



GLOBAL BIOFUEL DEVELOPMENTS

~ Focus on Latin America and Asia ~

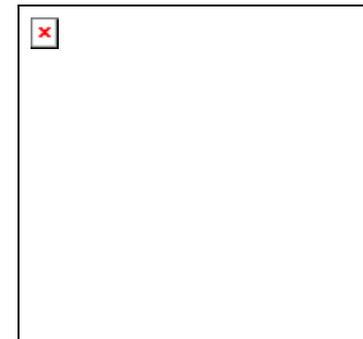
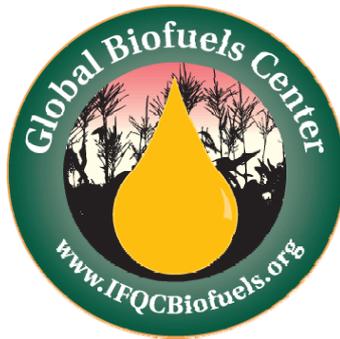


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Hart Energy Consulting

- ✓ **Mission**: To improve communication and information exchange between automotive, refiner and fuel quality stakeholders to achieve an improved environment;
- ✓ **We do not advocate any position;**
- ✓ **We are a non-biased organization representing all parties.**

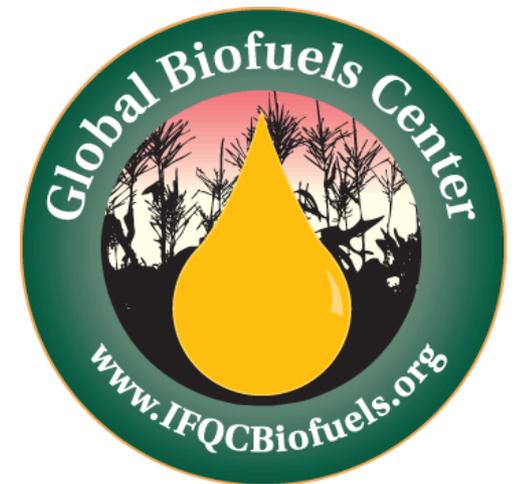


Global Biofuels Center Members



Presentation Overview

- ✓ Drivers
- ✓ Overview of Global Biofuel Developments
- ✓ Biofuel Developments in Latin America
- ✓ Biofuel Developments in Asia
- ✓ Trends and Observations
- ✓ Conclusions



Common Drivers Facilitating Growth of Global Biofuels

- ❑ **Energy security = #1**
 - Poverty reduction & rural job creation #2
 - National security
 - Climate change
 - Air quality improvement
 - MTBE & Lead switch out; octane enhancement

- ❑ **Global Energy Demand to grow 40% by 2020 = supply & sustainability pressures!**
 - Refining Capacity saturated
 - Crude & product supply constraints = record high prices
 - More petroleum use leads to increased GHG emissions
 - CO2 impact on Climate Change
 - Carbon Credit Trading Opportunities for biofuels

Observations:

- ✓ Drivers are cross-cutting issues that affect developed and developing countries alike
- ✓ Biofuels can generally be used in the existing liquid fuel infrastructure
- ✓ Conventional vehicles easily adapted for biofuel use in most cases

Regional Biofuels Policy Review

Europe

- Biofuels Directive 2010 target won't be met
- 10% target by 2020 being considered
- Looking at sustainability criteria
- Germany's revision of tax incentives has squashed the market
- Producers reacting to U.S. "splash and dash" issue

US & Canada

- US RFS finalized
- "Low carbon fuels"
- New round of energy legislation being considered by Congress will increase biofuels production and use further
- Biofuels as foreign policy?
- Canada proposing own RFS

Asia

- Diverse region
- Generally seem to set specs first before wide introduction
- APEC region studying biodiesel quality standards
- Japan looking at ETBE, others ethanol and biodiesel
- Similarities to the LAC situation

