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Round Table 2 - Policy Section

Policies and Strategies for Bioenergy Development

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Policies and Strategies for Bioenergy Development

Competitiveness and good feasibility indicators generally are not enough to foster bioenergy and particularly liquid biofuels.

To promote new technologies in mature energy markets is required planning and proper strategies.

Outline

1. ***Why promote bioenergy?***
2. ***How promote biofuels?***
   - ***Basic actions: assessing potentials, costs and benefits.***
   - ***Advanced actions: creating an real biofuel market***
3. ***Final comments***

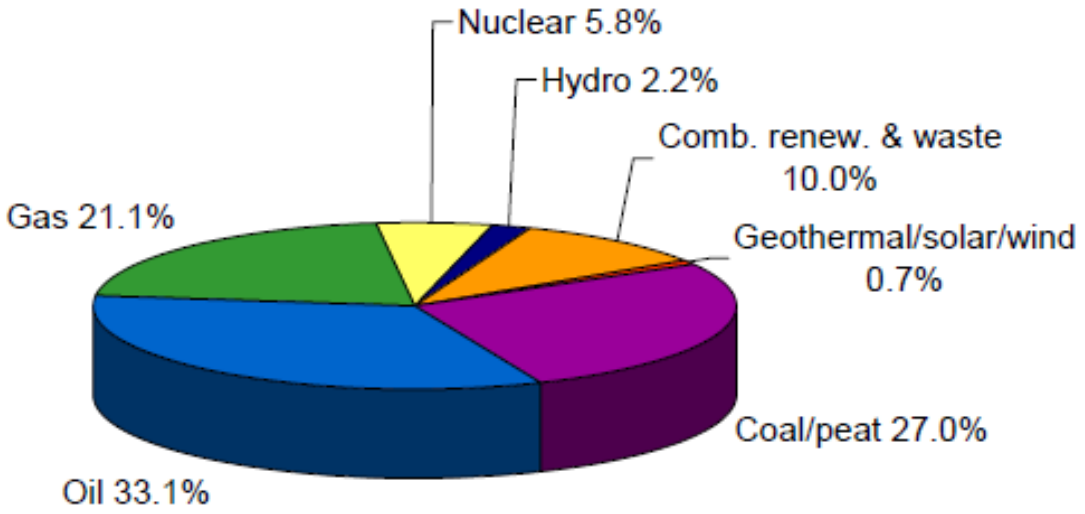
1. Why promote bioenergy?

From the global perspective, the main drivers for an energy transition towards bioenergy (mainly biofuels) production and use are:

- ✓ ***the increasing concern on oil dependence and energy costs***
- ✓ ***the global and local environmental problems***
- ✓ ***the opportunity for economic activation of agroindustrial sector***

Fossil energy still dominates...

The global energy market is currently based on fossil energy, which represents about 88% of total energy consumption, with a limited contribution of bioenergy, estimated in 10%, used in households, industry and transportation, basically with traditional technology.



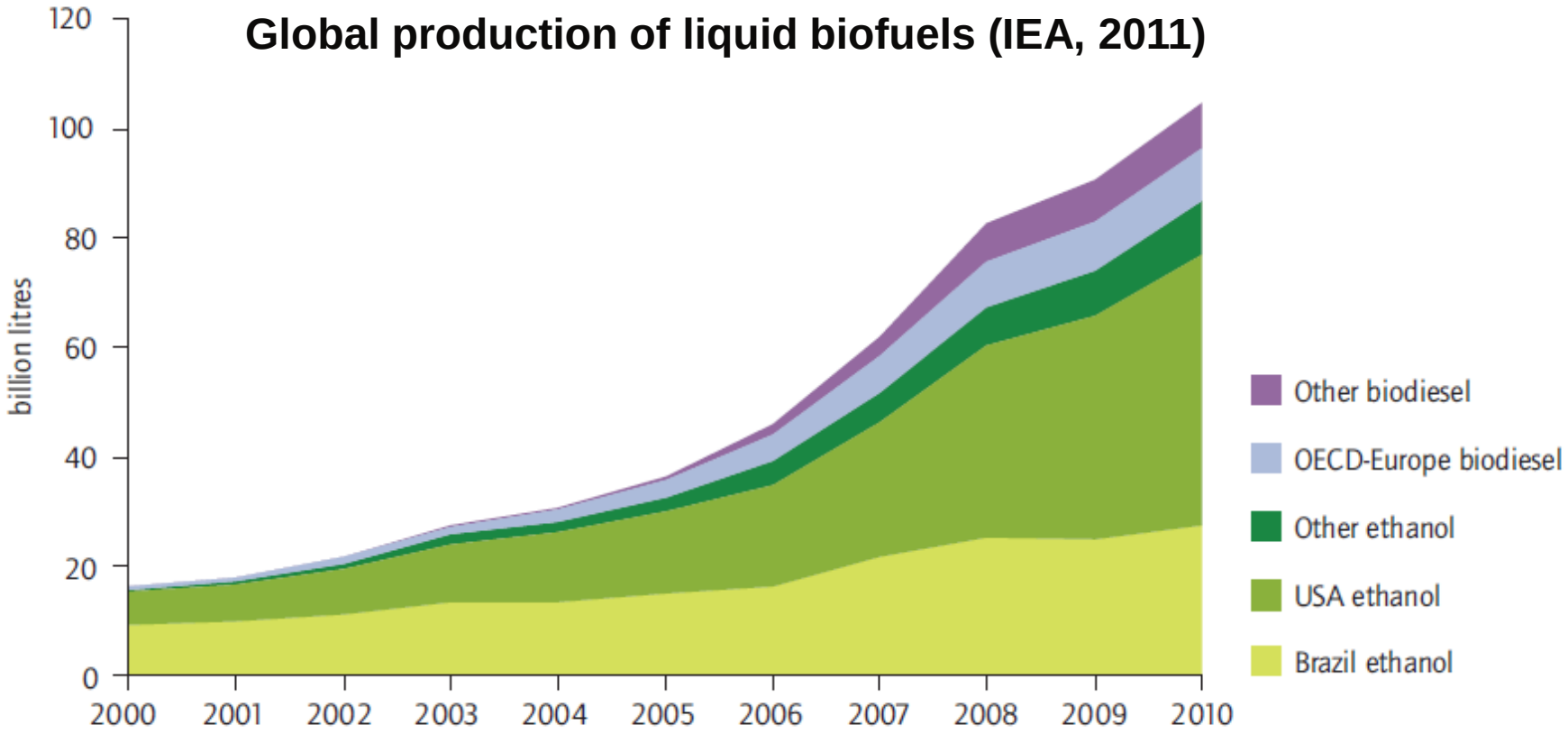
Total Supply: 12.267 Mtoe, 2008

(IEA Energy Balances, 2010)

… but biofuels are becoming relevant.

Liquid biofuels (about 90% ethanol) demand represents today about 3% of global energy consumption in the transport sector. Anyway, this market is concentrated and the bioenergy potential remains largely untapped.

Global production of liquid biofuels (IEA, 2011)



Source: IEA, 2010a.

