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1st Policy dialogue on energy efficiency in Latin America and the Caribbean: towards sustainable institutionalities

How to reposition the energy sector's *role in economic development, through innovation policies*

**Ministério da Ciência e Tecnologia - MCT
Secretaria de Desenvolvimento Tecnológico e Inovação – SETEC
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Some numbers on Brazil



Total area	8.5 million km²
Population	194 million
GDP (2008)	1.6 US\$ trillion (2% world)
Investment in R&D	1.2 % GDP
Scientists and researchers	211,000 in 2008 (<i>headcount</i>)
Scientific papers	2.7 % of world



Summary

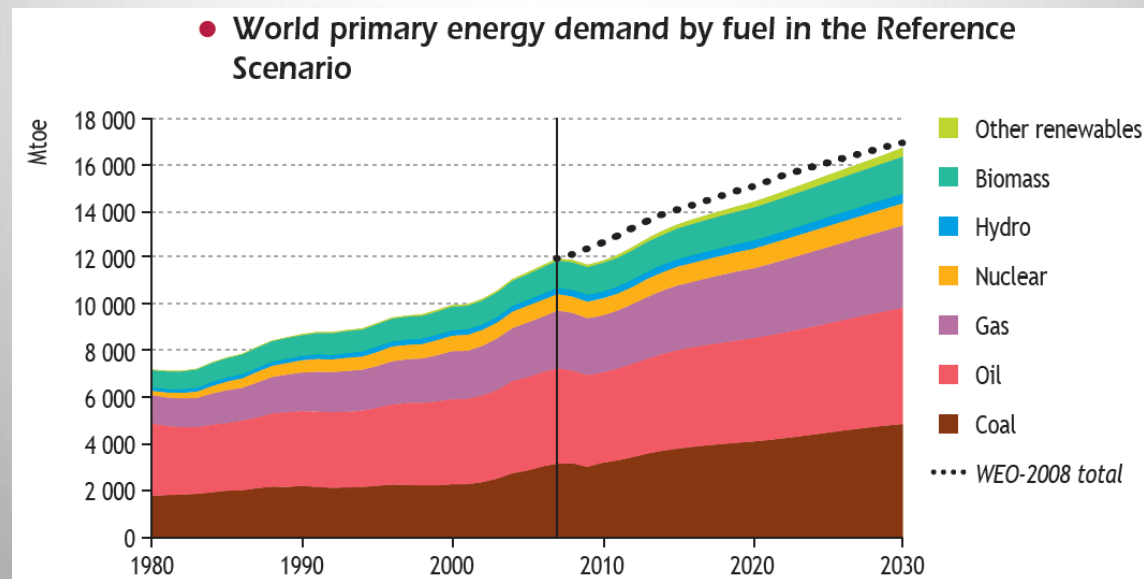
1. The energy sector
2. Energy policy
3. Environmental policy
4. Energy and economic development
5. Innovation policy
6. Industrial policy and market development
7. The role of energy efficiency
8. Energy role in economic development, some examples

1 - The Energy sector

Energy is one sector with great impact in the economy.

Accordingly to the projections of the International Energy Agency

- Global primary energy demand will increase 40% between 2007 and 2030 rising by 1.5% per year on average
- The capital required to meet projected energy demand through to 2030 amount to \$26 trillion (in year-2008 dollars)



1 - The Energy sector

Table 1.2 • Primary energy demand by region in the Reference Scenario (Mtoe)

	1980	2000	2007	2015	2030	2007-2030
OECD	4 050	5 249	5 496	5 458	5 811	0.2%
North America	2 092	2 682	2 793	2 778	2 974	0.3%
<i>United States</i>	1 802	2 280	2 337	2 291	2 396	0.1%
Europe	1 493	1 735	1 826	1 788	1 894	0.2%
Pacific	464	832	877	892	943	0.3%
<i>Japan</i>	345	518	514	489	488	-0.2%
Non-OECD	3 003	4 507	6 187	7 679	10 529	2.3%
E. Europe/Eurasia	1 242	1 008	1 114	1 161	1 354	0.9%
<i>Russia</i>	<i>n.a.</i>	611	665	700	812	0.9%
Asia	1 068	2 164	3 346	4 468	6 456	2.9%
<i>China</i>	603	1 105	1 970	2 783	3 827	2.9%
<i>India</i>	207	457	595	764	1 287	3.4%
<i>ASEAN</i>	149	389	513	612	903	2.5%
Middle East	128	378	546	702	1 030	2.8%
Africa	274	499	630	716	873	1.4%
Latin America	292	457	551	633	816	1.7%
World**	7 228	10 018	12 013	13 488	16 790	1.5%
<i>European Union</i>	<i>n.a.</i>	1 684	1 757	1 711	1 781	0.1%

* Compound average annual growth rate.