Latin

America/Caribbean

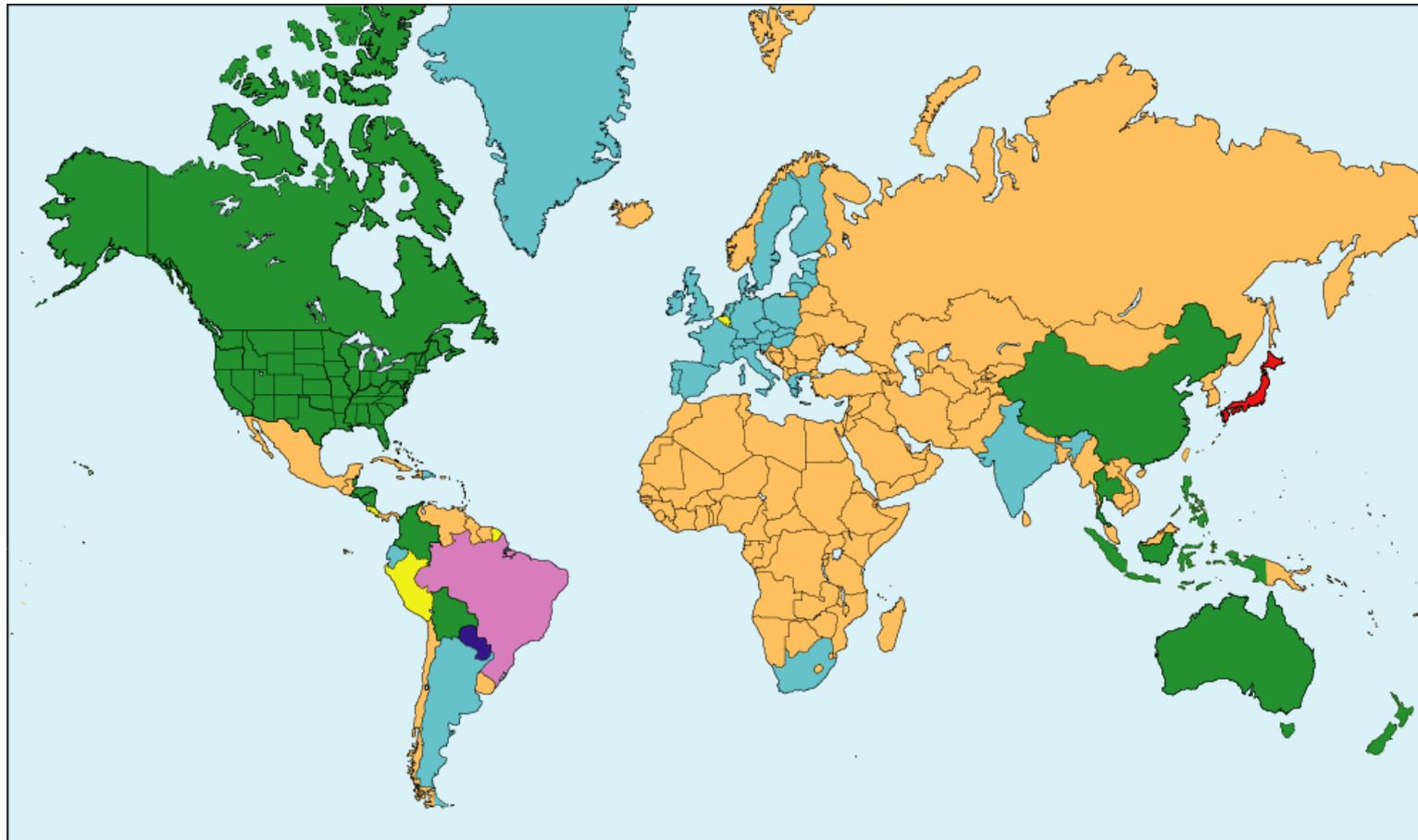
- International Biofuels Forum
- Brazil – US cooperation – what will it mean for the LAC region?
- To grow market in Brazil, huge infrastructure investments needed
- Flexi-Fuel Vehicle market exploding!!
- Many LACs looking at biofuels policies for end of decade

Africa

- Interest from many countries to start domestic programs
- Brazil to help with expertise
- Poor maize crop has suspended SA biofuels program