1. Why promote bioenergy?

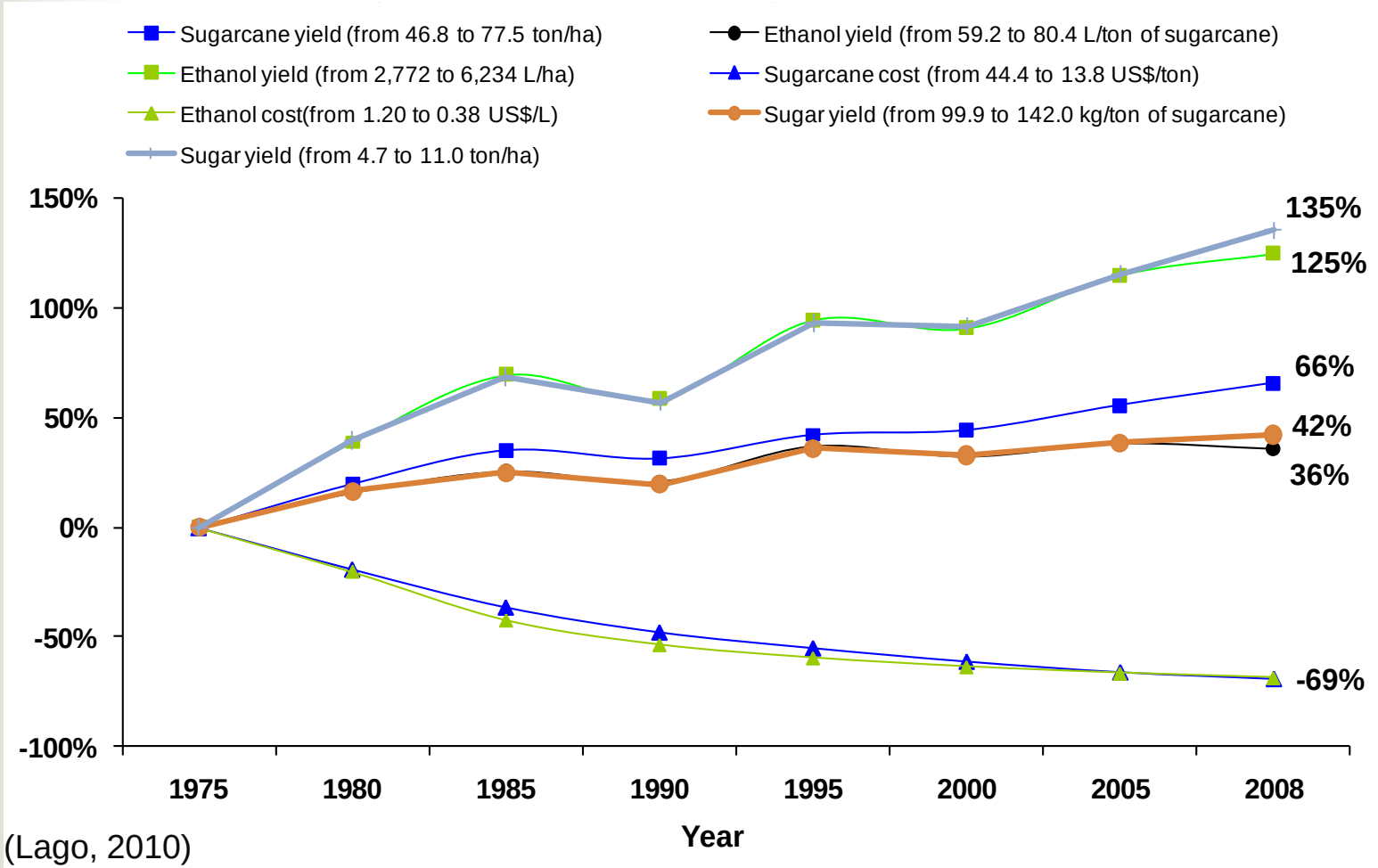
From a national perspective, biofuels production and use can bring relevant additional advantages:

- ✓ ***competitive introduction of renewable energy***
- ✓ ***social benefits (jobs and income generation, better social conditions)***
- ✓ ***promotion of sustainable use of natural resources***

(UNICA, 2010)

Sugarcane ethanol is already competitive

Considering the last three decades, the cost of ethanol production from sugarcane reduced about 30%.

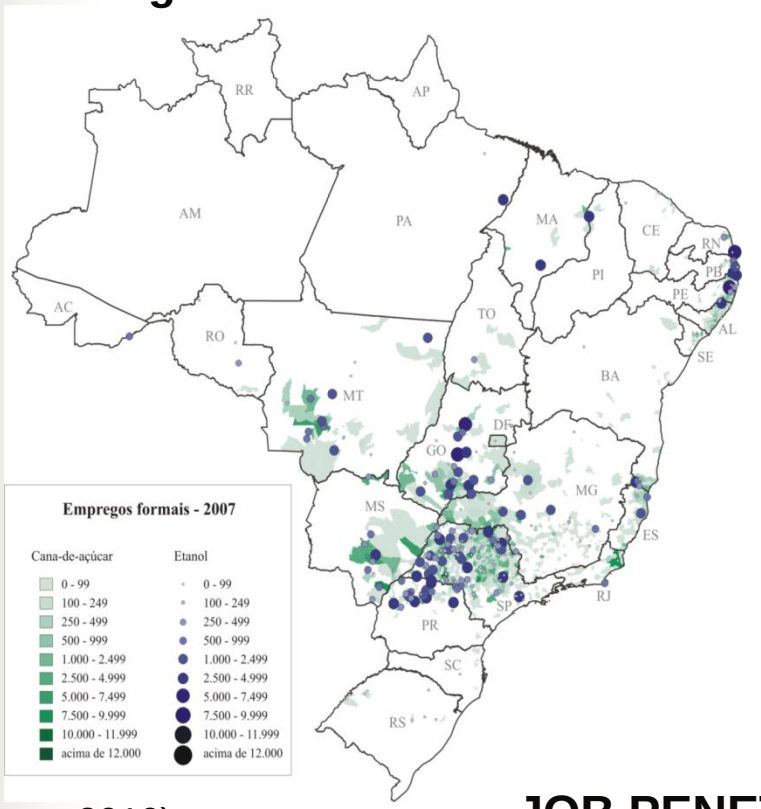


(Lago, 2010)

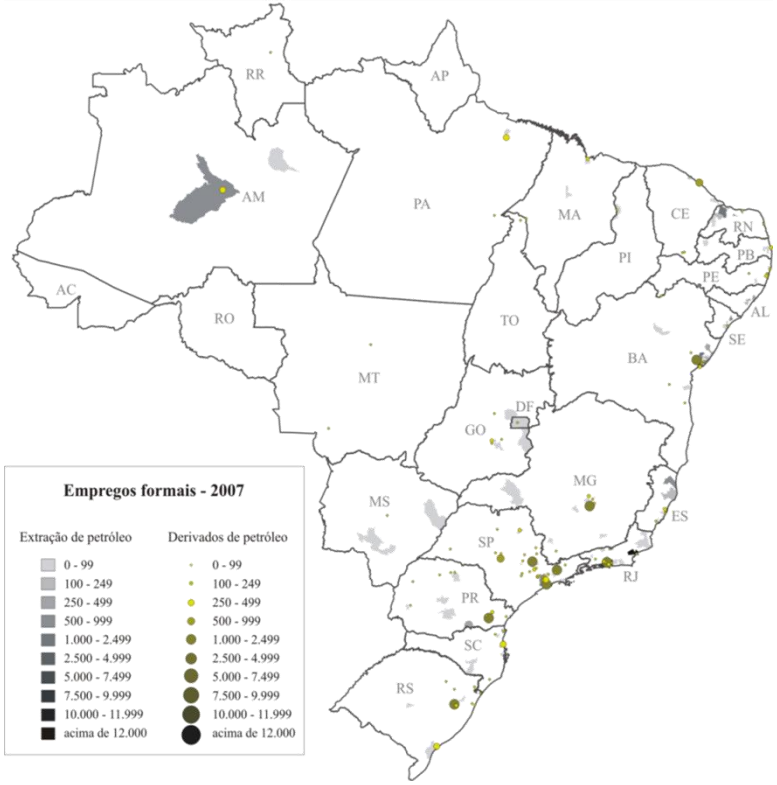
Biofuel production induces jobs distribution

The Brazilian ethanol agro-industry employs more than 6 times the number of workers employed in petroleum production, with high penetration and interiorization of generated jobs.

Sugarcane and ethanol



Petroleum extraction and oil by-products

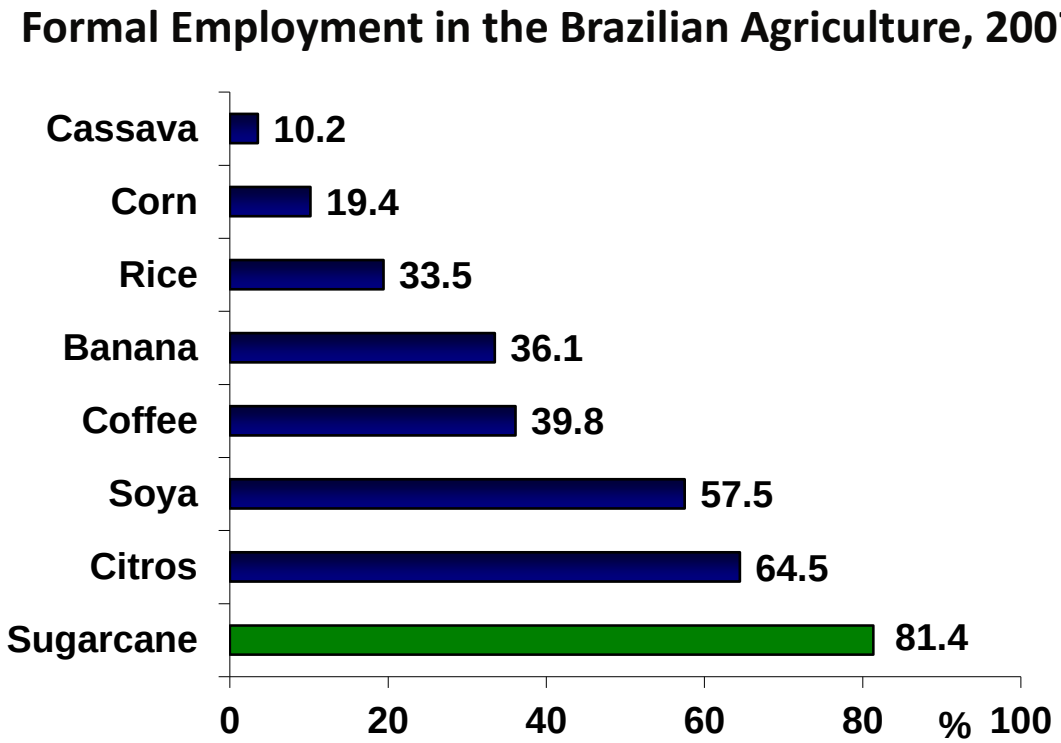


(Moraes, 2010)

