



**ICAO AVIATION AND SUSTAINABLE
ALTERNATIVE FUELS
WORKSHOP**



ICAO Headquarters, Montréal, Canada

18 to 20 October 2011

IDB support to biofuels

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Thursday, 20 October 2011



Presentation Outline

- **Available instruments at IDB to support the development of biofuels projects**
- **Examples of supported biofuels projects, including for aviation purposes**

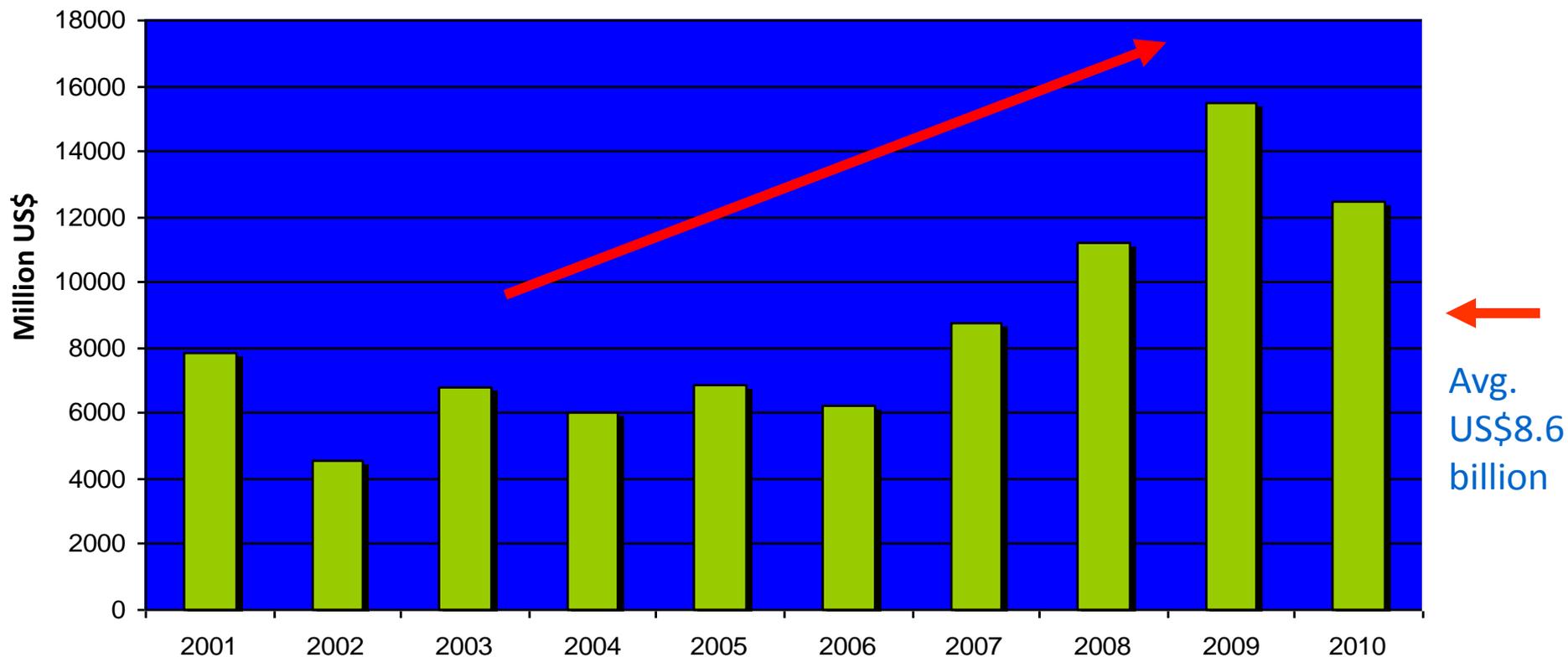


Inter-American Development Bank - IDB

- **Oldest regional development bank (1959):** 48 member countries, 26 borrowers (with >50% votes in the Board); 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**
 - ✓ Approved loans/guarantees since its creation: US\$ 197 billion (1961-2010)
 - ✓ Overall leveraged investments (project costs): US\$ 420 billion
 - ✓ Non-reimbursable technical cooperations (grants): US\$ 4.1 billion
- **Loans/guarantees to Energy Sector:** US\$ 27 billion (1961-2010)
 - ✓ Main item in Bank's pipeline with 14% of total Bank loans/guarantees