Source: Global Biofuels Center, Oct. 2007

Current Ethanol Blending Limits for Conventional Gasoline



20 vol% min

11-24 vol% max

10 vol% max

7-8 vol% max

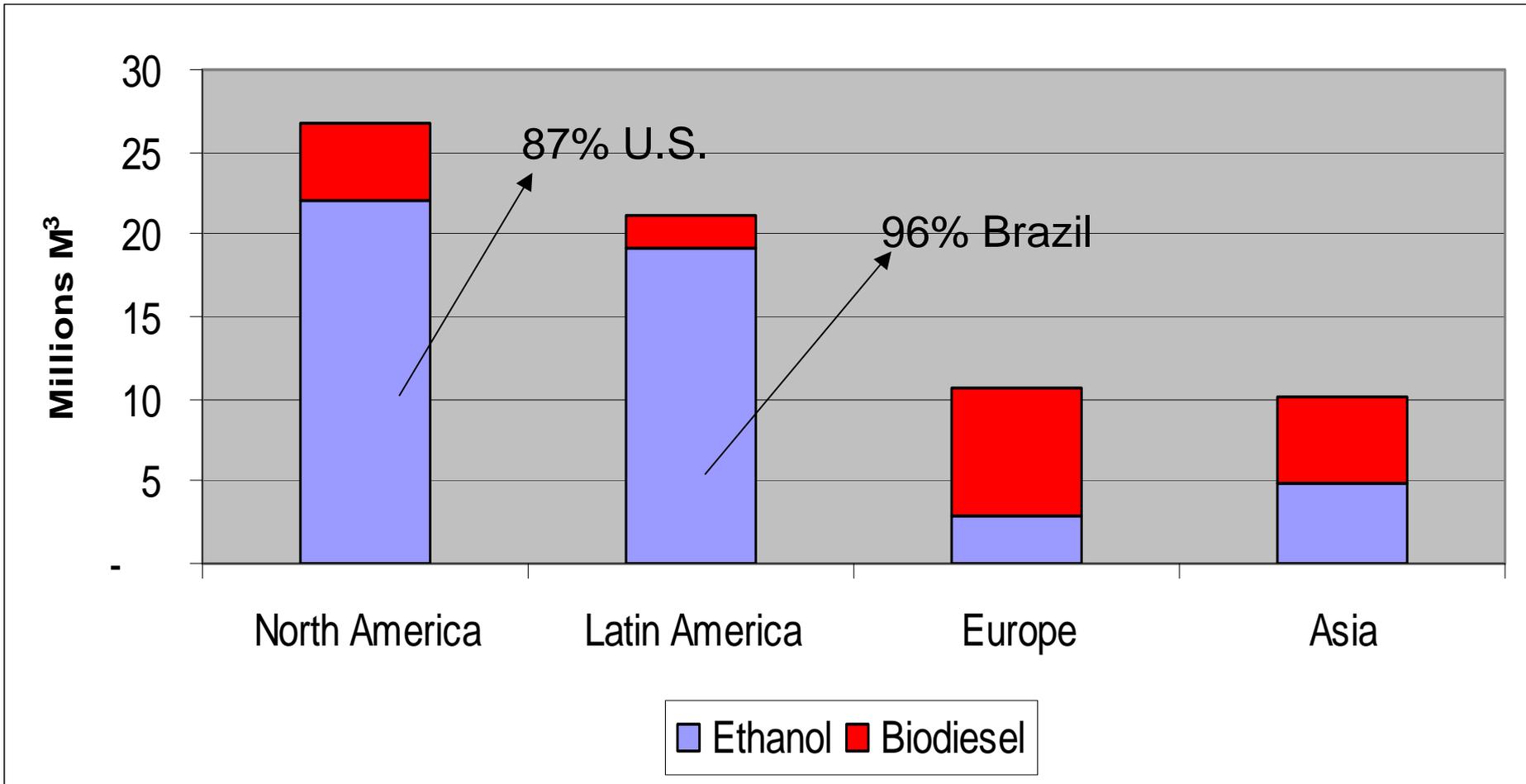
5 vol% max

3 vol% max

No blends or data not available

Source: Global Biofuels Center, March 2007.

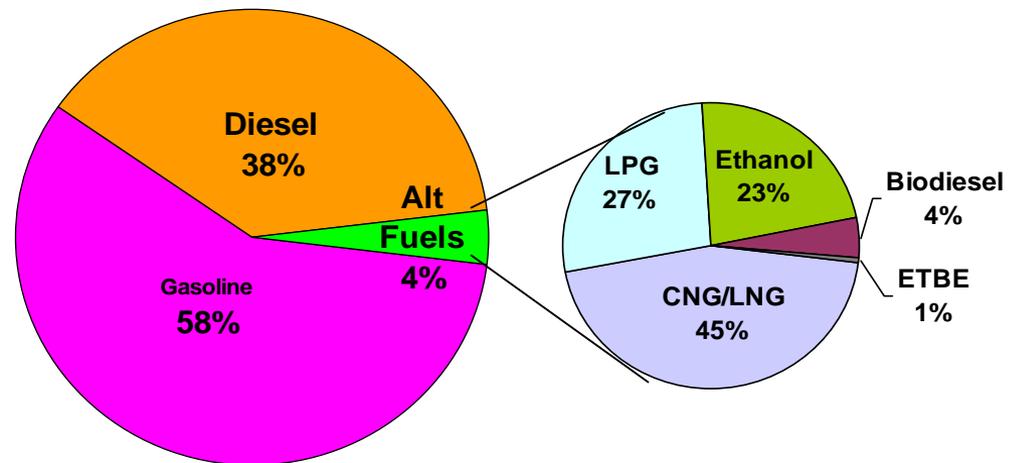
Current Biofuels Production Capacity



Source: Global Biofuels Center, April 2007

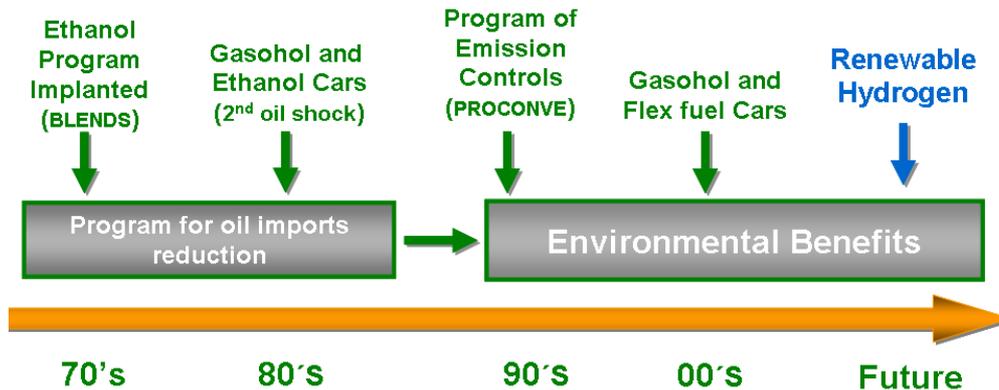
Renewable Fuels Outlook 2020

- ✓ **Alternative liquid transportation fuels expected to grow at 7.3%, from 2.3 to 5 million BPD.**
 - Biofuels expected to grow at 15% pa, from 430 BPD to 2.2 million BPD.
- ✓ **With mandates, biofuels could grow to higher levels**
- ✓ **Feedstock diversity will become increasingly important with coal, NG and renewable playing a bigger role**



Source: Hart's World Refining & Fuels Service 2007

Ethanol in Brazil



Source: Petrobras, April 2006

✓ Two goals:

- “Our proposal is that other countries start producing ethanol...To become a commodity, we have to have several suppliers in the global market.”
- Increase sugarcane/ethanol production capacity (23.3 billion liters) and double exports by 2010