JOB PENETRATION - 2007

Biofuel production stimulates formal hiring

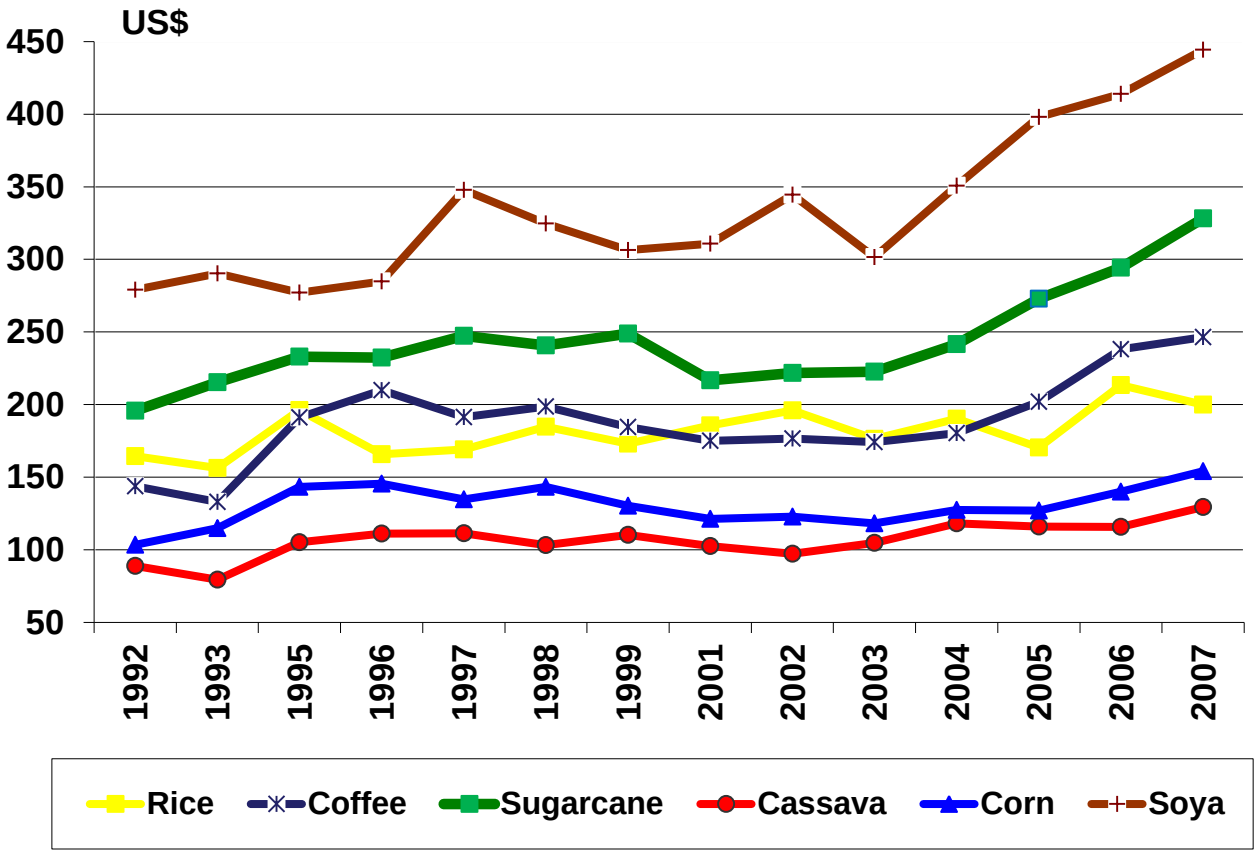
Less than 40% of workers in the Brazilian agriculture is formally employed. With this regard, sugarcane shows the best indicator: about 81.4% of the employees are formally hired, meaning that they had been hired under a formal labor contract.



(Moraes, 2010, based on IBGE data)

Biofuel production promotes better wages

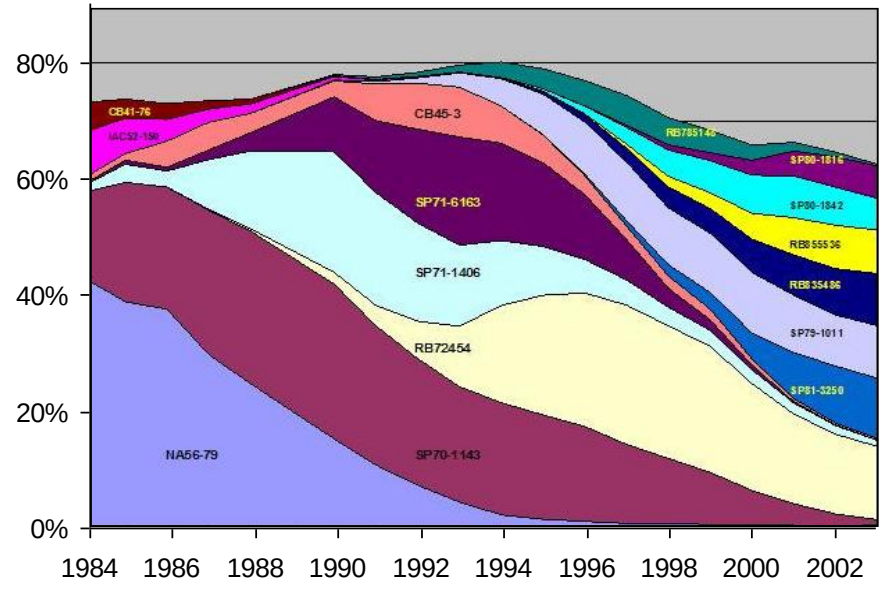
The average monthly wage of sugarcane workers in comparison with sugarcane wages are better than the agriculture national average.



(Moraes, 2010, based on IBGE data)

Biofuel production can be sustainable

Innovation has been essential for ethanol development. New techniques are frequently introduced, cutting costs, diversifying products and reducing environmental impacts of ethanol production.