IDB financing, 2001-2010





IDB financing

- Public-Private comprehensive coverage -

Full spectrum of Public-Private Structures to meet Member Countries expectations and needs



Attractive conditions according to project needs

(interest rate, longer grace periods, longer maturity – some cases 40 yrs)



Available support instruments at IDB

- **Loans and guarantees:**
(US\$ 12.5 billion in 2010, for all sectors)
- **Non-reimbursable technical cooperation (TCs):**
(US\$ 830 million in 2010, for all sectors)
 - Trust funds established by donors and managed by the Bank (HSET/DOE, JSF/JPO Japan, EC, Spain, UK, Netherlands, France, Austria, Switzerland, etc), including operations from the Multi-lateral Investment Fund (MIF), Infracfund and from the Global Environment Facility – GEF
- **More than a Bank:** seeking sustainable economical development of LAC countries



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Inter-American Development Bank – IDB

Press Release

July 25, 2007

IDB approves US\$120 million for biofuel project in Brazil

First IDB's private sector financing for bioenergy

The Board of Directors of the Inter-American Development Bank today approved its first private sector financing for a bioenergy project in Brazil for a total of **US\$120 million** to **Usina Moema Açúcar e Alcohol Ltda.**, a major sugar, ethanol and bio-energy producer based in the State of São Paulo, that is operating in one of the fastest growing industries in Brazil and worldwide.

This operation is part of IDB's initiative to promote the structuring of senior debt financing for 3 Brazilian ethanol production projects that will have a total cost of US\$ 1 billion. These investments will contribute to Brazil's goal of tripling annual ethanol production by 2020.





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Inter-American Development Bank – IDB

Press Release

July 23, 2008

IDB lends US\$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 Alcool (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.

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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.





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Inter-American Development Bank – IDB

Press Release

January 16, 2009

IDB backs \$150 million Regional Financing Facility for Sugar and Bioenergy

Program will focus on northeastern Brazil, Mexico & Central America

The Inter-American Development Bank will support the establishment of a \$150 million facility to provide short-term trade financing and medium-term investment loans to sugar and bioenergy companies and exporters in Brazil, Mexico and Central America. Replanting **sugarcane fields**, building **drip irrigation** systems, **upgrading sugar mills and ethanol distilleries** and construction of bagasse-burning **cogeneration** power plants.

The IDB's Board of Executive Directors on Wednesday approved a senior loan of up to \$75 million for the facility. **LACFIN Holdings**, a company owned by **Reservoir Capital Group**, will invest \$75 million in the program, which will be run by **Latin American Capital Management LLC (LACAM)**. Depending on future market conditions, the program may be **expanded to \$250 million**, with additional loans from commercial banks and further capital contributions from LACFIN.





Guarantees for Biofuels exports - Trade Finance Facilitation Program (TFFP) -

- Launched in 2005, it supports the expansion of international trade financing to LAC companies through a network of 200 Confirming Banks from several international groups and issuing banks in >15 LAC countries.
- The IDB's TFFP has issued guarantees for over US\$600 million in support of hundreds of individual trade transactions, including:
 - ✓ Banco Indusval S.A., Brazil: under this transaction on November 1, 2007, the IDB has extended its guarantee to cover a promissory note used to finance the **export of ethanol from Brazil to UK**. The guarantee was issued in favor of American Express Bank Ltd., taking 100% of the risk on the US\$1 million transaction with one-year tenor.
 - ✓ On August 06, the IDB issued 2 other guarantees supporting ethanol exports to UK and Switzerland, covering 60%-70% of the risk for US\$1 million each for 240 and 365 days, respectively.
 - ✓ Under several other transactions during 2006-2007, the IDB has extended about 10 guarantees for sugar exports from Brazil to several countries.



