

INEE

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Promovendo o uso de etanol

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Brasil

Fostering the ethanol use as fuel

Outline

- 1. Evolution of blending in Brazil***
- 2. Situation in Latin America and Southern Africa***
- 3. Perspectives on Brazil***

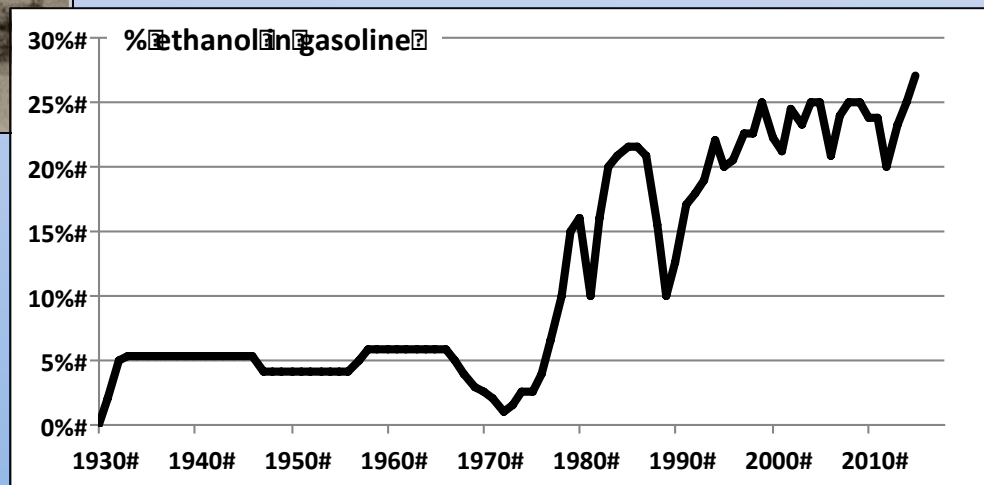
Ethanol use: the initial steps

Gasoline blended with ethanol has been a mandatory practice in Brazil since 1931 (minimum E5, average E7.5), reinforced after the oil crisis during the seventies, when the use of high blends (E25) in all gasoline motors and pure hydrous ethanol in dedicated motors was adopted.



Ford Model T adapted for pure ethanol, used for public demonstrations in the 20's (INT, 2006)

**Ethanol content in the Brazilian gasoline
(BNDES, 2009, updated)**



Bioenergy production potential in Latin America and the Caribbean

This region presents excellent conditions to produce bioenergy.

About 360 Mha of land suitable for rainfed agriculture are available for expanding agriculture in LAC (FAO, 2012); 37% of global total and more than 3X the area required to meet future world food needs.

20% of this area, managed properly and using efficient processes (3 Mha/EJ) could produce annually 24 EJ of liquid biofuels, equivalent to 11 million bpd, more than current US or Saudi Arabia oil production.

Current status of biofuel programs in LAC

Since the 80's several LAC countries have promoted biofuels production and use.

Several countries have introduced ethanol and biodiesel mandates: Argentina, Brazil, Colombia, [Costa Rica], Ecuador, Honduras, Jamaica, [Panamá], Peru, and Uruguay.

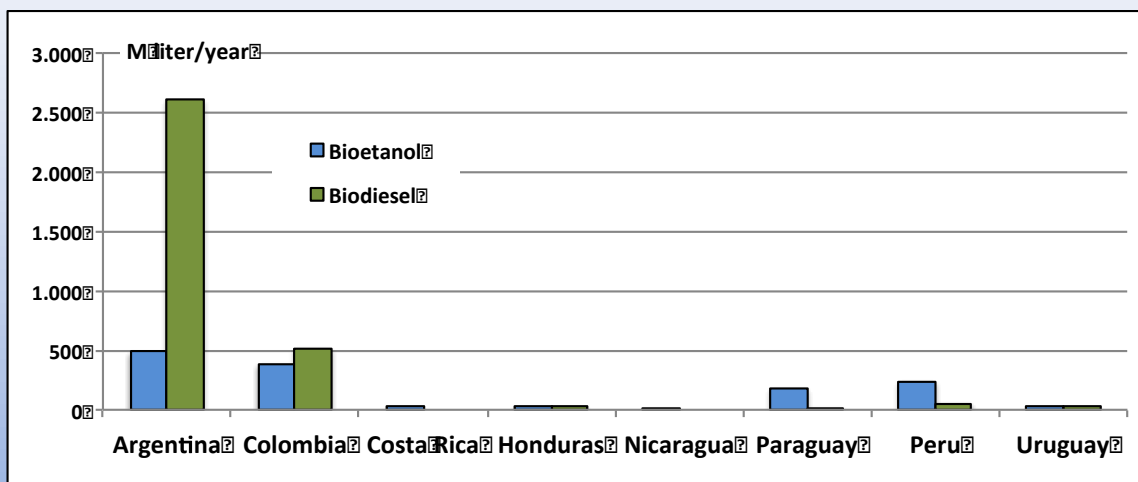
Programs for bioelectricity and biogas production have been also implemented.



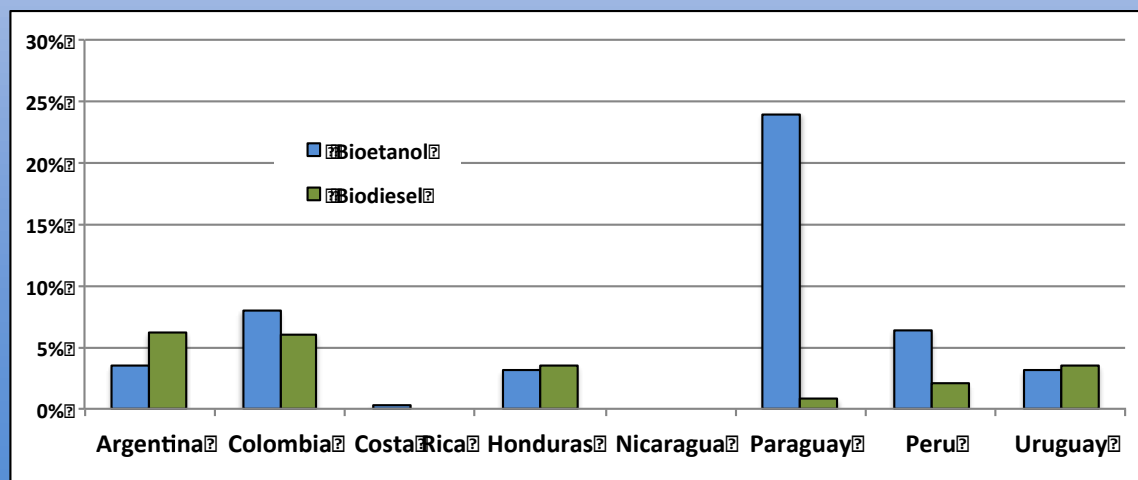
E5 in an Ecuadorian gas station

Current status of biofuel programs in LAC

Several countries are producing liquid biofuels, in some cases for just for trading. The relevance of production depends on the domestic market.