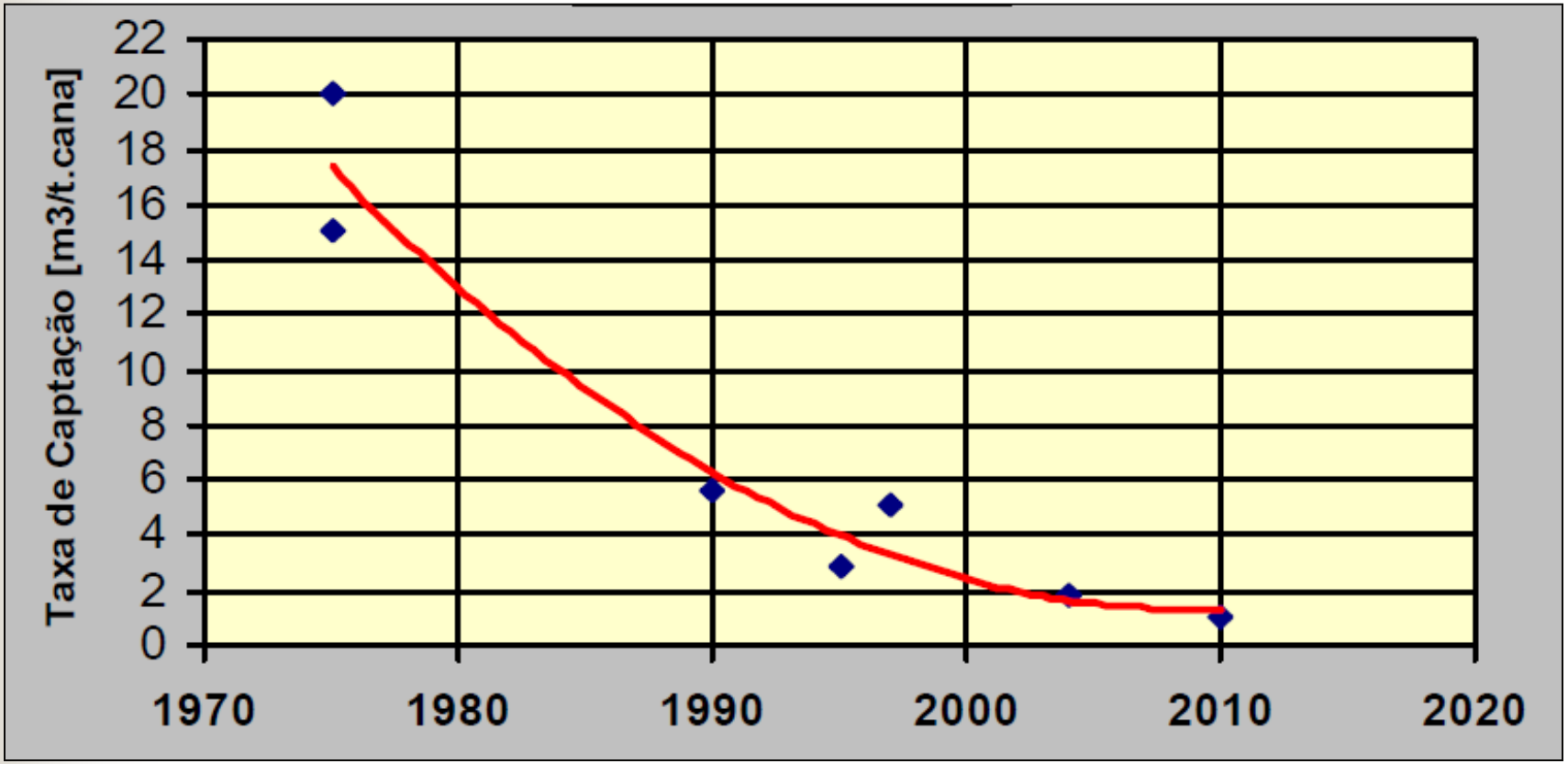


Varietal diversification of sugarcane in Brazil
(Burnquist e Landell, 2005)

Biological control of sugarcane borer (*Diatraea saccharalis*) using a wasp (*Cotesia flavipes*)
(Bento, 2006)

Biofuel production can be friendly to nature

It is remarkable the reduction of water use in sugarcane mills, consequence of water recycling and reuse, pushed by legislation.



Evolution of water use in sugarcane mills in Brazil
(Elia Neto, 2010)

Biofuel production can be friendly to nature

The sugarcane agro-ecological zoning defined the area available for sugarcane production considering environmental constraints and minimum productivity conditions, thus reducing potential conflicts of land use.

Areas outside these allowed zones do not receive any official support or financing for sugarcane production.

Sugarcane agro-ecological zoning
(MAPA, 2010)

2. How to promote bioenergy?

The government role is <u>decisive</u> in promoting biofuels production and use.

Depending on the context actions can be done in two complementary lines:

- ***<u>Basic actions</u>: assessing potentials, costs and benefits, to increase the amount and quality of information about biofuels.***
- ***<u>Advanced actions</u>: aiming to create conditions for biofuels production and use.***

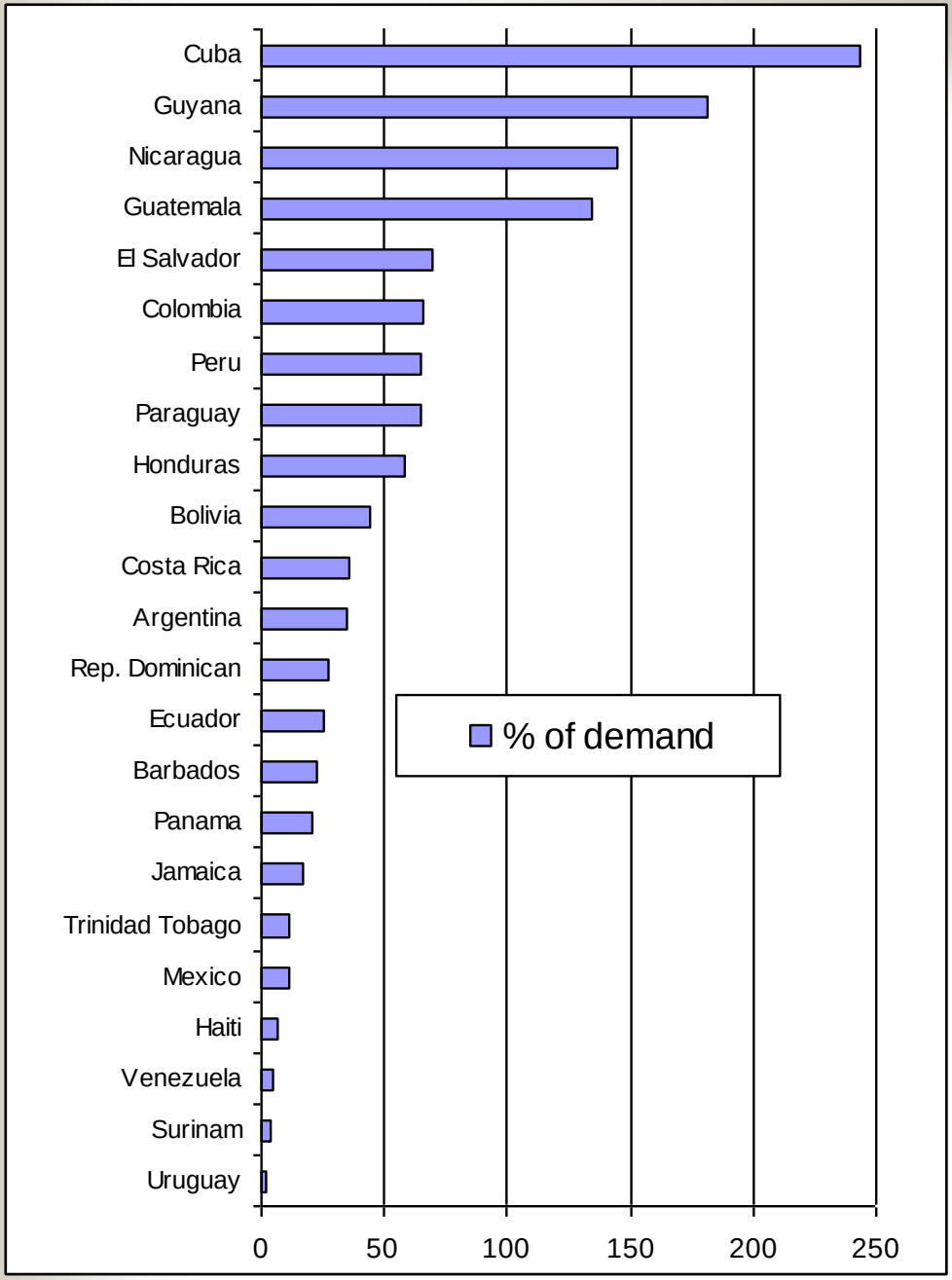
Improving bioenergy awareness

In many countries decision makers require objective, updated and consistent information on bioenergy potential, risks and advantages.

Frequently, the available information is distorted by other interests and conflicts, thus independent and trusty sources are important.

Just when enough and convincing information is available, robust decision can be taken and biofuel programs can be put forward.

Some examples of information required about biofuels are presented as follows.