Some TCs approved by SECCI funds

1. Haiti, Guatemala and Honduras: National Biofuels Programs Feasibility Studies (BR-US MOU; \$750k; BR-T1086; Mar 2007)
2. Guatemala: Action Plan (MEM; \$400k; GU-T1095; Dec 2007)
3. El Salvador: Action Plan (MINEC/CENTA; \$750k; ES-T1096; Mar 2008)
4. Brazil: **MG** Sustainable Energy Development (BDMG; \$160k; BR-T1103; Jun 2008); Sugarcane workers requalification (UNICA; \$500k; Jul 2009)
5. Honduras: Action Plan (SP; \$600k; HO-T1101; Oct 2008)
6. Chile: Advanced Biofuels (ForEnergy; \$1.000k; CH-T1096; Sept 2009)
7. Colombia: Innovation in Science and Technology applied to Biofuels (Colciencias; \$830 k KPK/SECCI; CO-T1059; \$1.5M CO-T1052 MME-DNP-MADR; Feb 2008)



Some TCs approved by SECCI funds (cont.)

9. **Guyana**: Expanding opportunities on Bioenergy (MAG; \$925 k; JSF/SECCI; GY-T1041; Mar 2008)
10. **Peru**: Strategic Plan for Sustainable Energy & Bioenergy (MEM; \$1M; SECCI; PE-T1146; Apr 2008)
11. **Retainer**: Expedite support to bioenergy through KPMG (\$1M; SECCI; RG-T1554; Jan 2009)
12. **Sustainable Aviation Biojet fuels in LAC**: Regional initiative to support studies and analysis on potential technologies (SECCI; RG-T1904; Jul 2011)



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News Releases
Jul 27, 2011

Boeing, Embraer and IDB to Fund Sustainability Analysis of Producing Amyris Renewable Jet

Brazilian research group ICONE to lead study; World Wildlife Fund to serve as independent reviewer and advisor

SÃO JOSÉ DOS CAMPOS, Brazil – Boeing (NYSE: BA), Embraer (NYSE: ERJ; BM&FBOVESPA: EMBR3), and the Inter-American Development Bank (IDB) announced that they will jointly fund a sustainability analysis of producing renewable jet fuel sourced from Brazilian sugarcane. The ground breaking study will evaluate environmental and market conditions associated with the use of renewable jet fuel produced by Amyris (NASDAQ: AMRS). World Wildlife Fund (WWF) will serve as an independent reviewer and advisor.

“Emerging renewable jet fuel technologies have the potential to reduce greenhouse gas emissions significantly, as sugarcane ethanol in Brazil has already proven,” said Arnaldo Vieira de Carvalho, leader of the IDB Sustainable Aviation Biofuels Initiative. “This study will examine the overall potential for sustainable, large-scale production of alternative jet fuels made from sugarcane.” Last month, the IDB announced a regional cooperation grant to help public and private institutions develop a sustainable biojet fuels industry. The Amyris study is the first to be financed under that grant.

The study will be led by ICONE, a research think-tank in Brazil with extensive experience in agriculture and biofuels analysis, and independently reviewed by WWF. Scheduled for completion in early 2012, the study will include a complete life cycle analysis of the emissions associated with Amyris’s renewable jet fuel, including indirect land use change and effects. In addition, the study will include benchmarking of cane-derived renewable jet fuel against major sustainability standards, including the Bonsucro, the Roundtable on Sustainable Biofuels and the IDB Biofuel Scorecard.

“Collaborative research into the cane-to-jet pathway is important for diversifying aviation’s fuel supplies, and also builds on the strong renewable energy cooperation established between the United States and Brazil,” said Boeing Vice President of Environment and Aviation Policy Billy Glover. “With aviation biofuel now approved for use in commercial jetliners, understanding and ensuring the sustainability of sources that can feed into region supply chains is critical and Brazil has a strong role to play there. This project also expands upon existing collaboration between Amyris, the State Government of Queensland, and Boeing.”

“Last month, ASTM International created a task force to establish product specifications for direct sugar-to-hydrocarbon renewable jet fuels, such as that being developed by Amyris. We are committed not only to delivering on the technical specifications for our jet fuel but also to ensuring that our renewable products are produced sustainably,” said John Melo, CEO of Amyris. “Our planet derives no benefit from a fuel that merely replaces current fossil fuels. This study will help us



- [IDB](#)
- [Boeing Company](#)
- [Embraer S.A.](#)
- [World Wildlife Fund Amyris](#)

Boeing et Embraer s'intéressent à un biocarburant pour avions

Cartagena de Indias - Colombia
Miércoles 27 Julio de 2011
Ediciones anteriores

Actualizado hace: 15 mins 4 segs



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Boeing, Embraer y BID financian estudio sobre biocombustibles para aviones

AFP | SAO PAULO, BRASIL | Publicado el 27 Julio |

Compartir 4

Los fabricantes aeronáuticos estadounidenses Boeing y Embraer, junto con el Banco Interamericano de Desarrollo (BID), finalmente anunciaron el uso de un combustible de caña de azúcar renovable comunicado.