Ethanol/ biodiesel production (from official data, 2012/2013)



Average blending level (from official data, 2012/2013)

Ethanol production in Paraguay



Empresa: SAN LUIS SAECA
 Capacidad: 20.000.000 lts/año
 Producción: 17.000.000 lts/año
 Localización: Col. F. Caballero Álvarez

Empresa: INPASA
 Capacidad: 90.000.000 lts/año
 Volumen de Producción: 20.000.000 lts/año
 Localización: Col. Nueva Esperanza

Empresa: ALMISA
 Capacidad: 5.000.000 lts/año
 Producción: 1.000.000 lts/año
 Localización: Colonia Repatriación

Empresa: ALCOTEC SA
 Capacidad: 10.000.000 lts/año
 Producción: 4.000.000 lts/año
 Localización: Ruta 2 Km. 198

Empresa: NEUALCO SA
 Capacidad: 10.000.000 lts/año
 Producción: 4.000.000 lts/año
 Localización: Ruta 2 Km. 206

Empresa: EXPELLER SA
 Capacidad: 10.000.000 lts/año
 Producción: 3.300.000 lts/año
 Localización: Maciel,

Empresa: COOPERATIVA CNEL OVIEDO
 Capacidad: 10.000.000 lts/año
 Producción: 4.000.000 lts/año
 Localización: Ruta Cnel Oviedo- Carayao

Empresa: PETROPAR
 Capacidad: 36.000.000 lts/año
 Producción: 22.000.000 lts/año
 Localización: Mauricio Jose Troche

Empresa: ITURBE SA
 Capacidad: 20.000.000 lts/año
 Producción: 15.000.000 lts/año
 Localización: Iturbe

Empresa: AZPA SA
 Capacidad: 30.000.000 lts/año
 Producción: 26.000.000 lts/año
 Localización: Tebicuary

Empresa: PHOENIX
 Capacidad: 10.000.000 lts/año
 Producción: 2.000.000 lts/año
 Localización: Maciel

Empresa: ALPASA
 Capacidad: 15.000.000 lts/año
 Producción: 6.000.000 lts/año
 Localización: Colonia Santa Isabel, Dpto. de Paraguari

**Capacidad de produccion:
 266 M litros etanol/año**

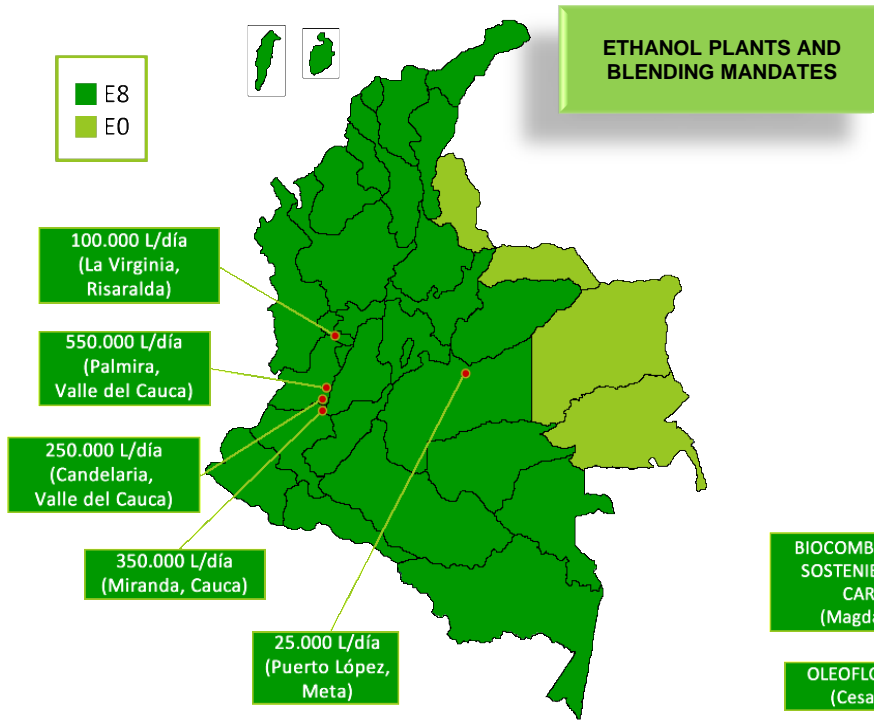
**Superficie Cultivada en
 Caña para Etanol:
 30.000 hectareas
 (2011)**

**Mano de O bra Agrícola: 18.000 Personas
 Mano de O bra Industrial: 1.500 Personas**

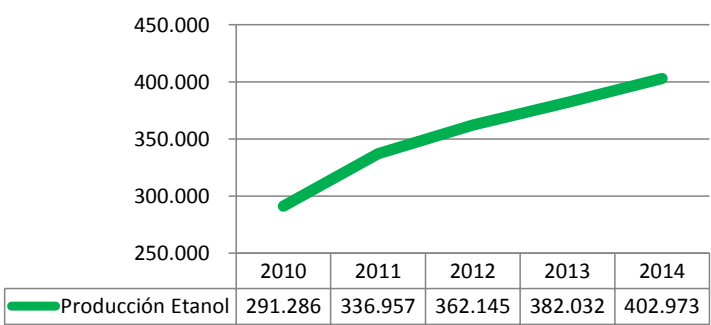
Rendimiento:
 Agrícola: 55 ton/ha cañaveral
 Industrial: 65 litros etanol/ton caña
 Agrondustral 3.080 litros etanol/ ha

(adapt. Comarca Guaireña, 2012)