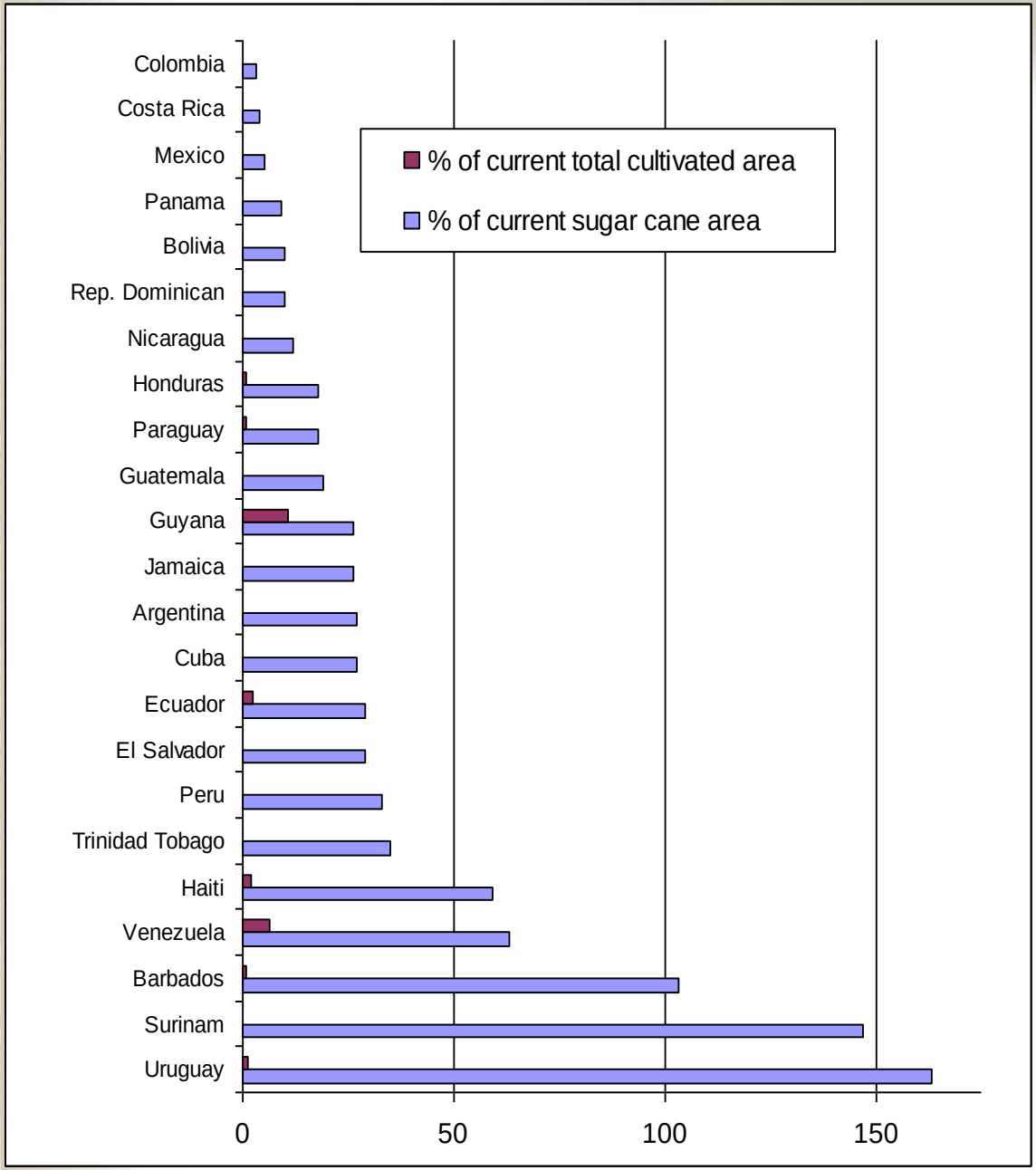


Ethanol prospects in Latin America

Scenario 1:

Fraction of ethanol required to make E10 in domestic market which can be supplied from conversion of actual exhausted molasses, without changes in sugar production or sugarcane planted area (assuming a productivity of 78 liters per ton of sugar produced (about 8.6 liters per ton of sugarcane).

(CEPAL, 2006)



Ethanol prospects in Latin America

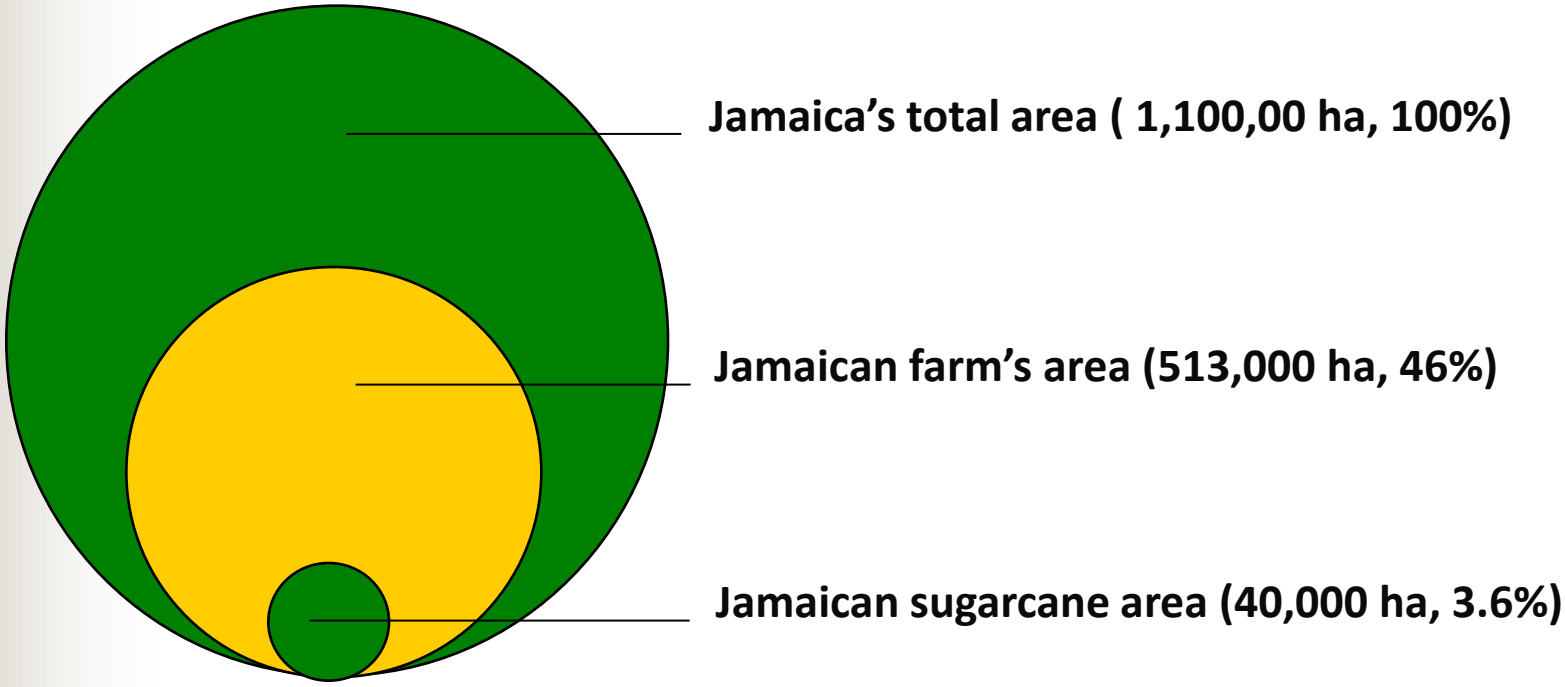
Scenario 2:

fraction of total and sugarcane area required to make E10 directly from sugarcane juice, assuming a productivity of 75 sugarcane tons per hectare and a conversion of 80 liters of ethanol per ton of sugarcane.

(CEPAL, 2006)

Improving bioenergy awareness

The assessment of the area required for ethanol production helps to understand the impact of bioenergy in land use.

