fuel against major sustainability standards

Report

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André M. Nassar

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Sponsors:

July 20th, 2012



Sustainable Aviation Biofuels
Espaço das Ideias Circulantes, Humanidade 2012

Life Cycle Carbon Emission and Sustainability Analysis

Andre Nassar
ICONE

Rio de Janeiro
18 June 2012

www.iconebrasil.org.br



- ✓ Support demonstration flights with Azul (1st ever with DSHC) and GOL (as part of ICAO Flightpath) during Rio+20 using different feed stocks.



RIO+20
Conferência das Nações Unidas
sobre Desenvolvimento Sustentável



- ✓ Brazil's first commercial biojet fuel flight, CGH-BSB on October 24th, 2013



- ✓ Feasibility study of the 1st HEFA commercial biojet fuel production plant for ASA of **Mexico**: 2,000 and 6,500 barrels per stream day (bpsd) of refined vegetable oil.



- ✓ Study on Camelina in **Argentina**: feasibility of cultivation in marginal areas in south of the country, includes analysis of economic, social and environmental issues; and knowledge exchange with Brazil, 2012-14.
- ✓ Support to SABB-Brazil studies, 2013



Biennial General Meeting
28 January, 2014
Washington, DC



CAAIFI General Meeting 2011
November 30 – December 1, 2011
Georgetown University Hotel and Conference Center, Washington, DC
www.caafimeeting.com



CBPPM II Congresso Brasileiro de Pesquisa em Pinhão-mansô

"Pinhão-mansô: focando em soluções sustentáveis para produção de biocombustíveis"
29 a 30 de novembro de 2011- Centro de Eventos e Treinamentos da CNTC, Brasília-DF



Patrocinador Prata



Transportadora Oficial

Apoio



Ministério da Educação

Promoção e realização



Ministério da Agricultura, Pecuária e Abastecimento



- ✓ Brazil Action Plan for **FIFA World Cup 2014** and **Rio 2016 Olympics**: to reduce carbon footprint of international and domestic flights through use of biofuels in cooperation with the Brazilian Biojet fuel Platform

1st activities:

concept of the Games initiative in 2010 and support effort led by Embraer to prepare a **certification compliance plan** to make possible commercial flights in Brazil (STC process) with E-jets aircrafts between soccer games host cities



PROJECT "AZUL+VERDE" PHASE II

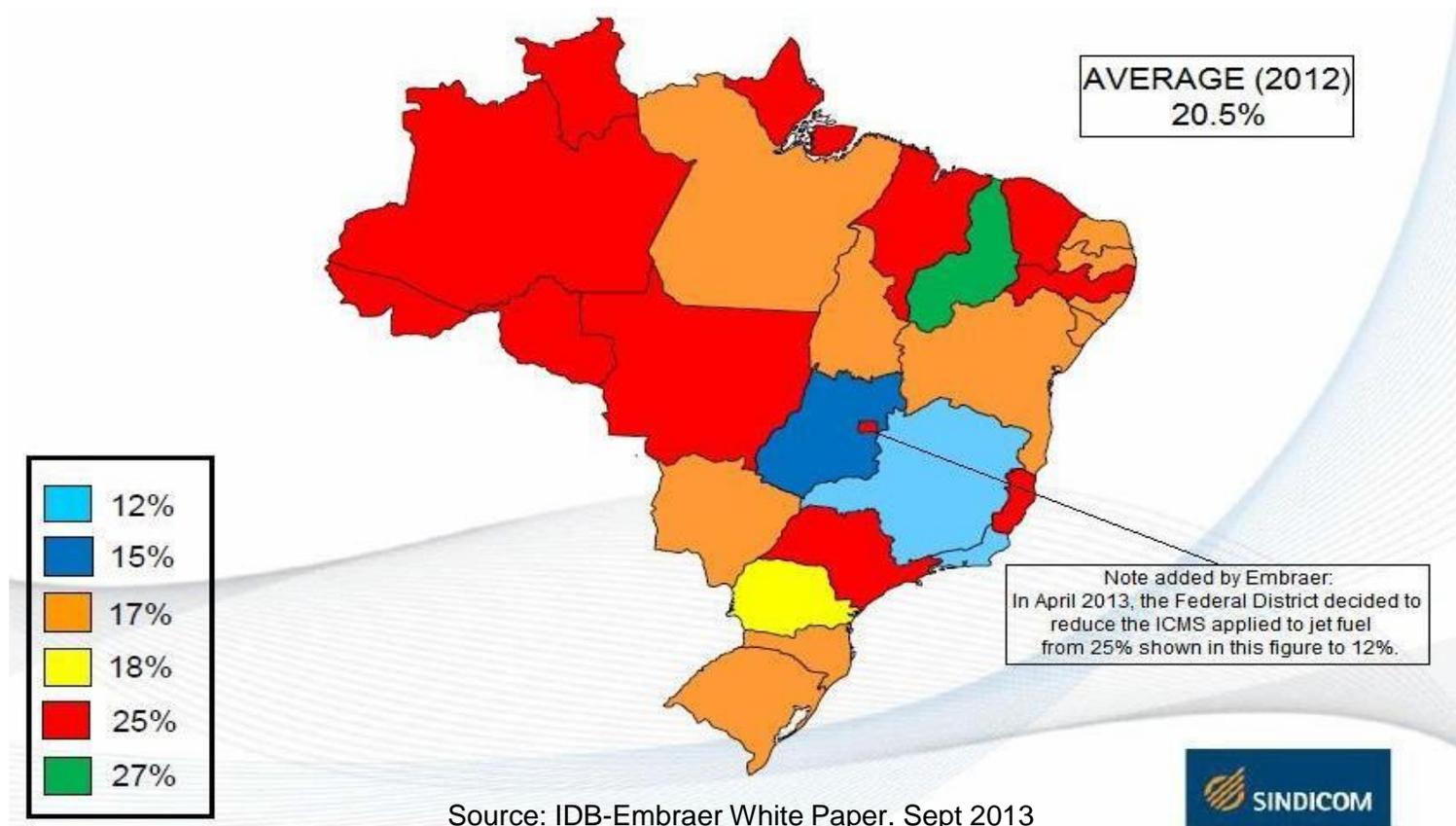
Motivation



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Possible tax-incentives for aviation biofuels in Brazil



State-level tax (ICMS) applied to jet fuel reduced (to 4%) to promote commercial flights for 2 yrs





Next activities:

- ✓ Support to **UN SE4ALL** Initiative (doubling renewables worldwide pillar): HIO on biofuels for LAC including aviation, with Novozymes and FAO: events, studies, investment projects promotion - 1st activity to be in Mexico
- ✓ Support to **ANAC** (Brazilian Agência Nacional de Aviação Civil): development of a software/algorithm within the FAA's Aviation Environmental Design Tool 2a (AEDT 2a) to compute GHG emissions related to flights using biojet fuels, particularly those based on sugarcane
- ✓ Studies on **value chains** for the following technologies:
 - Direct Sugar to Hydrocarbon (DSHC) - Sugarcane; enzymes
 - Hydroprocessing of Esters and Fatty Acids (HEFA) - Camelina, Jatropha, sugarcane, Hydro-cracking and microalgae
 - Alcohol oligomerization to jet-fuel (TKA) - Ethanol from sugarcane; Hydrolysis





THANK YOU

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