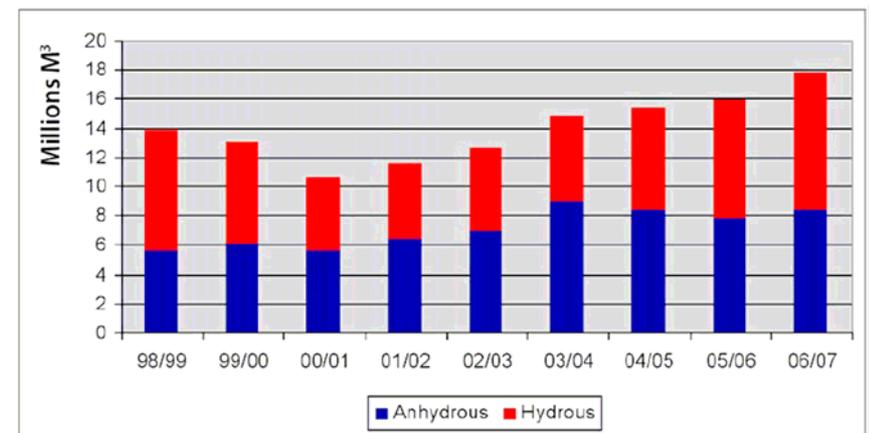
✓ Support of agriculture & rural economies:

- 0.5 M m³ can create 20,000 direct and 60,000 indirect jobs
- Feedstocks: sugarcane

✓ Energy independency:

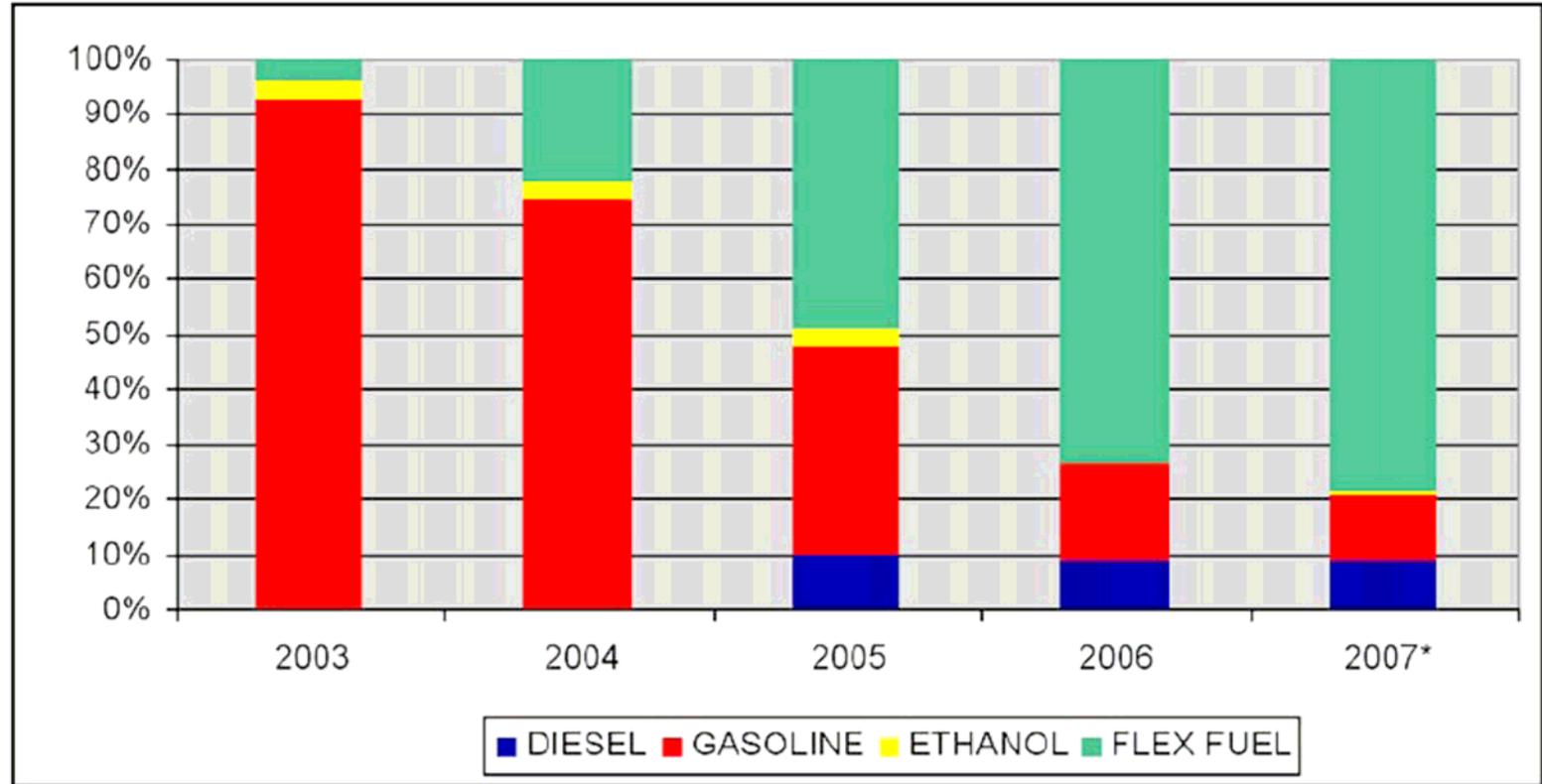
- Uses 15 ML of ethanol annually = 40% less fossil fuel consumption in transportation sector
- Market share of ethanol in light vehicles 33% (2006)

Ethanol Production



Source: UNICA, June 2007

Flex-Fuel Vehicles (FFV) in Brazil



Note: *Denotes sales through April 2007

Source: ANFAVEA, June 2007

- ✓ **FFVs account for almost 80% of all new vehicles sales => will comprise 25% of fleet by 2010**
- ✓ **Consumers want to decide the fuel at the station; fuel price is one of the most important factors**