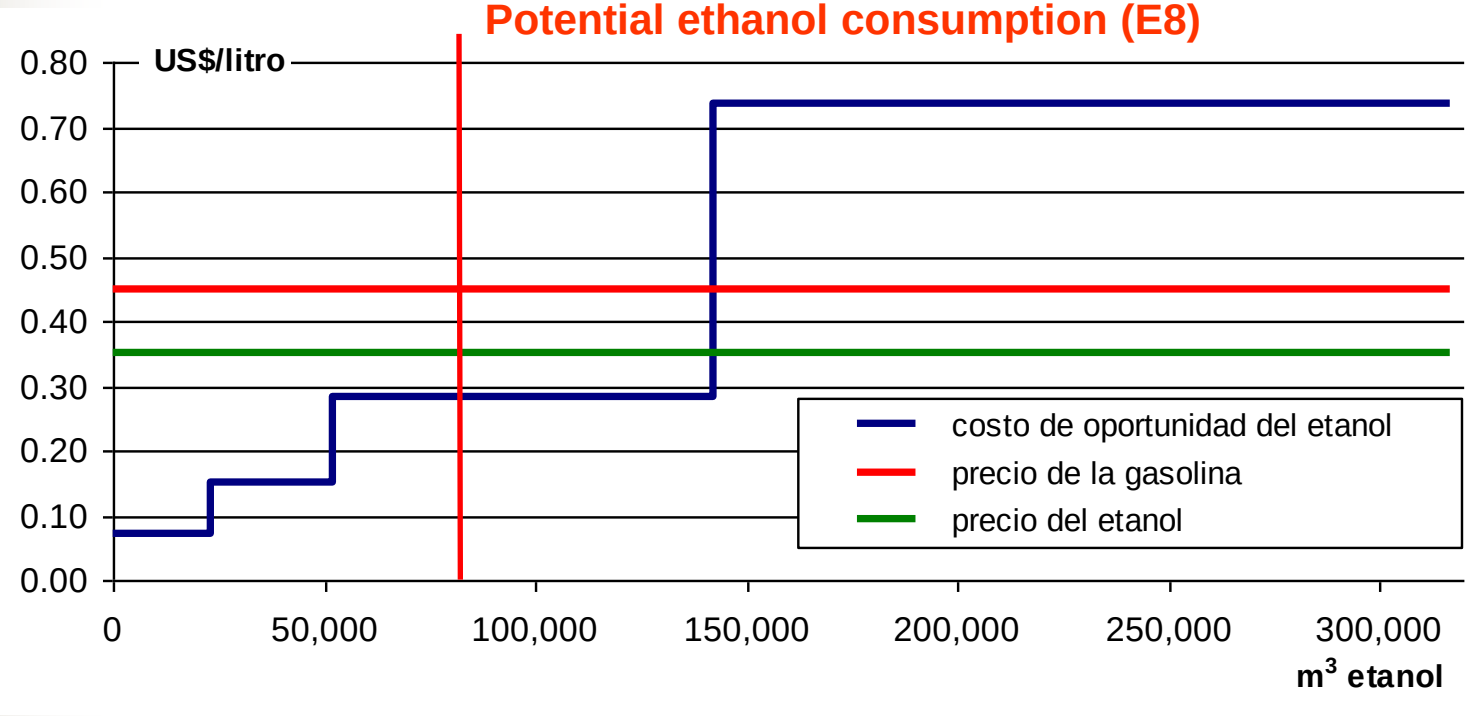


Sugarcane area required to supply Jamaican demand of ethanol for E10: 11,700 ha (+29% of current sugarcane area)

(FAOSTAT, 2005 and ECLAC, 2006)

Improving bioenergy awareness

It is worth to estimate the Supply Curve for biofuels, considering different production context and actual costs and prices.



Ethanol opportunity cost and actual prices (parity condition) of gasoline and ethanol in Costa Rica, 2005

(CEPAL, 2006)

Setting the stage for a biofuels market

To create effective conditions for biofuels market development, some measures can be advised:

1. ***Biofuel quality specifications should be established***
2. ***An equilibrated tax regime should be implemented***
3. ***A blending program should be implemented***
4. ***A R&D program must be promoted***

Proper biofuels specs are essential

Any fuel specification should harmonize basically three different perspectives:

Fuel producers

Consumers

Environment

It is generally a government role to define fuel specification, by its regulatory agencies.

Proper biofuels specs are essential

In Brazil, ethanol (pure or in gasoline blends) and biodiesel specs are established by ANP, the Brazilian regulatory agency for oil, natural gas and biofuels.

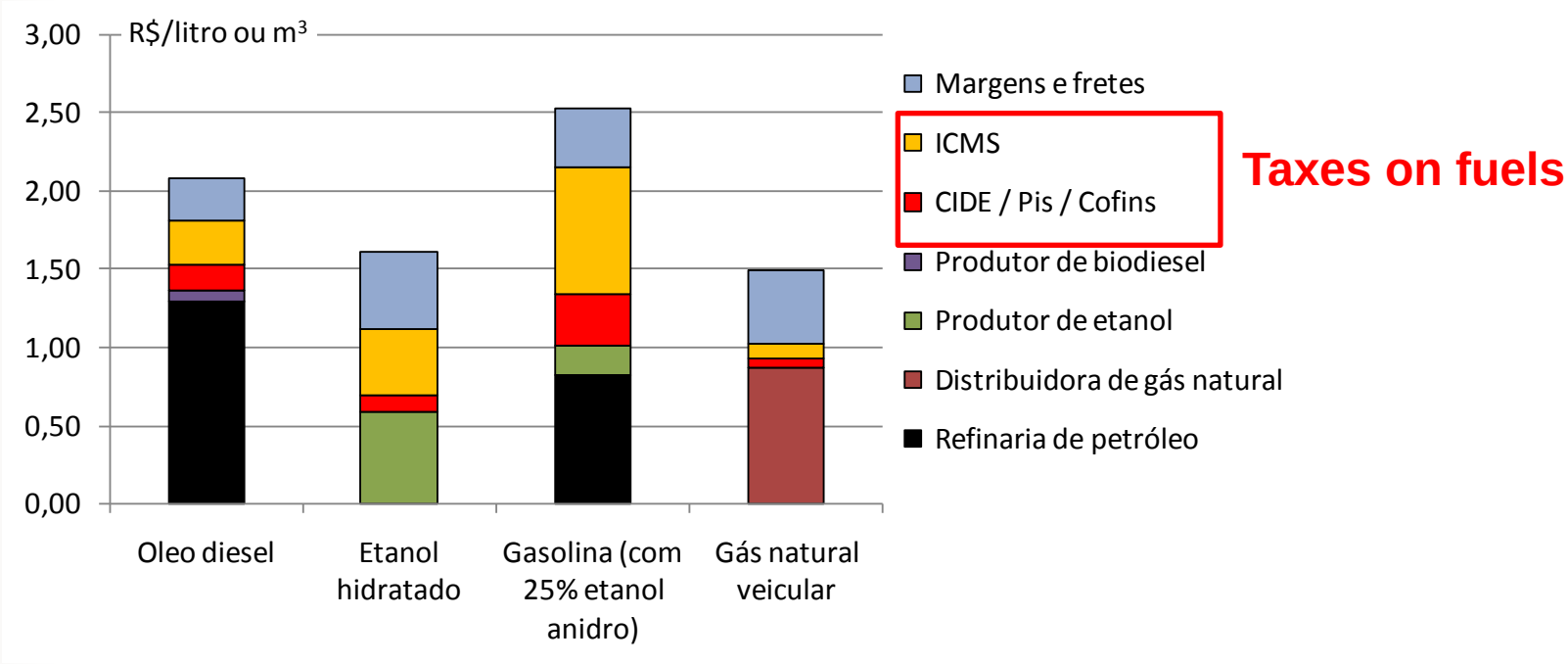
Brazilian Spec of Anhydrous Ethanol (ANP 36, 2005)

Característica	Unidades	Método		Especificación
		ASTM	ABNT/NBR	
Aspecto	-	Visual		Límpido y exento de impurezas
Color	-	Visual		Incoloro
Acidez Total (como ácido acético)	Mg/l	D 1613	9866	30 máx.
Conductividad Eléctrica	µS/m	D 1125	10547	500 máx.
Masa Específica A 20 °C	kg/m^3	D 4052	5992	791,5 máx.
Grado alcohólico	°INPM	-	5992	99,3 mín.
Grado de Hidrocarburos	% vol	-	13993	3 máx.
Ion Cloruro	Mg/kg	D 512 [a/]	10894/10895	1,1
Grado de etanol	% vol	D 5501[b/]	-	99,3 mín.
Íon Sulfato	Mg/kg	-	10894/12120	4,3 máx.
Hierro	Mg/kg	-	11331	5,5 máx.
Sodio	Mg/kg	-	10422	2,2 máx.
Cobre	Mg/kg	-	10893	0,07 máx.

Fuente: Agência Nacional de Petróleo, Gás Natural e Biocombustíveis (s/f), Resolução da ANP No. 36 de 6/12/2005.

The tax regime makes different prices…

In order to balance final costs in the fuel market and introduce the externalities costs and benefits, an equilibrated tax regime should be implemented. Fair prices are crucial for biofuel promotion.



Fuel prices breakdown in Rio de Janeiro, May 2009

(Sindicomb, 2009).