** World includes international marine and aviation bunkers (not included in regional totals).

2 - Energy policy

Principles and Goals of a “typical” Energy Policy

- Energy Supply Security
- Reasonable Tariff Policy
- Attendance Services for Entire Population (developing countries)
- Minimum cost expansion considering social-environmental constraints

Main characteristics

- Long term policy
- No room for mistakes – conservative choices in technology
- Price concern (competitiveness of the country)

2 - Energy policy

Principles and Goals of a “typical” Energy Policy (2)

- Strengthening of Planning
- Matrix Diversification: Use of Renewable Sources
- National Integration
- National Energy Sources Fostering: Renewable and Competitive
- National Technology Development and Energy Efficiency
- South-American Energy Integration

3 - Environmental policy

Principles of a “typical” Environmental Policy in energy

- Low impact choices
- Sustainability concerns
- Low emissions
- Low carbon

Main characteristics

- “Optimism” in relation to disruptive technologies
- Tendency to foster the best technology available (price differs from environmental cost)
- Innovative choices in technology

4 - Energy and economic development

The energy sector can influence the economic development mainly in two ways:

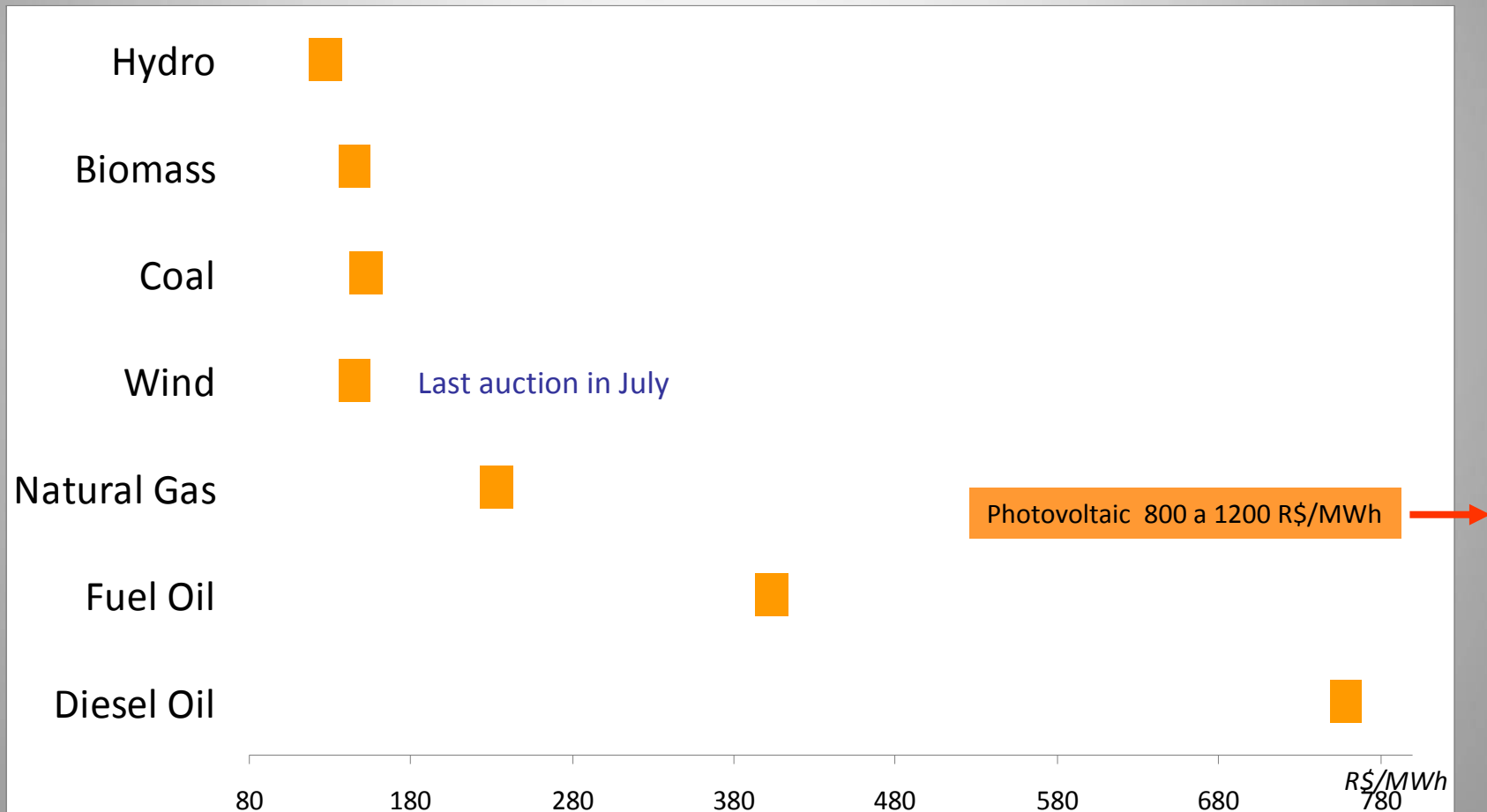
1. Capacity for large investments
 2. Price of energy
- The investments in the energy sector can stimulate national enterprises and the industrial capacity.
 - The price of energy is pervasive to all sectors and influences the competitiveness of the country.