Biodiesel in Brazil

- ✓ **B100 standard set**
- ✓ **Feedstocks: soy, castor**
- ✓ **B2 voluntary 2005-07, mandatory Jan. 2008**
- ✓ **B5 voluntary 2008, required 2013**
 - 840 million liters required, 1.7 billion liters of capacity (36 plants) to come online early next year
 - ❖ Puts Brazil in a position to export, along with Argentina
- ✓ **Social plan problematic and inefficient**
 - Aim was to benefit 360,000 families in poor, rural northern region of Brazil
 - ❖ Only 2,500 families in program so far
 - ❖ Castor receives best tax advantage as feedstock
 - ❖ Small-time production impractical for large-scale program



Biodiesel in the Rest of Latin America

Colombia

- B5 limit set
- 2004: law known as “Ley 939” passed
- Jan. 2008: B5 required

Bolivia

- 2007: B2 required
- 2015: B20 required

Uruguay

- B2 limit and B100 standard set
- B2 voluntary 2006-08, mandatory 2009-11
- 2012: B5 required

Argentina

- Exports 90% of vegetable oil production
- B100 standard set
- Feb. 2007: Biofuels law known as “Ley de Biocombustibles” passed
- 2009: B5 required



Ethanol in the Rest of Latin America

Costa Rica

- 2008: E7 required

Colombia

- Second-largest ethanol producer in Latin America
- E10 limit set
- Nov. 2005: E10 required in major cities
- 2008/2009: E10 nationwide

Ecuador

- July 2006: E5 pilot test in Guayaquil
- Plans to require E10

Jamaica

- 2008: E10 required

Venezuela

- Octane enhancer to replace lead
- 2007: E8 required



Bolivia

- E10 limit set
- June 2005: Decree known as “Ley 3086” increasing from E10 to E25 by 2010

Paraguay

- 2006: E24 required

Argentina

- Feb. 2007: Biofuels law known as “Ley de Biocombustibles” passed
- 2009: E5 required

Peru

- 2010: E7.8 required

Asian Biofuel Standards

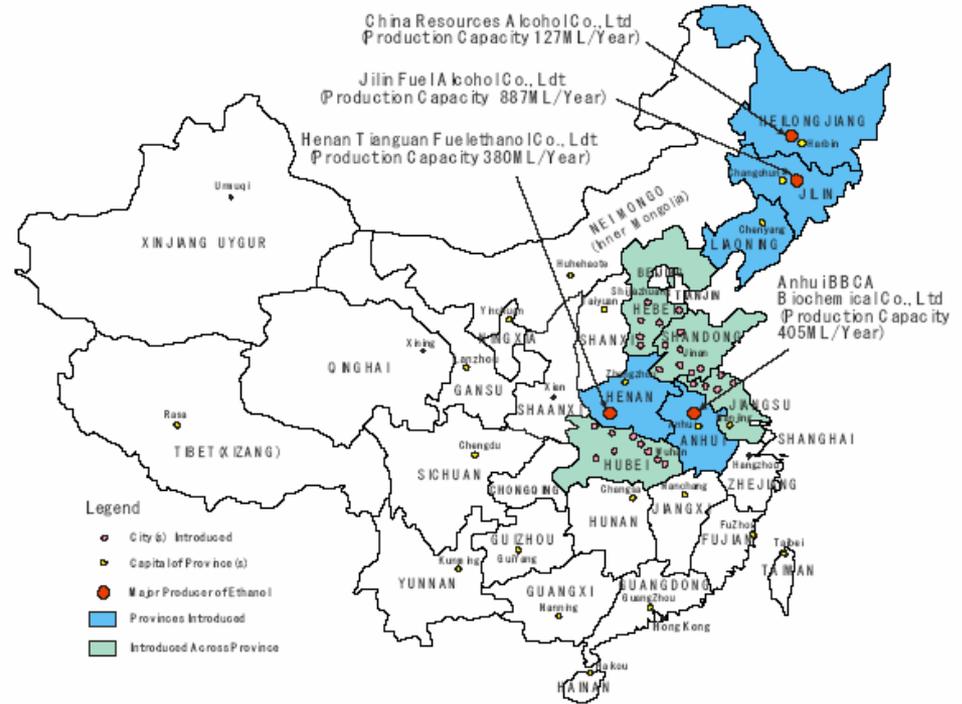
- ✓ Diverse, not a “one-policy” region
- ✓ Conventional fuel quality mainly follows EN standards; biofuel quality also similar path
- ✓ Japan: JAMA/METI findings that neither ASTM nor CEN biodiesel standards are acceptable standards for Japan because of oxidation stability, corrosion and acid value
- ✓ Promoting biofuels through international and regional cooperation:
 - ***Asia-Pacific Economic Cooperation (APEC) Biofuels Taskforce (2006) to carry out two projects in 2007:***
 - ❖ Establish “Guidelines for the Development of Biodiesel Standards in the APEC Region”
 - ❖ Establish “Alternative Transport Fuels Policy Options for APEC Economies”
 - ***2nd East Asia Summit (Philippines, January 2007)***
 - ❖ 15 member countries signed the “Cebu Declaration on East Asian Energy Security”
 - ❖ Working toward harmonization of standards and free trade in biofuels

Biofuels in China

- World's second largest energy consumer
- Jan 2006: Renewable Energy Law set
- July 2007: Agricultural Biofuels Industry Plan released