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Eficiencia energética en América Latina y el Caribe: situación y perspectivas

HUGO ALTOMONTE

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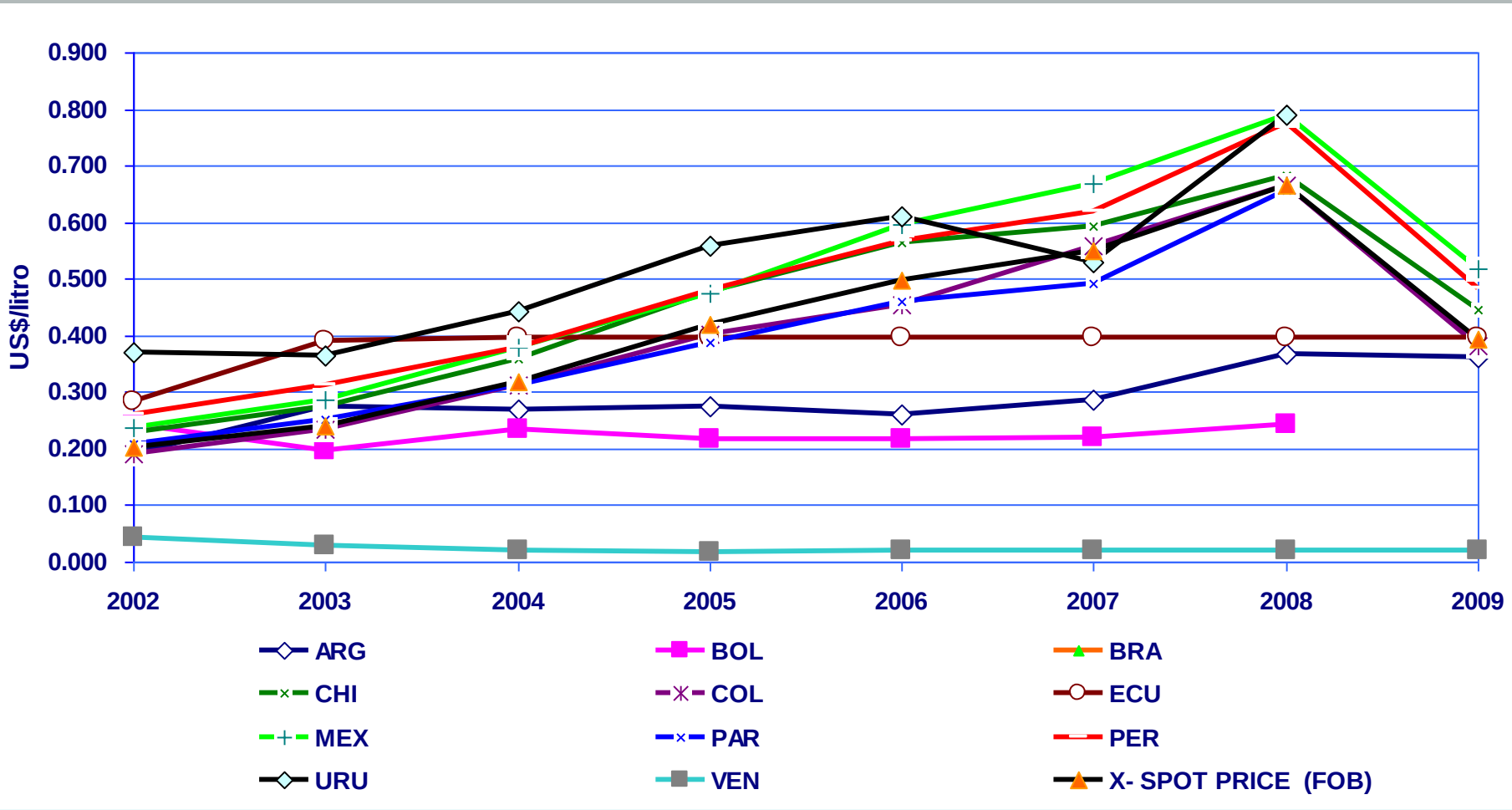
División de Recursos Naturales e Infraestructura, CEPAL

II Seminario Latinoamericano y del Caribe de Eficiencia Energética

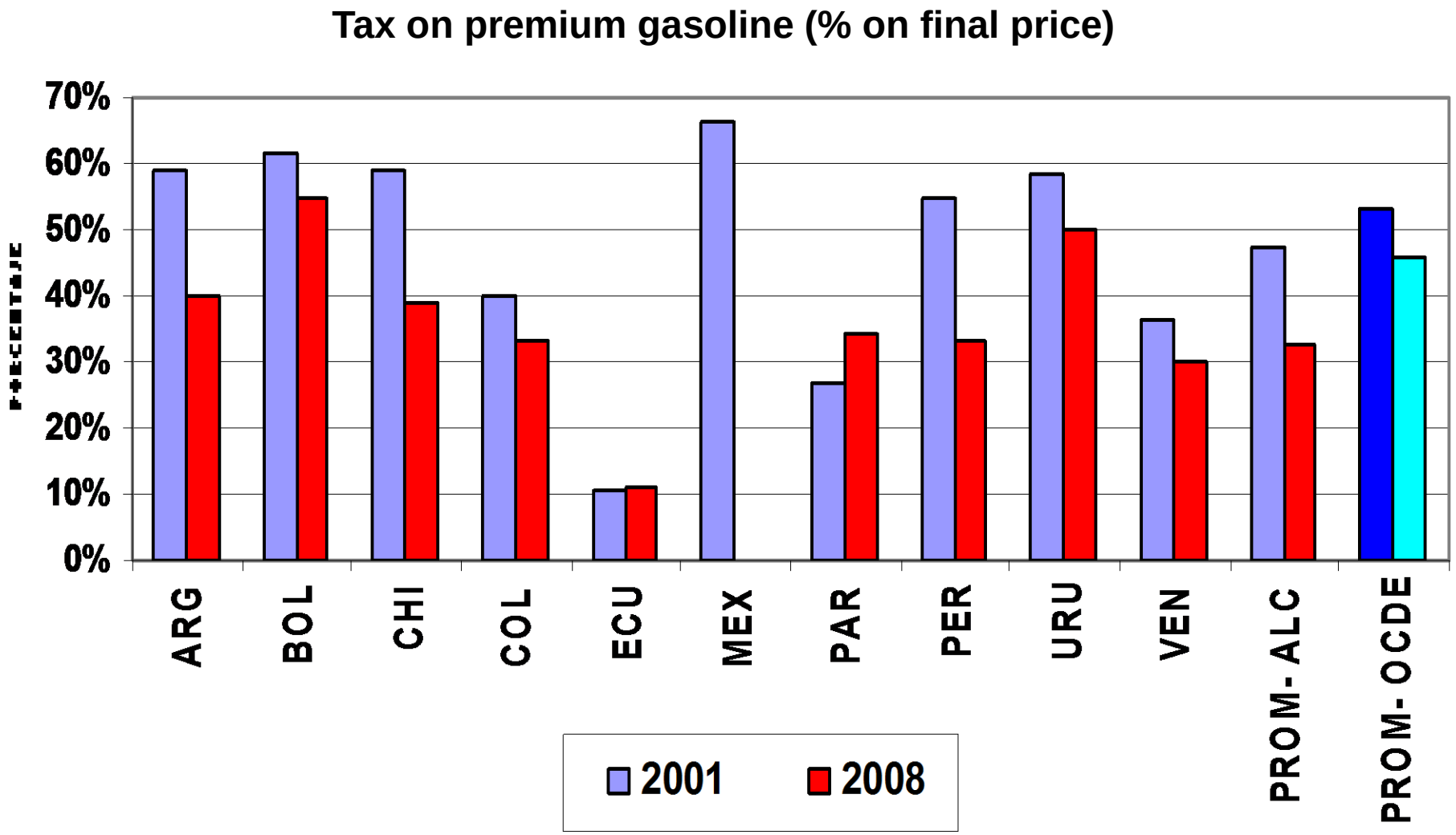
OLADE, La Habana 2009.