Agencia France-Press
Sao Paulo, Brésil



Boeing, Embraer and IDB to fund sustainability analysis of producing Amyris renewable jet fuels from sugarcane

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Posted by **BioHub Staff** on 7/27/11 • Categorized as **Ag, Biojet, Commodities, Markets, Feedstocks, Fuels, Latin America, World News**



Boeing, Brazilian plane maker Embraer and the Inter-American Development Bank (IDB) announced Tuesday that they will jointly fund a study of producing aviation biofuels from sugarcane.

The Brazilian think tank ICON and the World Wildlife Fund will serve as independent reviewer and advisor.

The study is scheduled for completion in early 2012.



Boeing e Embraer financiam pesquisa para desenvolver biocombustíveis para jatos

As fabricantes de aviões Boeing e Embraer vão financiar, em conjunto com o Banco Interamericano de Desenvolvimento (BID), um estudo de viabilidade de combustíveis a base de cana-de-açúcar para abastecimento de jatos. Com base em padrões internacionais de sustentabilidade, o estudo avaliará as emissões de gases de efeito estufa no ciclo de produção em larga escala de biojet para aeronaves.

A pesquisa é a primeira a ser beneficiada por meio de acordo de cooperação regulada entre empresas públicas e privadas proposto pelo BID para ajudar no desenvolvimento da indústria de jatos. "Novas tecnologias para produção de combustíveis de fonte renovável podem reduzir significativamente as emissões de gases de efeito estufa, como o etanol, que já demonstrou no Brasil", ressaltou o líder da Iniciativa de Biocombustíveis Sustentáveis do BID, Arnaldo Vieira de Carvalho.

O diretor de Estratégia e Tecnologia para o Meio Ambiente da Embraer, Guilherme de Azevedo, destacou que a iniciativa integra a força do Brasil na produção de combustíveis renováveis e sustentáveis da aviação. "O Brasil é uma rica fonte de biomassa e o desenvolvimento de biojet baseada na cana-de-açúcar, reforça a importância do crescimento sustentável do setor."

Publié le 26 juillet 2011 à 13h42 | Mis à jour le 26 juillet 2011 à 13h42

Photo AFP

Verra-ton bientôt des 747 voler avec du biodiesel à partir de canne à sucre?

Les avionneurs américain et brésilien Boeing et Embraer ont annoncé mardi avec la Banque interaméricaine de développement (BID), une étude sur la viabilité d'un biocarburant à base de canne à sucre pour les avions.

«Les nouvelles technologies pour produire des combustibles à partir de sucre peuvent réduire significativement les émissions de gaz à effet de serre comme la canne à sucre au Brésil», a affirmé Arnaldo Viera de Carvalho, responsable de la coopération pour l'aviation.



Aeronave Embraer 190 adquirida pela companhia Azul Linhas Aéreas. Modelo vai realizar voo com combustível alternativo feito com cana-de-açúcar no primeiro semestre de 2012. (Foto: Divulgação/Embraer)

26/07/2011 21h16 - Atualizado em 26/07/2011 21h16

Parceria vai analisar se bioqueroseno de cana-de-açúcar é menos poluente

Combustível avião feito com produto reduz CO2 em 80%.

Estudo de impacto será financiado pelo BID, Em

Eduardo Carvalho Do Globo Natureza, em São Paulo

Boeing y Embraer estudian uso de biocombustibles en aviación

Las compañías aeronáuticas contarán con el apoyo del BID, que financia el estudio para desarrollar un combustible a partir de caña.

Los fabricantes aeronáuticos Boeing y Embraer, junto al Banco Interamericano de Desarrollo (BID), finalmente anunciaron el uso de un combustible de caña de azúcar renovable comunicado.

El informe evaluará las condiciones ambientales y de mercado asociadas a los biojet para aeronaves y será elaborado por la compañía especializada en fuentes alternativas de energía.