Biofuels production in Colombia

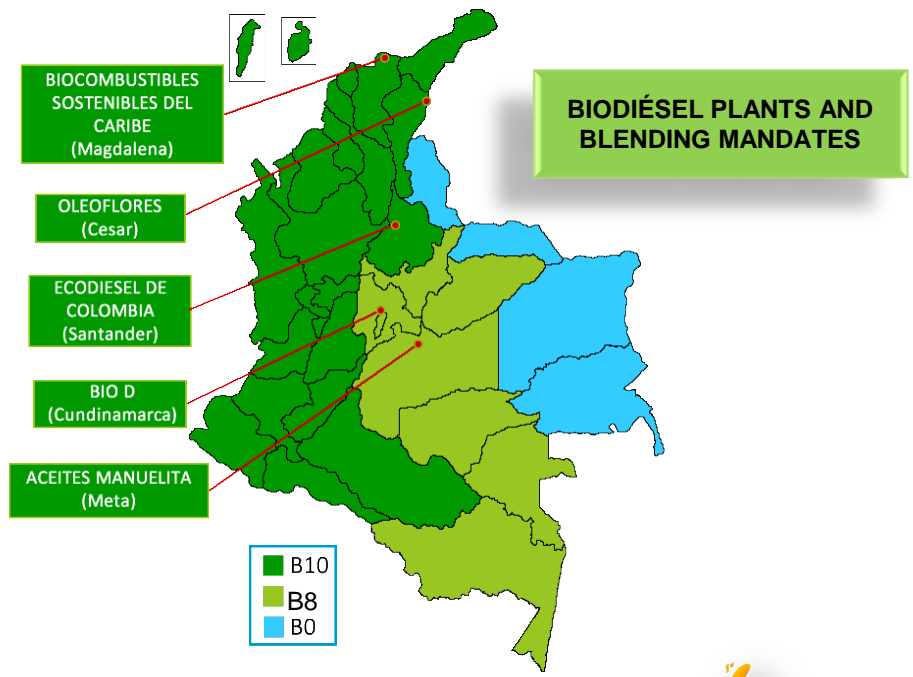
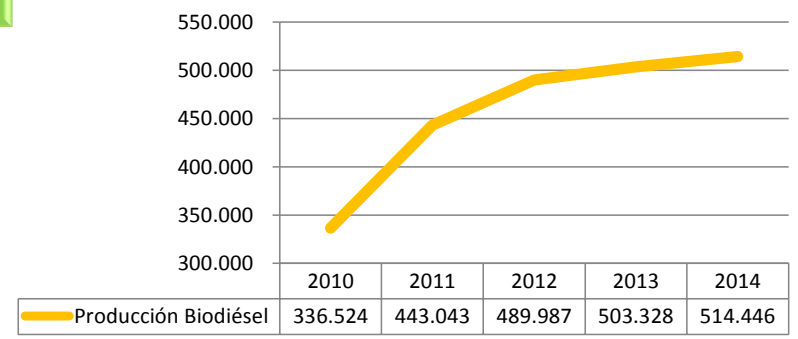


ETHANOL PRODUCTION



Source: Fedebiocombustibles.

BIODIESEL PRODUCTION



NATIONAL BIOFUELS FEDERATION OF COLOMBIA



Opportunities and challenges

New frontiers for bioenergy in LAC

There are new areas to develop bioenergy projects in LAC, presenting risks and rewards. For instance, in Piura (North of Peru) two large greenfield sugar/ethanol projects were deployed (20,000 ha of sugarcane); in Uruguay the ALUR Paysandu plant, commissioned recently, will supply ethanol for E10.



Irrigated sugarcane in Piura, Peru, 2013

POR UNA MATRIZ ENERGÉTICA SOBERANA Y AMIGABLE CON EL MEDIO AMBIENTE.

En el marco de la Política Energética 2005-2030, en los últimos años se han dado importantes pasos en pos de alcanzar la soberanía energética, promoviendo la diversificación de la matriz energética de nuestro país.



Bio VEHICULO

ALUR
ALCOHOLES DEL URUGUAY



Promoting ethanol use
in Uruguay, 2014

Opportunities and challenges

Setting equilibrate supporting measures

Besides blending mandates for biofuels and feed-in schemes for bioelectricity; balanced and stable tax regimes, as well as fair pricing mechanisms are essential to foster bioenergy markets.

Although presenting good conditions for producing ethanol enough to attend the domestic potential consumption, biofuel programs have been blocked by pricing distortions and weak governance in Mexico and Panama.

TAR location	Reference price offered by PEMEX	Minimum price offered by bidder
Salina Cruz, OAX	9.19 pesos (US\$ 0.66)	14.50 pesos (US\$ 1.05)
Tapachula, CHP	9.39 pesos (US\$ 0.68)	14.20 pesos (US\$ 1.03)

Source: PEMEX Refinacion and Grupo Refor

Ethanol price dispute in México, 2012



Campo de Pesé distillery, Panama





Opportunities and challenges

Informing consumers

It is relevant identify the risk perception associated to biofuels use and promote marketing campaigns and demonstration programs to reduce misunderstanding.

Guatemala produce and export large amounts of ethanol; adopting E10 blend could reduce gasoline imports, replace MTBE, among other advantages. However, there are persistent concerns about the technical feasibility of ethanol. A well planned demonstration program was launched to clarify these aspects.