Question:

- Can low price of energy promote industrial development or can only lead to energetic inefficiency and waste ?

4 - Energy and economic development

Primary Energy Sources Competitiveness for Electricity Production



5 - Innovation policy

"Innovation is the multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace .

Baregheh A, Rowley J and Sambrook S.(2009)

"Innovation happens in enterprises and is related to acceptance in society, profitability and market performance expectation".

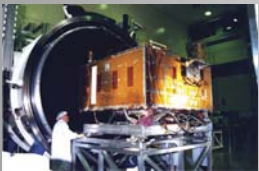
Innovation Policy Objective:

Boost promotion actions to create a favorable environment for innovation in enterprises and strengthen Industrial, Technological and Trade Policy

5 - Innovation policy

- Strong support to R&D and technological infrastructure
- Actions to foster early innovative products and markets
- Tax credits incentives for innovative enterprises
- Actions to foster energy efficiency goods and processes
- Government acquisition policy
- Success rely on market demand and acceptance
- Success rely on enterprises willing to innovate

5 - Innovation policy



R&D Investment (%)

Country	Government	Enterprises
Argentina	69,4	30,6
Brazil	55,1	44,9
Canada	40,5	59,5
United Kingdom	40,3	59,7
United States	28,7	71,3
Korea	25,9	74,1
Japan	16,8	83,2

2008

5 - Innovation policy

Some actions currently ongoing on Brazil

4. Support to Technological Innovation in Enterprises

- 4.1. Financial support to R,D&I and the placement of researchers in enterprises
- 4.2. Support for cooperation between enterprises and Science and Technology Institutions
- 4.3. Capacity-building in innovation
- 4.4. Implementation of industrial R,D&I centres

5. Innovation Technology in Enterprises

- 5.1. Brazilian System of Technology– SIBRATEC (networks in innovation, technological services and technological extension)

6. Incentives for the Establishment and Consolidation of Technology Intensive Enterprises

- 6.1. National Incubator and Technological Park Support Program (PNI)
- 6.2. Inovar – Promote the creation and expansion of the venture capital industry in Brazil
- 6.3. Use governmental purchasing power to stimulate development in domestic technology enterprises

6 – Industrial policy and market development

Principles of an Industrial energy Policy

- Produce goods in the country competitively (price of energy)
 - Develop more and sustainable jobs
 - Industrial development
 - Produce high quality energy efficient goods
 - Competitive insertion in the global marketing
-
- regulations to improve “quality”
 - Infrastructure for certification and quality control