Worldwide demo/test flights

Date	Airline or Other Sponsor	Aircraft	Engine Maker	Fuel Producer	Feedstock	Technology
Feb 2008	Airbus	A380	Rolls-Royce	Shell	Natural gas	Fischer-Tropsch
Dec 2008	Air New Zealand	B747-300	Rolls-Royce	UOP	Jatropha	HEFA
Jan 2009	Continental	B737-800	GE/CFMI	UOP	Jatropha, algae	HEFA
Jan 2009	Japan Airlines	B747-300	Pratt & Whitney	UOP	Camelina, jatropha, algae	HEFA
Oct 2009	Qatar	A340-600	Rolls-Royce	Shell	Natural gas	Fischer-Tropsch
Nov 2009	KLM	B747-400	GE	UOP	Camelina	HEFA
Apr 2010	United	A319	IAE	Rentech	Natural gas	Fischer-Tropsch
Nov 2010	TAM	A320	CFMI	UOP	Jatropha	HEFA



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Worldwide demo/test flights (cont.)

Date	Airline or Other Sponsor	Aircraft	Engine Maker	Fuel Producer	Feedstock	Technology
Apr 2011	InterJet (Mexico)	A320	CFMI	UOP	Jatropha	HEFA
Jun 2011	Honeywell	G450	Rolls-Royce	UOP	Camelina	HEFA
Jun 2011	Boeing	B747-8	GE	UOP	Camelina	HEFA
Jul 2011	Lufthansa	A321	CFMI	Neste Oil	Palm oil, rapeseed, animal fats	HEFA
Jul 2011	KLM	B737-800	CFMI	Dynamic Fuels	Used cooking oil	HEFA
Jul 2011	Finnair	A319	CFMI	SkyNRG	Used cooking oil	HEFA
Aug 2011	Aeromexico	B777-200	GE	ASA	Jatropha	HEFA
Sep 2011	Thomson Airways	B757	Rolls-Royce	SkyNRG	Used cooking oil	HEFA
Sep 2011	Embraer	EMB 170	GE	N/A	Camelina	HEFA
2012	Porter Airlines	Bombardier Q400	PWC	UOP	Camelina	HEFA
2012	Azul	EMB 170	GE	Amyris	Sugar cane	fermentation

Source: Adapted from ACA, 2011



The Mesoamerican Biofuels Group

- **Objective:** the group was formed to join efforts, exchange experience inside/outside the region, facilitate decision-making and promote regional biofuels initiatives in Mesoamerica.
- **Participants:** 10 countries (Mexico, Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Dominican Republic and Colombia) with initially 3 governmental representatives each from the energy, agriculture and finance sector, and regional institutions (SG-SICA, SIECA, CCHAC, CEAC, CEPAL, INCAE, CABEI, AID, IDB) coordinated by SG-SICA.
- **Results so far:** 5 working meetings held (August 25, 2006 in San Jose, Costa Rica; November 30, 2006 in Washington DC; March 12, 2007 in DF, Mexico; November 15, 2007 and November 4, 2008 in Guatemala). Action Plans prepared for regional initiatives on ethanol and biodiesel.



Other regional activities

- On June 7-8, 2007 the Ministers of Energy and Agriculture from the Mesoamerica Project – PM (former Puebla-Panamá Plan - PPP) and private sector representatives participated on a series of technical visits to Bogota, Cali, Medellín and Cesar region financed by the IDB and Colombia to learn the Colombian experience on biofuels, as an invitation from the President Uribe.
- Under the PM initiative, Mexico promoted the Mesoamerican Biofuels R&D Network and Colombia promoted the installation of biodiesel plants in:

- El Salvador, Honduras (CORPOICA)
- Mexico (Chiapas and Federal governments)
- Panama (IDB-SECCI)