Plan Piloto de Etanol

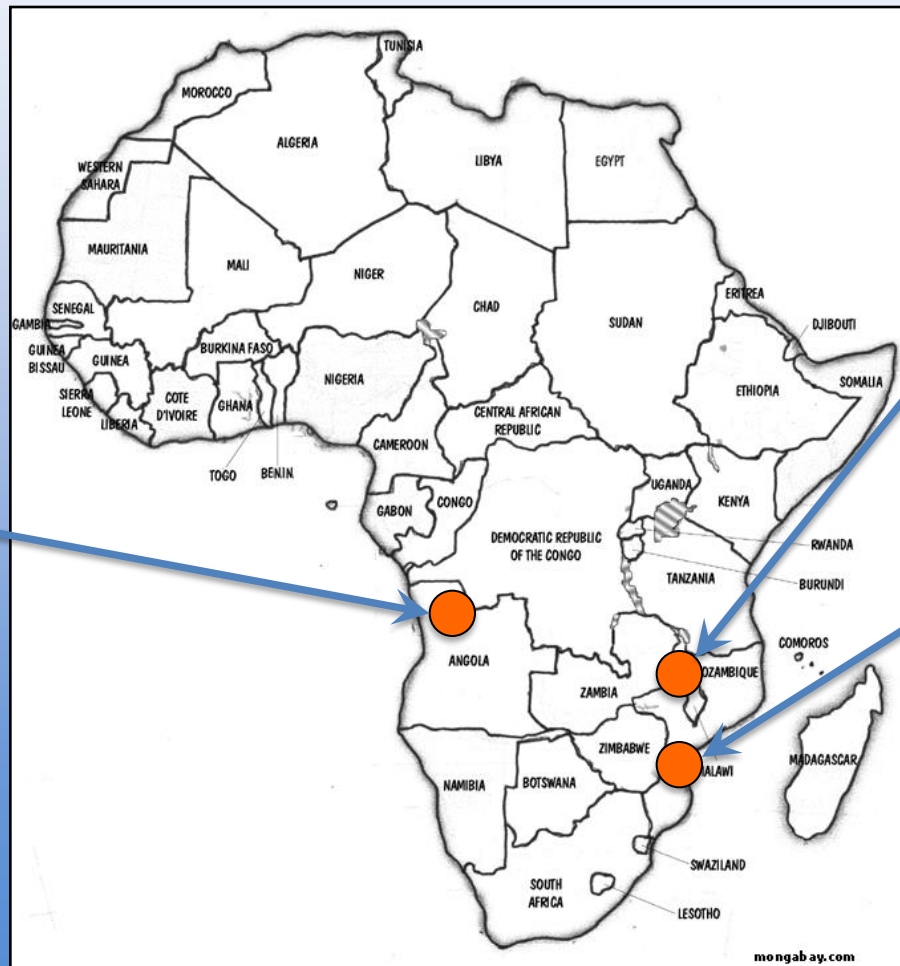
Modelo	Cantidad
2011-2014	
2000-2010	
1990-1999	
1986-1989	
1985-menor	
motocicletas	
TOTAL	30



Fleet composition, Guatemala demo plan, 2015

Ethanol initiatives in Africa

Several initiatives have been developed to introduce sugarcane bioenergy in Africa, adopting different concepts, scales and output profile. It is interesting to review some cases.



**BIOCOM
Angola**

**ETHCO and
PRESSCANE
Malawi**

**CleanStar
Mozambique**

Ethanol initiatives in Africa: Malawi

Since 1982 Malawi adopted E10 blending, using ethanol locally produced from sugarcane molasses in two mills: ETHCO Ltd in Nkhotakota and PRESSCANE Ltd in Chikwawa, with a total capacity of 32 million liters. Combined annual production from both plants is about 18 million liters.



Ethanol initiatives in Africa: Malawi

Recently the government decided to adopt E20 blends. For 2015 is estimated a consumption 198.6 million liters of gasoline in Malawi. For E20 will be required 37 million liters of ethanol to meet the demand for blending this year.

It was also planned for 2015 that 7.5% of vehicles would be able to run on pure ethanol ethanol (through importation and conversion of existing vehicles). Thus the total ethanol requirement would be about 49 million liters, imposing to increase the ethanol production.



(Ethanol Driven Project, 2015)

Ethanol initiatives in Africa: Mozambique

The CleanStar Project CleanStar Project was implemented in Mozambique to reduce deforestation and promote the production and use of renewable cooking fuels. The target was in two years 20% of Maputo (80.000 households) will have access to the little metal stoves and the locally produced biofuel. In Africa, more than 80% of urban families buy charcoal to cook their food, a commodity with climbing prices as forests retreat.



(Dometic, 2005)

Ethanol initiatives in Africa: Mozambique

The ethanol stoves have succeeded to replace old biomass stoves:

“We never estimated this much customer demand. City women are tired of watching charcoal prices rise, carrying dirty fuel, and waiting for the day that they can afford a safe gas stove and reliable supply of imported cylinders. They are ready to buy a modern cooking device that uses clean, locally-made fuel, performs well and saves them time and money.”



(CleanStar, 2012)