Ethanol

- Third largest ethanol producer in the world
- 2001: Fuel ethanol and separate E10 blend standard set
- E10 limit set in gasoline, currently covers nine provinces
- Four major fuel ethanol producers with capacity of 1.2 million tons in 2006
- Tax incentives and subsidies provided
- Current feedstocks: corn, wheat
- Dec 2006: Moving away from corn and towards non-grain based production (cassava, sweet potato, sugarcane, sorghum, cellulose)
- Targets: 2 million tons by 2010 and 10 million tons by 2020



Source: Institute of Energy Economics of Japan, May 2006

Biodiesel

- Huge potential (transport, agricultural, construction, etc)
- No policy in place, domestic market very small
- Current feedstocks: waste cooking oil, imported palm oil
- May 2007: B100 standard set
- Targets: 200,000 tons by 2010 and 2 million tons by 2020

Biodiesel in the Rest of Asia

Malaysia

- World's largest palm oil producer and exporter
- Mar. 2006: B5 trials introduced in selected government vehicles
- June 2007: Malaysian Biofuel Industry Act passed, implementation planned early 2008
- Palm olein for domestic use of B5, FAME for export markets
- Many palm biodiesel plants announced to be built

Indonesia

- World's second largest palm oil producer and exporter
- B100 standard set
- Aims to replace 10% of conventional fuel consumption with biofuels by 2010
- May 2006: B5 and B10 sold in selected stations; currently selling 2.5 vol% biodiesel blends

Japan

- No policy in place
- B100 standard voluntary
- Mar. 2007: B5 standard set



South Korea

- B5, B20 and B100 standards set
- July 2006: Refineries supply 0.5 vol% biodiesel nationwide for two years
- 2012: B3 required

Philippines

- World's largest coconut oil producer
- Standalone CME standard set; FAME standard proposed
- Mar. 2004: B1 blends introduced initially in government fleets
- Jan. 2007: Biofuels Act passed
- May 2007: B1 mandatory
- 2009: B2 mandatory

Ethanol in the Rest of Asia

Japan

- E3 limit set
- PAJ aims to blend ETBE in 20% gasoline pool by 2010
- Apr. 2007: 7% ETBE-blended gasoline pilot project started in and around Tokyo, to expand by 2009
- 2008: aims to supply E3 to Miyakojima, Okinawa

Thailand

- E10 limit set
- Jan. 2007: new interim government not mandating original target of phasing out and replacing MTBE in RON 95 gasoline with E10 due to supply shortages and incompatibility with old vehicles
- Resulted in current fuel ethanol surplus



Philippines

- E10 limit set
- Jan. 2007: Biofuels Act passed
- 2009: E5 required
- 2011: E10 required

Australia

- E10 limit set
- Biofuels target of 350 million liters by 2010

Trend: Global Trade of Biofuels?

Brazil Leading the Way...

- ✓ **Driving the creation of a global biofuels market – mainly on ethanol, but will include biodiesel as well**
- ✓ **Brazilians calling for harmonization of ethanol specifications, bringing about following benefits:**
 - Key for international market growth
 - Key for turning fuel ethanol into an energy commodity
 - Easier quality assurance
 - Product certification & traceability standardization
 - Wider product acceptance
- ✓ **Also calling for lifting of tax barriers that are preventing growth of global trade market, e.g., U.S. tariff**
- ✓ **International Biofuels Forum**
- ✓ **U.S.-Brazil Partnership: What's it all about?**

Trend: "Second-Generation" Biofuels

Example: Renewable Diesel

- ✓ **Example: Renewable diesel, green diesel or biomass-to-liquids (BTL)**

- ✓ **Tests are showing:**
 - Higher quality diesel fuel: free of sulfur and aromatics, very high cetane
 - Uses diverse feedstocks, can help avoid "food v. fuel"
 - Fits into distribution and logistics infrastructure
 - Reduces exhaust and GHG emissions
 - No storage issues
 - First plant being built by Neste Oil/Total in Porvoo, Finland

- ✓ **Accepted as biodiesel in Europe and Brazil, but not the U.S.**

To Ensure Biofuels Success Solve.....

✓ Quality, Storage, Transport, Logistics

- Diesel Cloud point, Water, Oxidation Stability, Specifications
- Rail or truck to terminals
- Biofuels pipeline shipment not widely accepted as feasible at this time

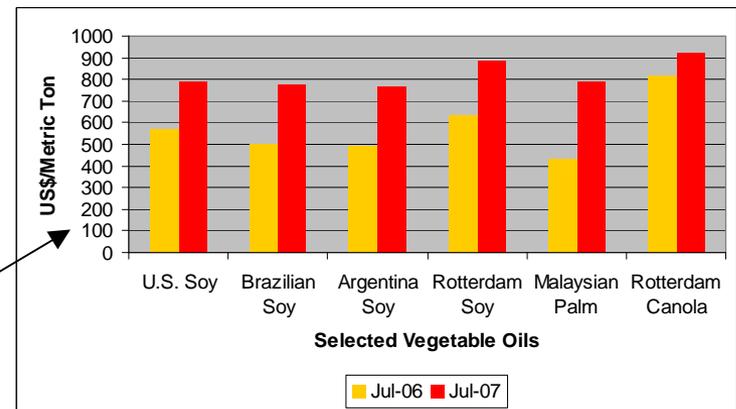
✓ Environment, Climate Change and Green House Gas Emissions

- Increased Evaporative Emissions...Air quality
- Increased demand of Water
- Impact of increased Use of Fertilizers and Pesticides, Other sustainable agriculture processes?
 - ❖ avoiding industrialized monoculture.... Habitat protection
- What's the proper lifecycle analysis? Net energy balance?
- Surface and groundwater issues
- Soil quality
- Waste management practices
- Limiting deforestation?
- Food vs fuel

✓ Price

- Subsidies, Mandates, Taxation

Feedstock Prices
Skyrocket!