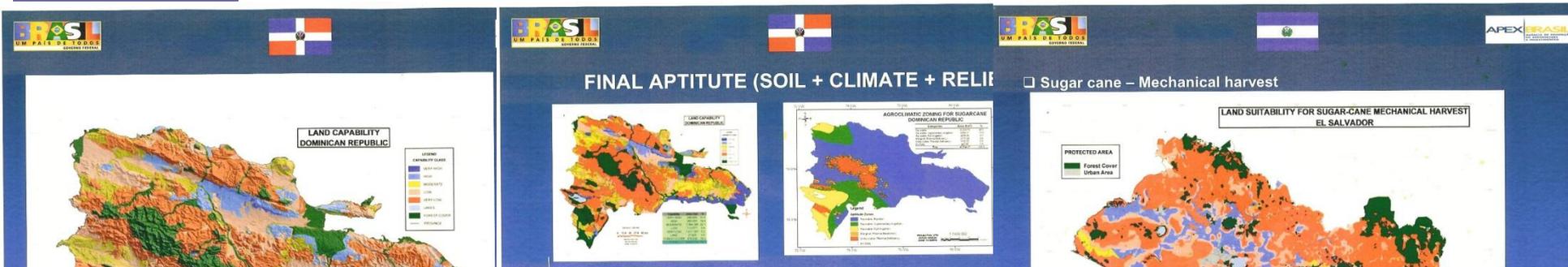




Support to BR-US MOU on biofuels

Technical assistance (US\$750,000 SECCI funds) to implement studies and evaluations to support National Biofuels Programs in:

- El Salvador (APEX-funded)
- Dominican Republic (APEX & IDB-funded)
- Haiti, Guatemala, Honduras (IDB-funded)





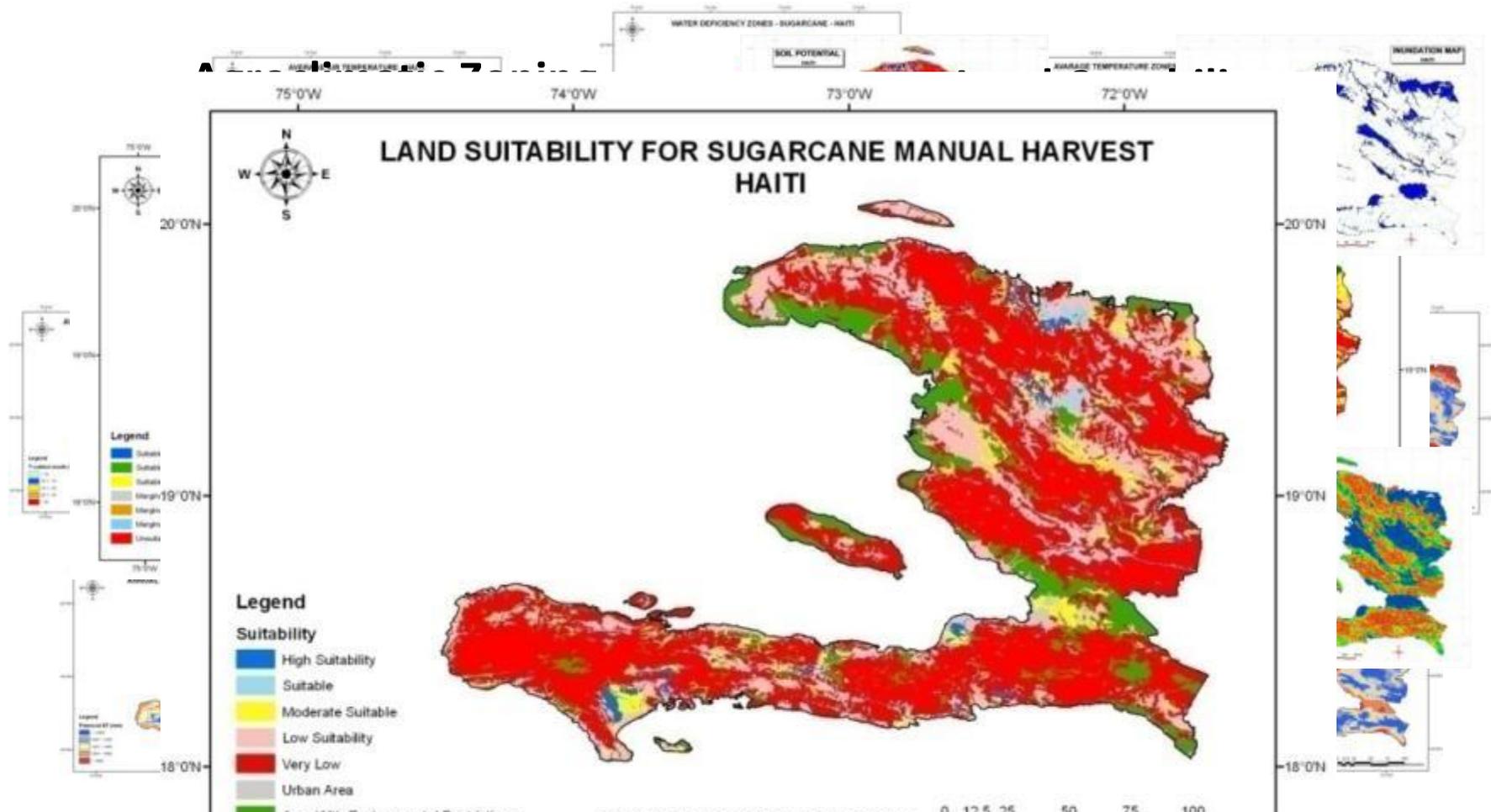
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PHASE 1 – LAND SUITABILITY