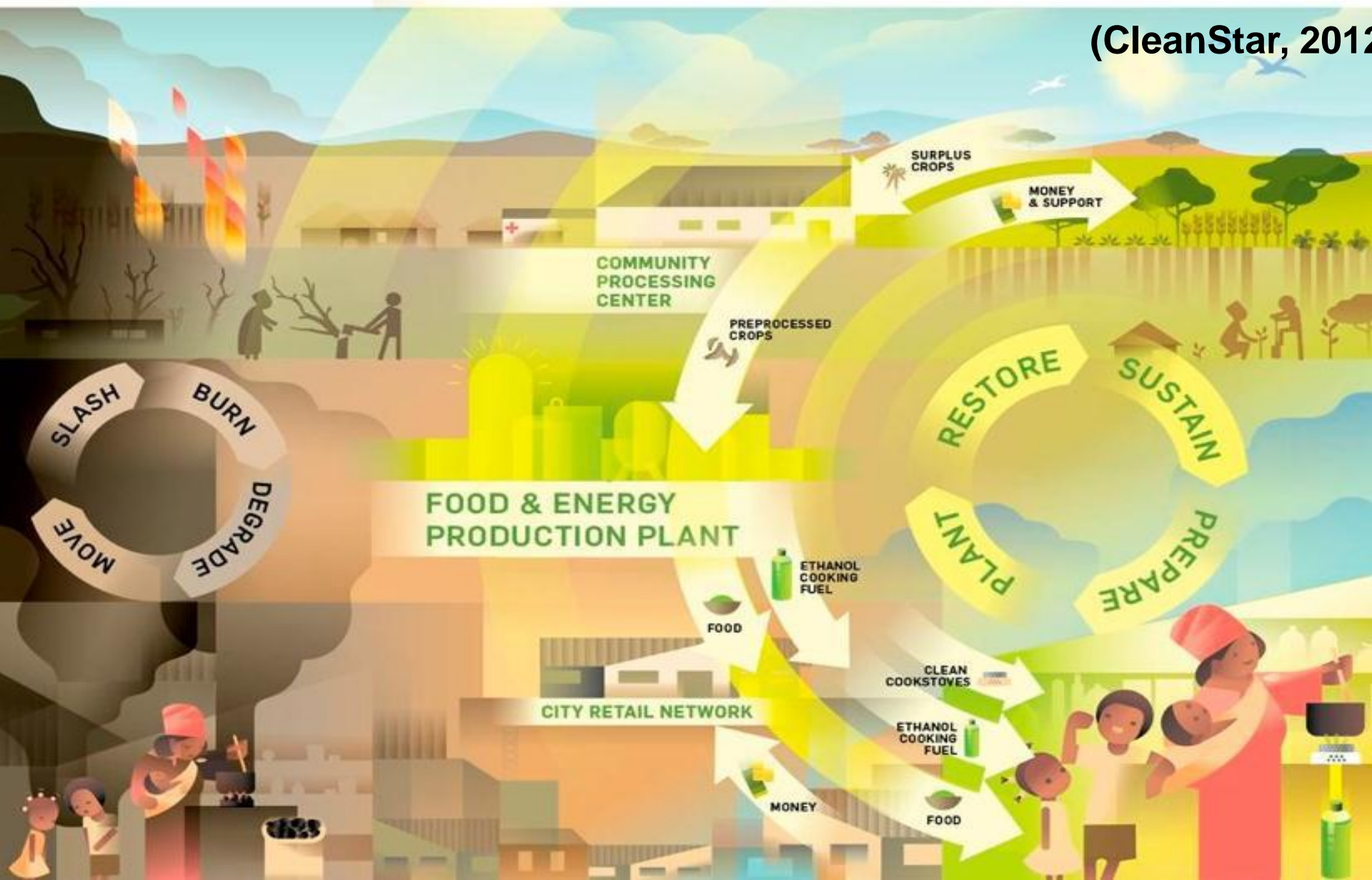
ENERGIZING AFRICAN AGRICULTURE

A BLEAK REALITY

THE CHANGE WE BRING

A BRIGHTER FUTURE

(CleanStar, 2012)



Ethanol initiatives in Africa: Angola

The BIOCOM Project aims to diversify the Angolan economy, activating the sugarcane agroindustry, generating jobs and income. When fully implemented (2018), 42,000 ha planted with sugarcane will supply feedstock enough to produce yearly 260,000 ton of sugar and 30 million liters of fuel grade ethanol.

The operation of the industry started in December, 2014.



(BIOCOM, 2014)

Ethanol initiatives in Africa: Angola

The BIOCOM Project is a joint venture of Angolan and Brazilian investors (worth US\$ 750 million), strongly based on technology transferred from the Brazilian sugarcane agroindustry model.

The sugarcane is produced using precision agriculture techniques and optimized methods for varietal management (25 sugarcane varieties), partially irrigated, with mechanized harvesting guided by GPS. The sugar/ethanol industrial plant adopts state-of-art technology, with high pressure boilers in the cogeneration plant.



Ethanol as fuel initiatives in Africa

These three cases point out the broad diversity of situations for developing sugarcane bioenergy in Africa. There are several other cases, always very site specific.

Country	Plant/Project	Annual Crushing (t/year)	Bioenergy production		Final use of ethanol	Remarks
			Ethanol annual production	Installed capacity of power generation		
Angola	BIOCOM	2,200,000 ton (first phase)	30 million liter	28 MW	Vehicular	Start to crush in December 2014
Malawi	ETHCO and PRESSCANE	240,000 ton	32 million liter	18 MW	Vehicular	Introducing E20 and pure ethanol cars
Mozambique	CleanStar	(cassava)	2 million liter	No	Cooking	Difficulties with fuel supply

Among the new ventures, it must be mentioned the **ADDAX Bioenergy** sugarcane ethanol project in Makeni, Sierra Leone.

- Plantation size 10,000 hectares
- Total project area 14,300 hectares
- Processing capacity 1 million tons per year
- Ethanol output 85,000 m3 per year
- Power supplied to national grid 15 MW
- Job creation 2000 jobs in 2013
- Project phase 2008 - 2013
- First production 2013 (full production 2014)
- Investment Euros 267 million

ADDAX Bioenergy plant main data

Potential for ethanol production

Today, the ethanol production in Southern Africa is about 32 million liters per year, 90% in Malawi and 10% in Zimbabwe. But certainly this region can produce much more.

Three scenarios were evaluated:

- 1. producing ethanol from exhausted molasses available today**
- 2. using 3% of pastures and permanent meadows for sugarcane**
- 3. assuming that sugar exports reduces to zero (CARENSA* study)**

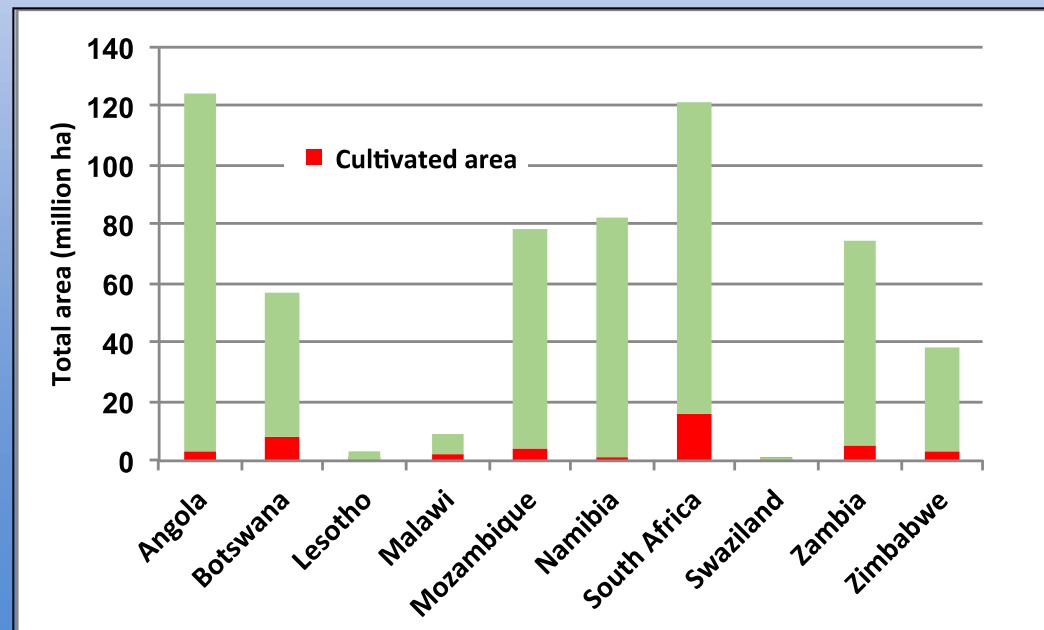
*** Cane Resources Network for Southern Africa**

Potential for ethanol production: scenario 2

In some countries there is a large area occupied with temporary meadows and pastures, from which a limited fraction (assumed 3%) can be dedicated to sugarcane production aiming bioenergy.