Source: USDA, Sept 2007

Conclusions, Thoughts & Questions to Consider

- ✓ **Moving toward creation of a global biofuels market – Brazil leading the way, addressing barriers to “commoditization”.**
- ✓ **How are policymakers preparing for the coming of a global biofuels market?**
- ✓ **How will policy framework evolve to support increased biofuels usage?**
- ✓ **Biofuels expected to solve a host of policy dilemmas – can it?**
- ✓ **Countries grappling with affording fiscal incentives for the long term versus instituting mandatory targets. Mandatory targets are coming!**
- ✓ **Product quality and addressing potential technical issues is an important issue that must be ensured for successful biofuels program!**
- ✓ **Some countries integrating of second-generation biofuels, R&D ongoing**
- ✓ **Sustainability concerns: Issue will continue to grow in importance in coming years**

Biofuels For Transportation

- Quality is Key -

CANADA

- Fish Oil
- Tallow



NORWAY

- Fish Oil



ASIA

- Jatropha
- Cooking Oil



UNITED STATES

- Soy
- Corn
- Bark
- Tallow
- Cool

Recent GBC analysis shows more than 100 feedstocks are currently in use or contemplated for biofuels production!



ARGENTINA

- Soy

AUSTRALIA/NEW ZEALAND

- Tallow

Source: FUEL, First Quarter 2007



<http://www.ifqc.org>

THANK YOU !