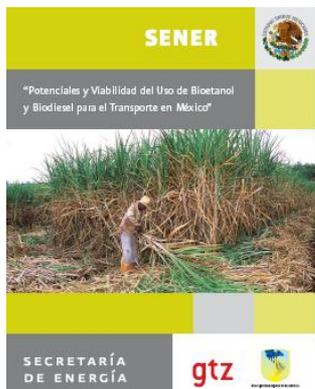


http://www.energia.gob.mx/webSener/res/169/Biocombustibles_en_Mexico_Estudio_Completo.pdf

Case of Mexico

A technical assistance project* to SENER funded by HSET/USDOE and GTZ to evaluate the feasibility of the production, distribution and utilization of ethanol and biodiesel as fuel for transportation:

- **Technical, economical, social and environmental issues were reviewed to calculate the impacts from the introduction of biofuels under alternative scenarios for market penetration & oil prices**
- **Several technologies were evaluated for the production from different raw material and the utilization of biofuels – fixed and variable blends, hydrated ethanol, flex fuel vehicles, ETBE; increased cogeneration**
- **Some of the results: US\$160 million would be required for replacing MTBE/TAME in major cities, without the need of expansion of sugarcane plantation; replacing 10% of gasoline nationwide requires add'l 800,000 ha (twice the current sugarcane area), US\$2 billion in 45 new distilleries and 400,000 new jobs; sugarcane most competitive solution**





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Case of Brazil (“renovAção” Program for requalification of sugarcane cutters)

A US\$500k SECCI Technical Assistance Operation for UNICA (Sugar Cane Industry Association) the major sugar and ethanol organization in Brazil with 119 sugar mills, responsible for aprox. 60% of the ethanol and sugar produced in Brazil:

- Full harvesting mechanization is expected by 2014 for all major sugar cane areas with <12% slope, and by 2017 in all other areas.
- During next 3 years about 26,500 sugar cane cutters will be displaced.
- Project target is requalify 7,000 workers/year: 3,000 through professional training for the sector and 4,000 for other sectors.



JOHN DEERE



syngenta

unica

UNIÃO DA INDÚSTRIA DE CANA-DE-AÇÚCAR
ETANOL • AÇÚCAR • ENERGIA SÃO PAULO • BRASIL

renovAção



Case of Chile

A US\$ 1 million SECCI Technical Assistance for a **2nd generation biofuel** feasibility study, employing wood residues:

- Executed by ForEnergy S.A., a public-private partnership of ENAP Refinerías S.A. and Consorcio Maderero S.A. that with support from a local R&D institution put together the Biocomsa Consortium.
- The SECCI grant together with funds from the Government of Chile will help ForEnergy build a pilot plant to produce hydrogen and steam from wood and other biomass sources through a gasification process.
- In a second phase, hydrogen will be converted to biofuels through a Fischer-Tropsch process and ForEnergy will analyze investments and O&M costs to determine the scale-up of the pilot plant.



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ENVIRONMENTAL IDB Scorecard for Sustainable Biofuels

General

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

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

www.iadb.org/biofuelsscorecard

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

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



IDB Carbon Finance Strategy

- IDB does not act as buyer or seller – instead support its clients (private and public) in integrating Carbon Finance in their business
- Support includes technical capacity for specific projects to comply with carbon markets regulations (mainly focus on the Clean development Mechanism - CDM) to broader capacity of project developers to organize themselves legally and institutionally to benefit from the market
- Support is provided in form of grants and technical assistance



THANK YOU



IDB

Infrastructure
and Environment
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