In this case it was adopted a yield of 80 ton of sugarcane per hectare, representative of good practices in favourable conditions and a productivity of 85 liters of ethanol per ton of sugarcane, also corresponding to good practices in agroindustry.

Total area and cultivated area in Southern Africa countries (FAOSTAT, 2010)



Potential for ethanol production

A preliminary assessment indicates a good potential for ethanol production, unevenly distributes among the countries.

Potential for Ethanol production in Southern Africa countries (million liters/year)

Country	Use of molasses already available from sugar production	Planting sugarcane in 3% of suitable and available area	Ethanol Production with Sugar Exports in 2015 deducing to zero
Angola	39	8,813	
Botswana		3,978	
Lesotho		352	
Malawi	217	673	66
Mozambique	251	7,436	
Namibia		5,814	1317
South Africa	1,599	15,239	200
Swaziland	468	214	
Zambia	316	5447	111
Zimbabwe	259	3106	232

Potential consumption of ethanol

The potential for ethanol as fuel demand in Southern Africa, independently of production model was estimated in two markets:

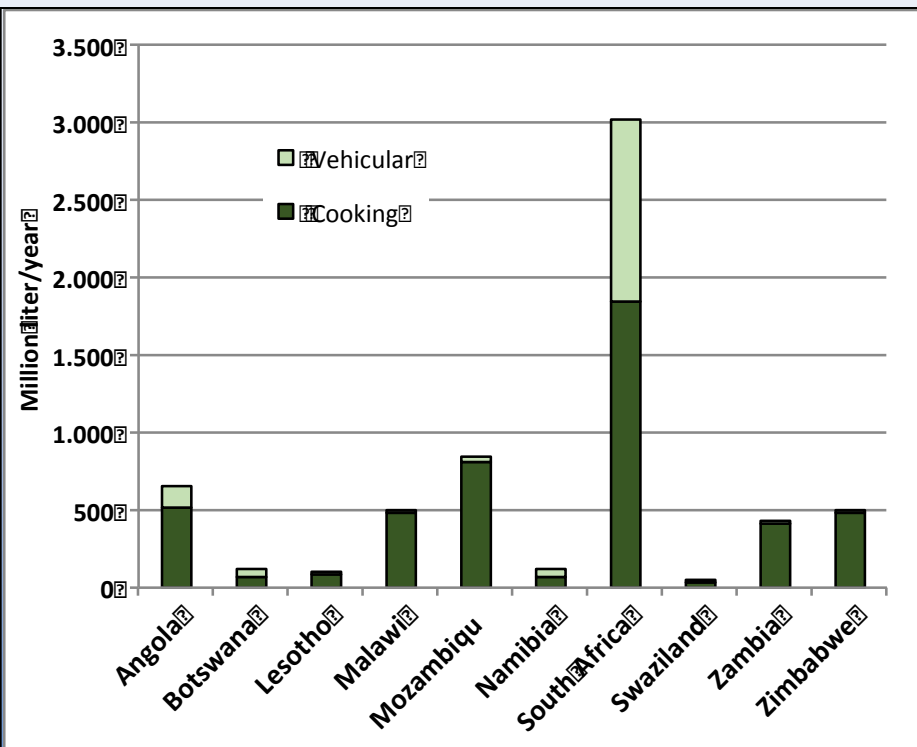
- vehicular consumption, for E10 and E20 blending levels, taking into account the current gasoline demand.**
- use for cooking, assuming a diffusion of ethanol stoves in 30% of households and annual consumption ranging from 150 to 300 liters per household.**

The data sources for this evaluation were IEA and FAOSTAT.

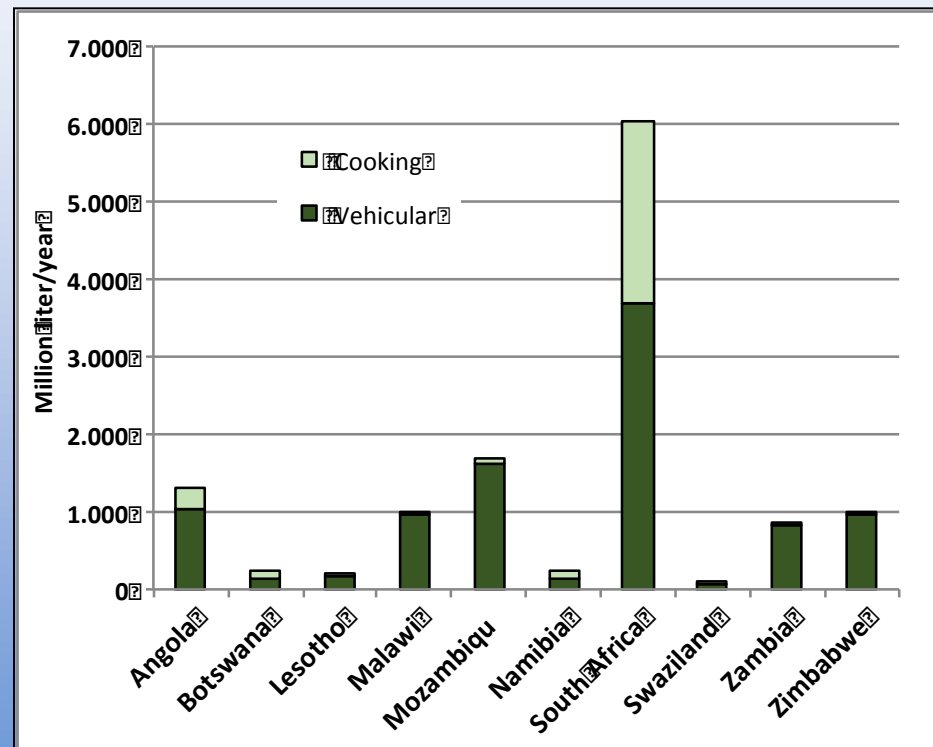
Potential consumption of ethanol

The results indicate that, for the current conditions in Southern Africa, the cooking demand can be as relevant as the vehicular one.