Gasoline price at Refinery gate, w/o taxes

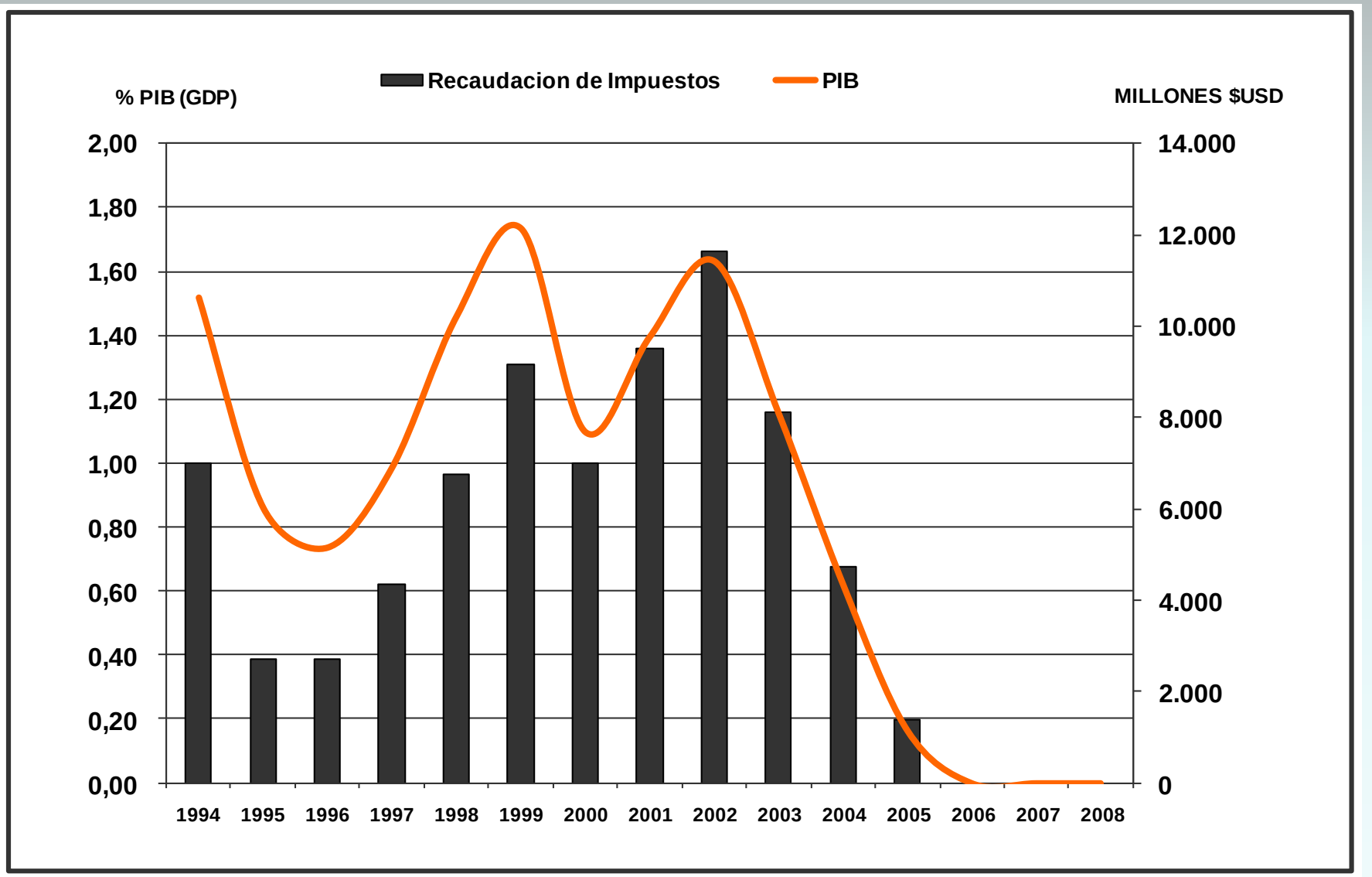


Fuente: CEPAL, sobre la base de datos de Precios de Combustibles, DRNI

While the average tax in OCDE countries reduced 7%, in Latin American countries this reduction was 13%.



MEXICO: the absolute (in USD million) and relative (as % of GDP) federal income felt to zero in few years, with a relevant increase of subsidies.



Mandatory biofuel blending is advisable

Just the "invisible hand of free market " will introduce biofuel use in a very slow pace. Clear public policies are required.

In ALL countries where biofuels have been succeeded, well planned and progressively implemented blending programs were adopted.

A good blending program should pay attention to:

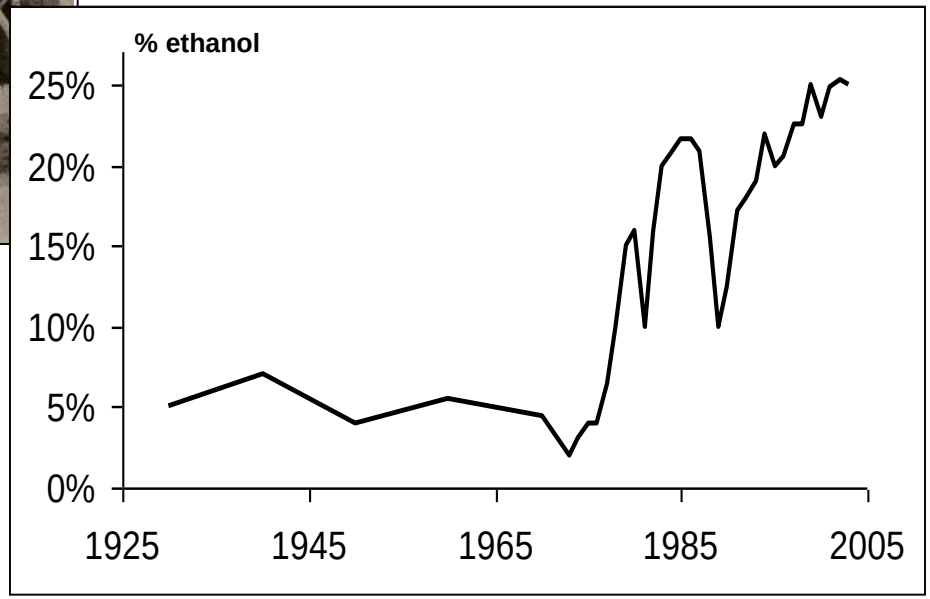
- ✓ ***a marketing (social communication) action, to reduce misinformation in the different publics: consumers, auto dealers, repair shops, etc.***
- ✓ ***transparency in pricing and tax definition***
- ✓ ***regular supply of data, information and results, including environmental aspects.***

Evolution of ethanol use in Brazil

Gasoline blended with ethanol has been a mandatory practice in Brazil since 1931 (minimum E5, average E7.5 before 1975), reinforced after the oil crisis during the seventies.

(INT, 2006)

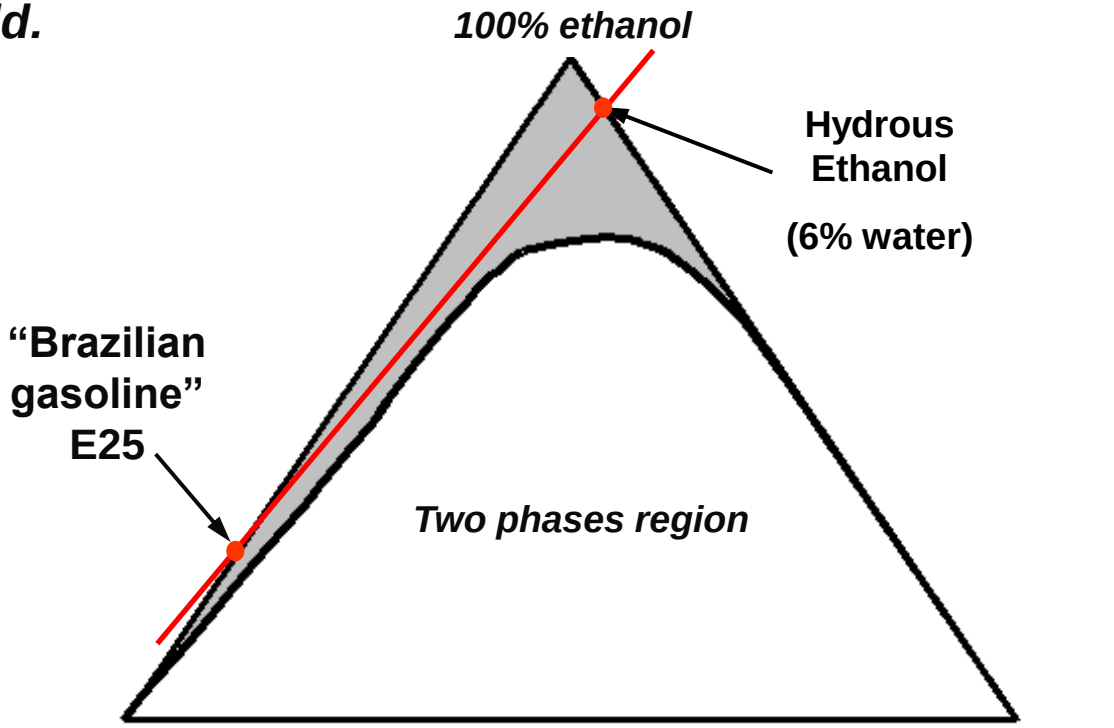
Ford Model T adapted for pure ethanol, used for public demonstrations in the 20's



Ethanol content in the Brazilian gasoline
(BNDES, 2008)

Ethanol use in Brazil: flexfuel motors

Vehicles with engines able to use any blend of pure hydrous ethanol (E100) and gasoline (blended with 25% anhydrous ethanol, E25), with good performance and accomplishing environmental requirements, were introduced successfully in 2003 the Brazilian market and today represents around 90% of new cars sold.



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

3. Final comments

Similar approach can be adopted for bioelectricity. In Brazil, the PROINFA program, with auctions specific for renewable sources of energy in power production and feed-in tariffs has reached interesting results.

Besides good potential and sound technologies, the desirable development of biofuels and bioelectricity in national energy markets depends strongly on public policies and actions.

To go ahead with bioenergy, knowledge requires willingness.

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