6 – Industrial policy and market development

Market development

- Promote and develop national energy sources
- Promote and support innovative technology in a speed that national industry can follow
- Promote demonstration and support for national technology development
- Adding value in the country
- Promote energy efficiency products as a industrial policy
- Energy policy tied to the industrial policy

7 – The role of energy efficiency

Energy efficiency

- Increases energy security – can act as a “source” of energy
- decreases pressure for investing in expanding energy system
- Promotes industrial development and increases competitiveness of product and services

But it is necessary to:

- Address the strong behavior aspect of energy use
- Support and encourage its development

7 – The role of energy efficiency

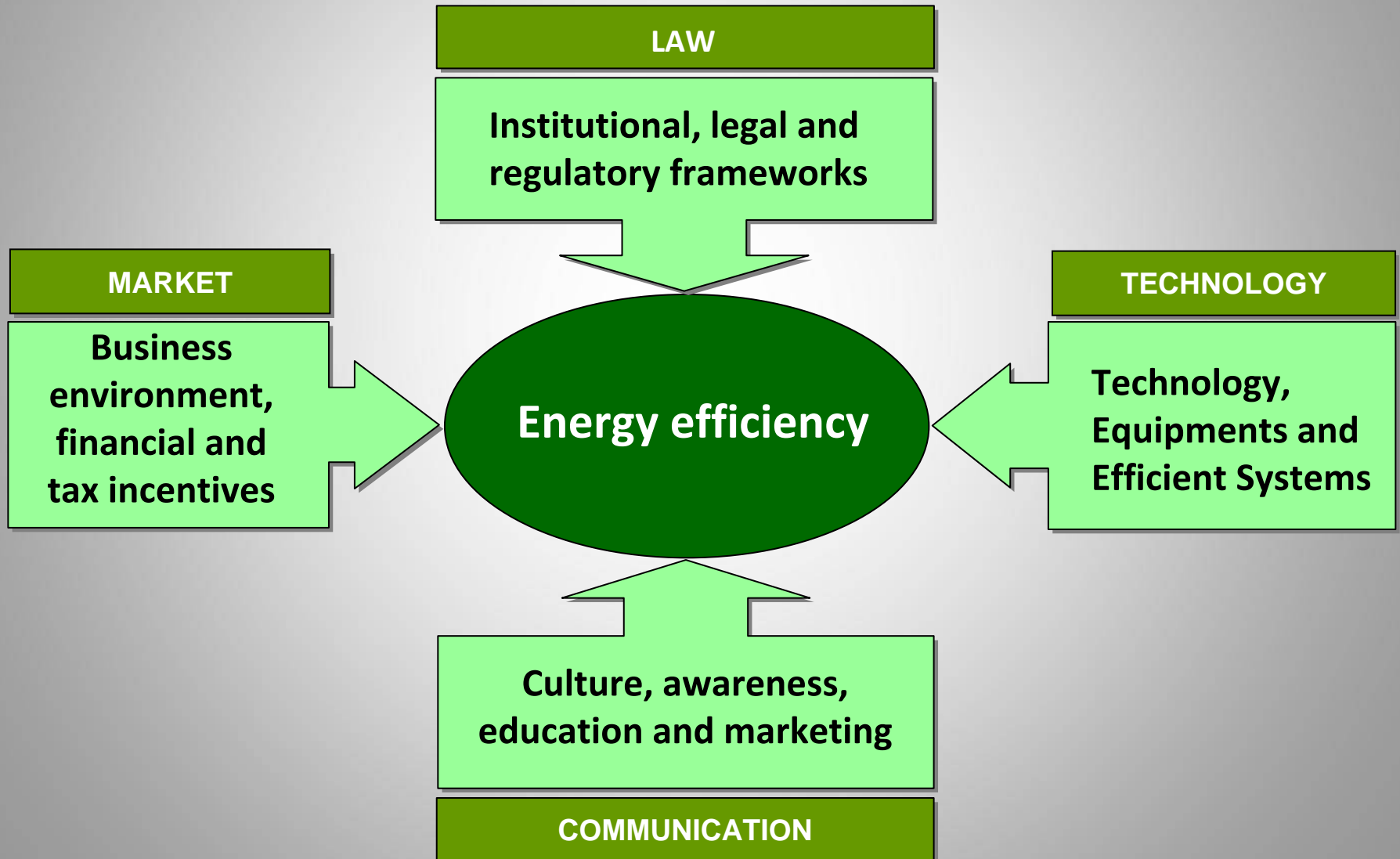
Energy efficiency saves money but it does not happen naturally. Why?