Low scenario: 150 l/year.stove and E10



Low scenario: 300 l/year.stove and E20



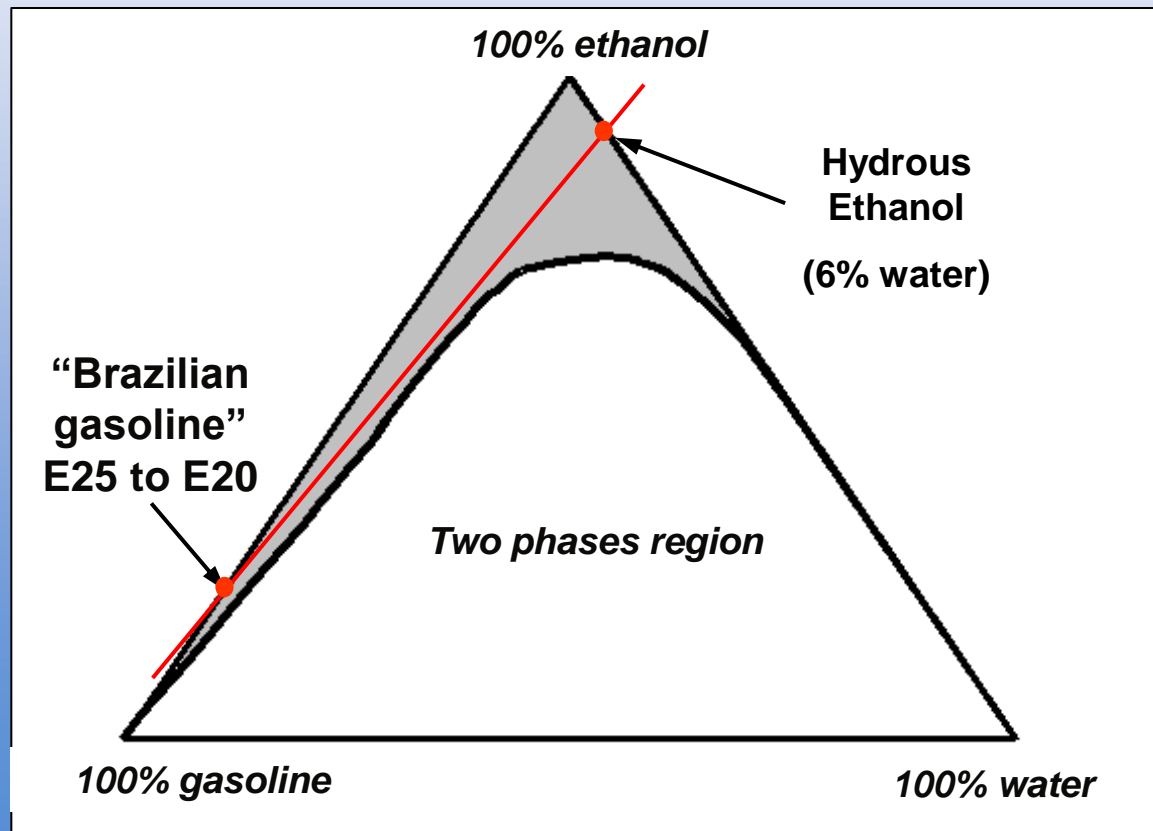
As expected, the proportional demand of South Africa matters and the reduced fleet in other countries affects the vehicular demand.

Ethanol use in flex-fuel motors

Vehicles with motors able to use any blend of pure hydrous ethanol (E100) and gasoline (E25), presenting good performance and accomplishing all environmental , were introduced successfully in the Brazilian market and today represents around 90% of new cars in the light vehicles fleet.



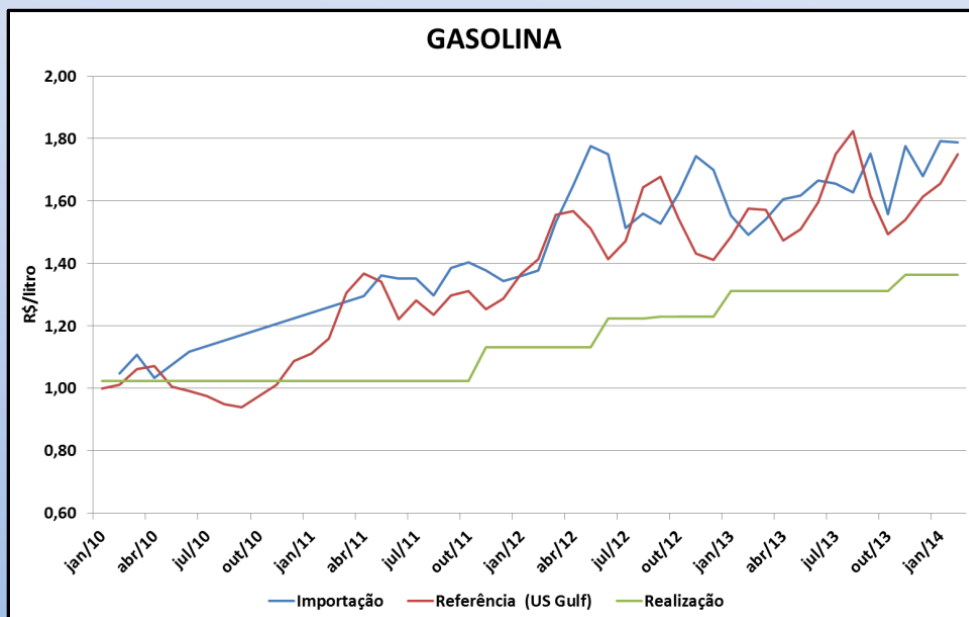
**Ternary diagram
ethanol/gasoline/water**
(CTC, 2004)