<http://www.ifqcbiofuels.org>



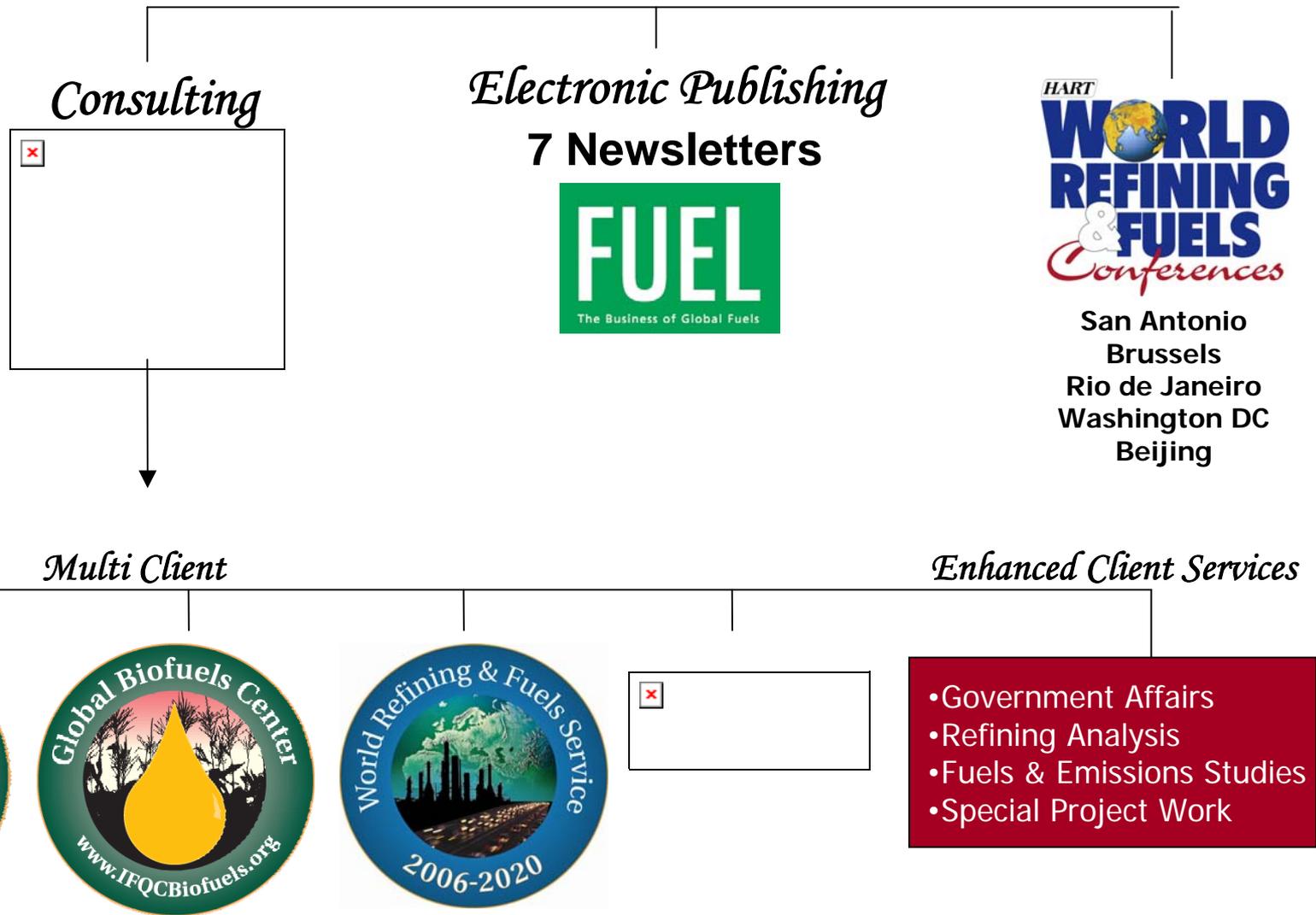
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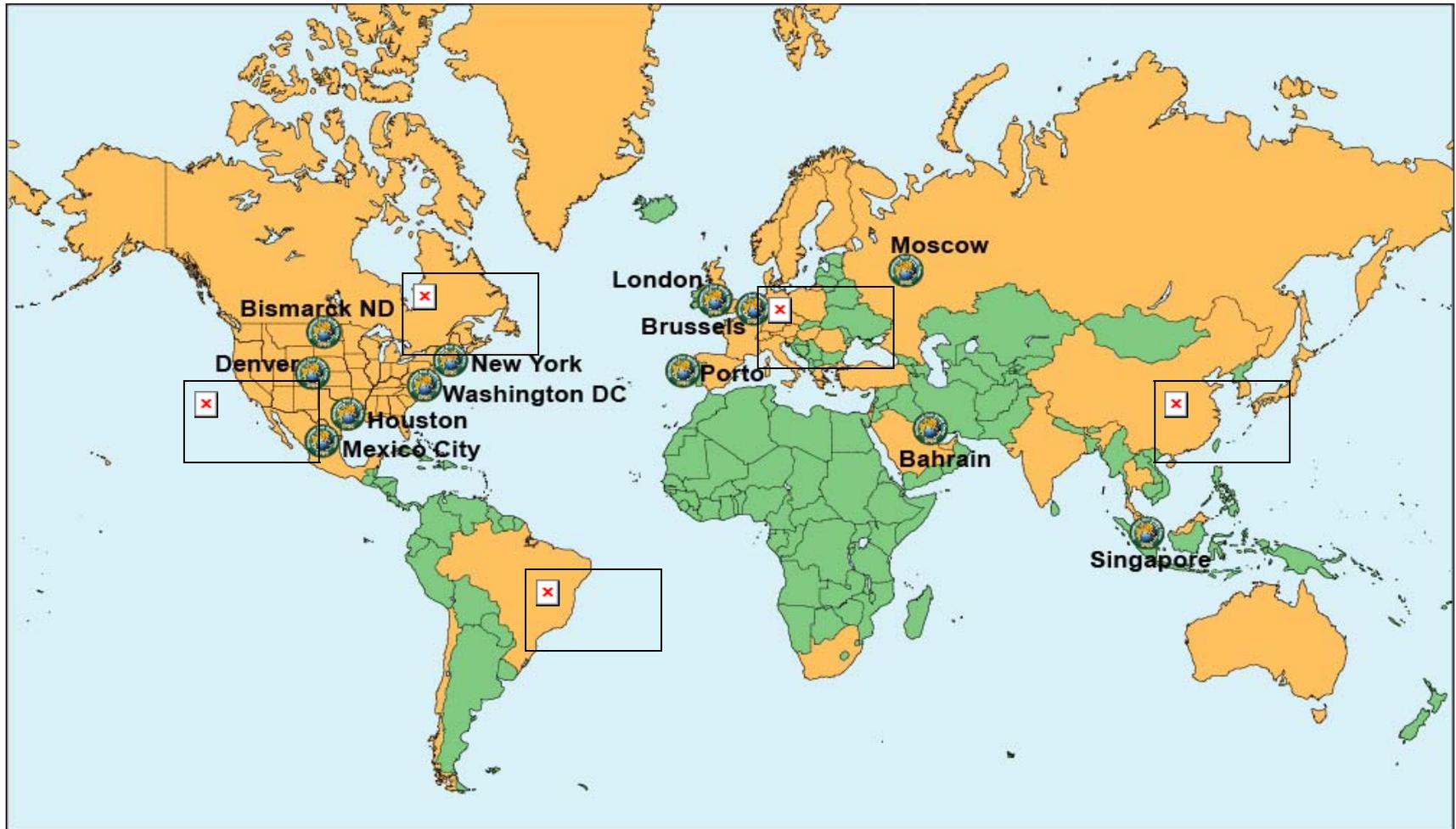


<http://www.hart-isee.org>

Downstream Related Products



Downstream: Offices & Conferences



IFQC / HART Offices



Countries with IFQC & Global Biofuels Members

Introducing Your IFQC Asian Team



Candace Vona
Executive Director
Middle East & Asia

- BSc Chemical Engineering graduate, 22 years experience in refinery scheduling, business optimization, crude oil procurement, international sales and marketing



Huiming Li
Manager Asia

- BSc Chemical Engineering (Hons) graduate
- Responsible for all of Asian IFQC and GBC data and analysis



Kuntal Vora
Manager Automotive &
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- Bsc graduate Mechanical Engineering from West Virginia University, USA with MSc in Aerospace Engineering.
- Assists with Asian data coverage and analysis; tracks global vehicle and emissions developments



Karen Chan
Sales & Marketing
Manager, Asia

- B Economics degree; Masters (Honors) of International Studies- majoring in Economic Analysis and Political Strategies of ASEAN countries
- Customer Service, market development, sales of FUEL editorial and advertisements



Lucky Nurafiatin
Research Manager, Asia

- BSc degree in Physical Science; 15 years experience in various product development, marketing and training roles.
- Assists with Asian data coverage and analysis