Barriers

- **For most organisations, energy is not a big cost and therefore energy efficiency is not a priority.**
- **Management time and attention are in short supply.**
- **Identifying opportunities needs external professional advice.**
- **Money is tight: little, if any, left over for energy efficiency.**
- **Short payback criteria exclude consideration of worthwhile measures.**

7 – The role of energy efficiency

Energy efficiency – Strategic aspects



8 - Energy role in economic development

Examples:

Ethanol in Brazil

Biodiesel in Brazil

8 - Energy role in economic development, some examples

Ethanol in Brazil

National Alcohol Program (PROALCOOL)

As a response to the 1973 oil crisis and awareness on the dangers of oil dependence the Brazilian government began promoting bioethanol as a fuel. The National Alcohol Program -*Pró-Álcool*, launched in **1975**, was a nation-wide program financed by the government to substitute automobile fuels derived from fossil fuels, such as gasoline, in favor of ethanol produced from sugar cane.

The first phase of the program concentrated in production of anhydrous ethanol for blending with gasoline.

1975

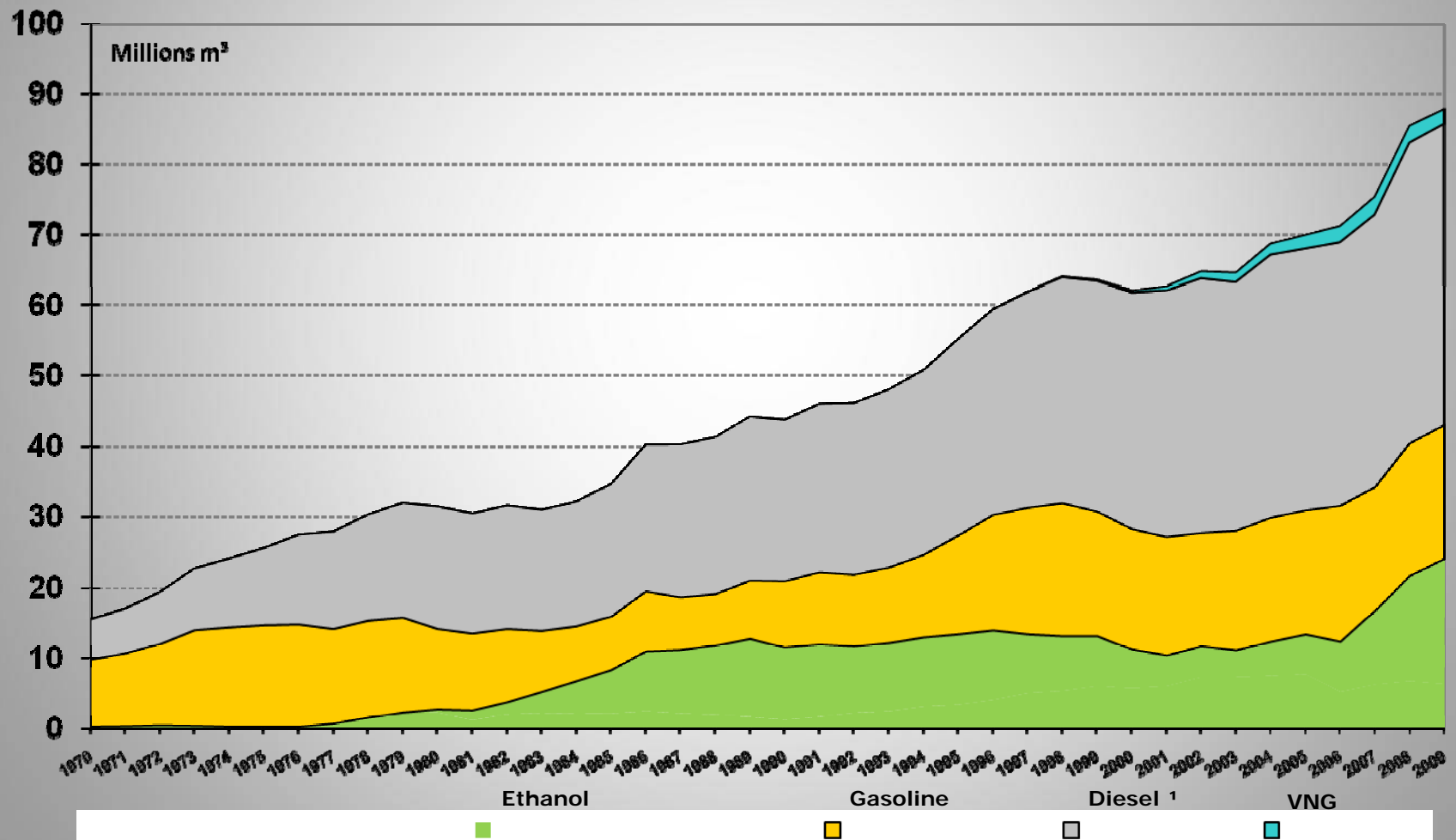
Production: 0,58 million m³

2010 (estimated)

Production: 28 million m³

8 - Energy role in economic development, some examples

Evolution of Matrix Fuel Vehicle in Brazil (m³)