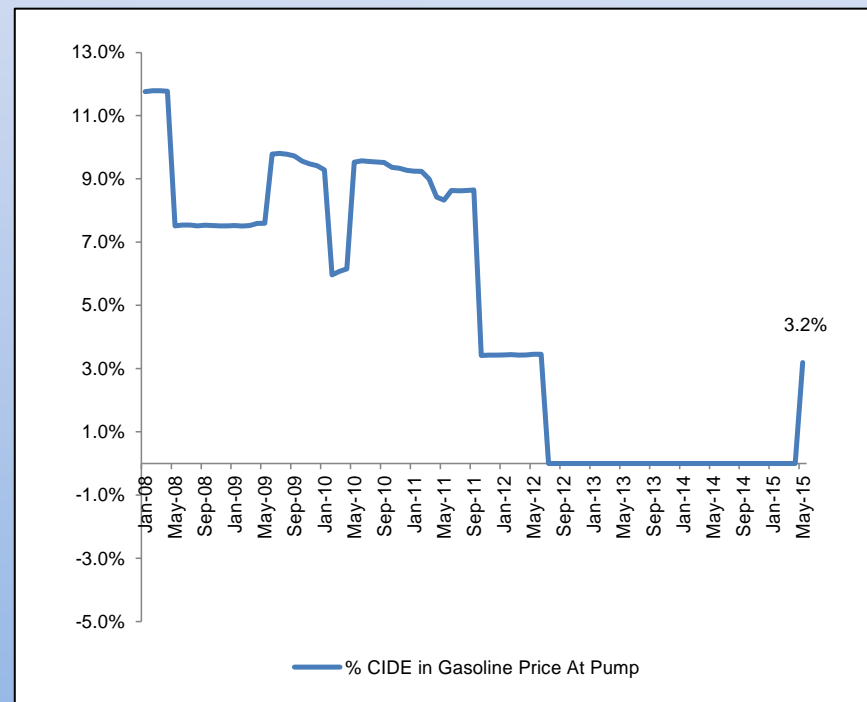
O contexto brasileiro: os desafios recentes

Desde 2008 o governo federal vem intervindo no mercado de combustíveis, reduzindo a competitividade do etanol de duas formas:

- **impondo preços de realização da Petrobras abaixo do valor de paridade internacional, adotado por décadas;**
- **reduzindo (até zerar) a CIDE, principal tributo federal sobre a gasolina.**



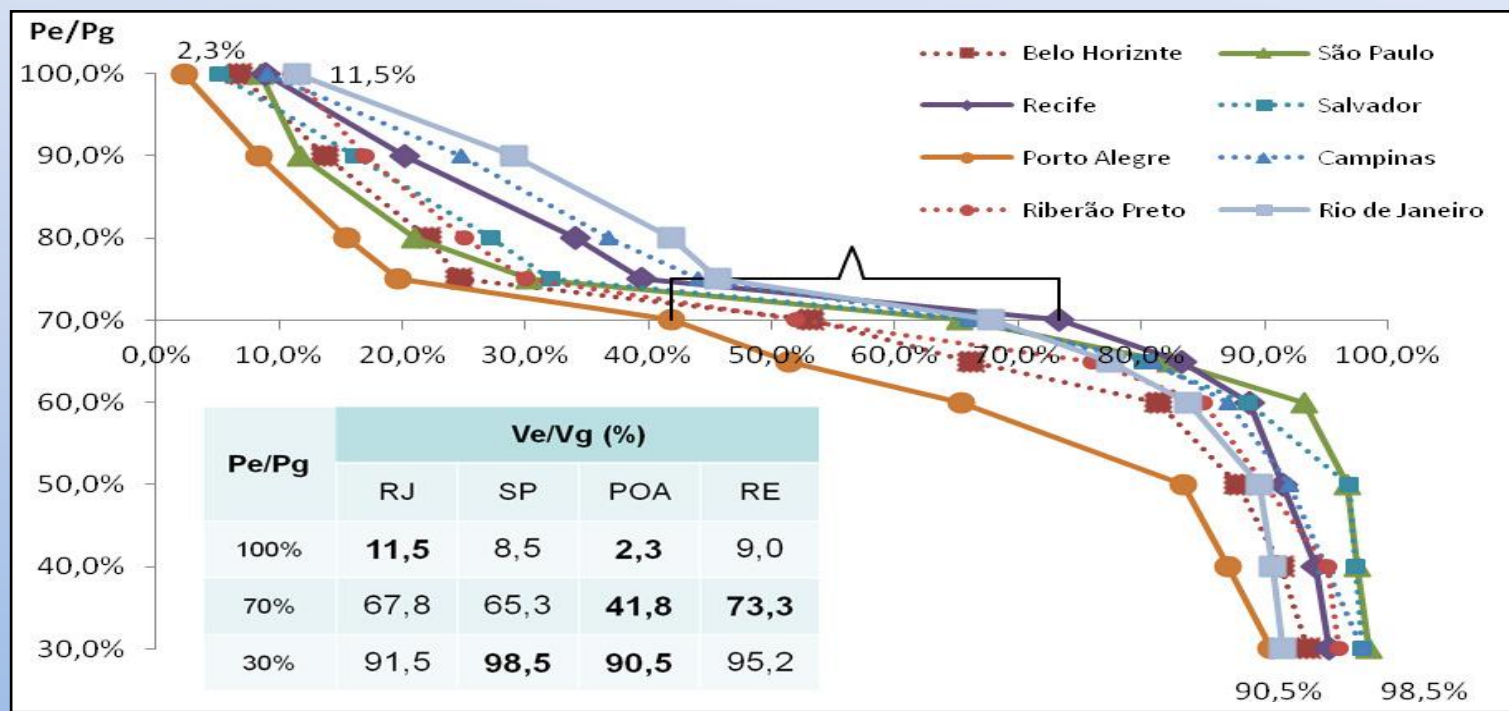
Preços da gasolina importada e nacional (ANP, 2013)



Evolução da CIDE desde 2003 (MME, 2013)

O contexto brasileiro recente

Devido à intervenção do governo federal, com a gasolina vendida abaixo do custo, o etanol perdeu mercado, porque os proprietários de automóveis (FFV's) mostram uma “reação racional” aos preços dos combustíveis.



Consumo dos veículos flex em função dos preços dos combustíveis (EPE, 2013)

Ideias para promover a eficiência no uso de etanol:

- ***promover o uso racional de etanol, em um mercado saudável, com tributação equilibrada entre as alternativas.***
- ***resgatar os veículos com motores dedicados a etanol: permitir que gaviões substituam os patos...***
- ***estimular estudos e pesquisas voltadas para o desenvolvimento tecnológico de motores, possivelmente preservando a flexibilidade.***
- ***usar os mecanismos disponíveis: etiquetagem e tributação diferenciada!***

Muito obrigado por sua atenção.

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