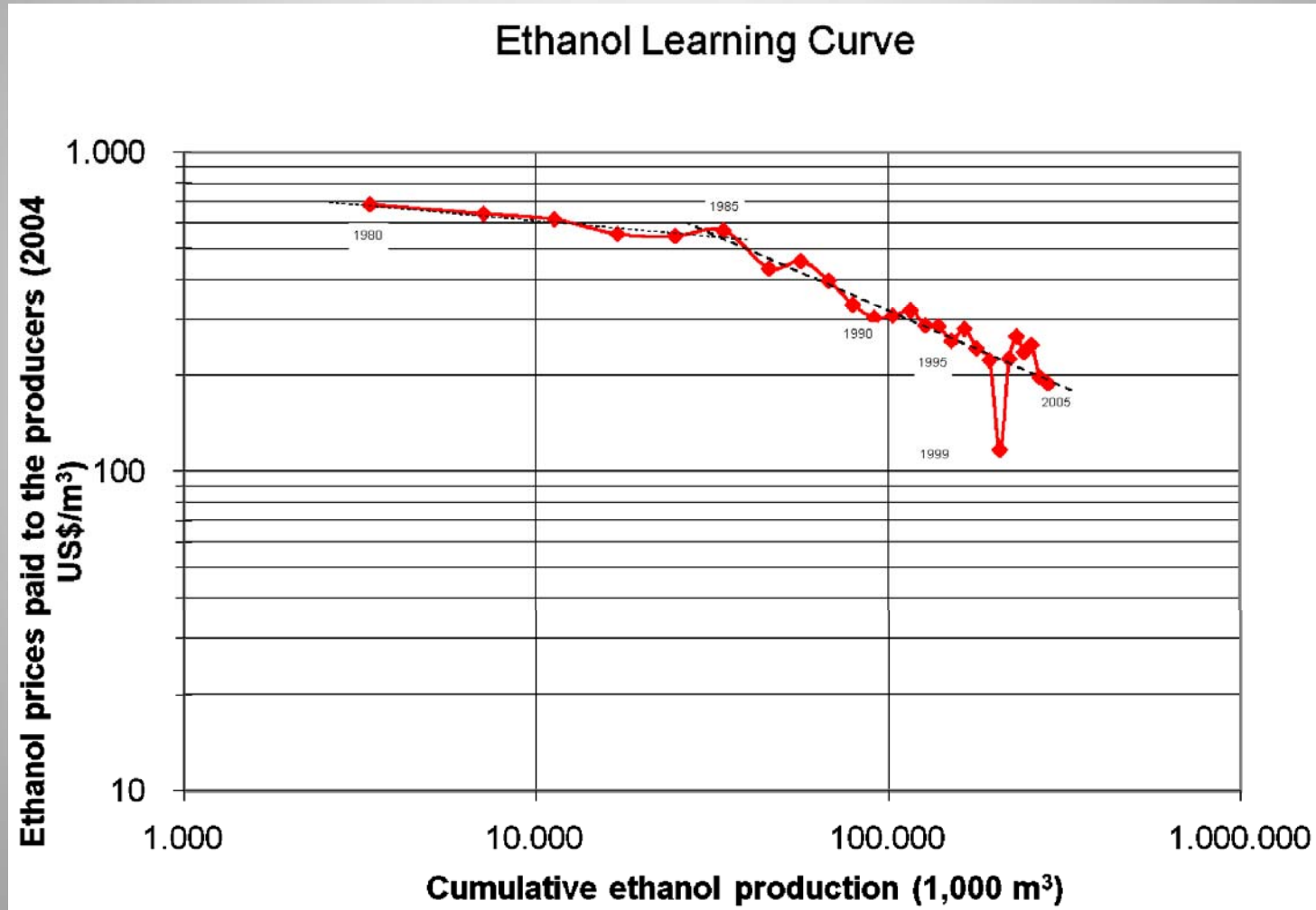


¹ Biodiesel mixture since 2008

Source: Brazilian Energy Balance (MME)

8 - Energy role in economic development, some examples

Ethanol in Brazil



8 - Energy role in economic development, some examples

Flex Fuel Fleet Growth:

The main driver for ethanol market expansion

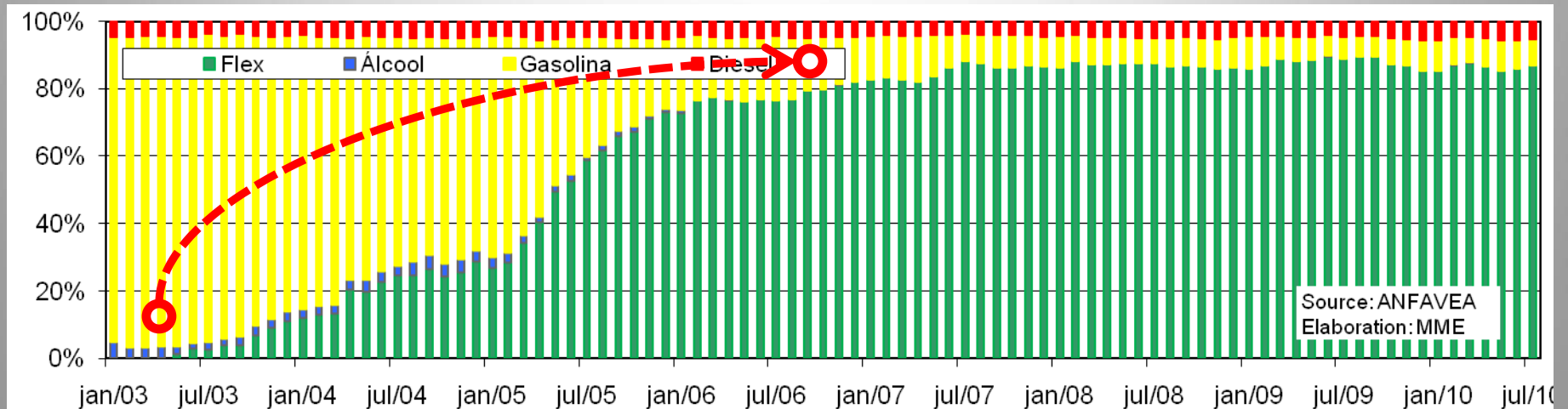


Allows any mixture of hydrous ethanol and gasoline C (E25 to E100)

- In 2009, vehicle sales registered a growth of 11% in comparison to 2008, and the historical record of 3 million vehicles was reached. Flex-fuel sales represented 88.2% in 2009.
- Since 2003, until June/2010, more than 11 million flex-fuel vehicles were commercialized and its share in total light vehicles fleet is estimated in 37%.

Flex-fuel sales:

From zero to 80% in 3 years!



8 - Energy role in economic development

Examples:

Ethanol in Brazil

Biodiesel in Brazil

8 - Energy role in economic development, some examples

Biodiesel in Brazil

National “Program for Biodiesel Production and Use” was launched in December/2004

- **Reasons for biodiesel:**
 - **Economics: oil prices - diversification energy matrix, energy security, development of a new industry**
 - **Environmental: introduce a more sustainable and renewable fuel**
 - **Strong social component – social stamp and engagement of small holders - development of employment and income**

8 - Energy role in economic development, some examples

Biodiesel in Brazil

Situation

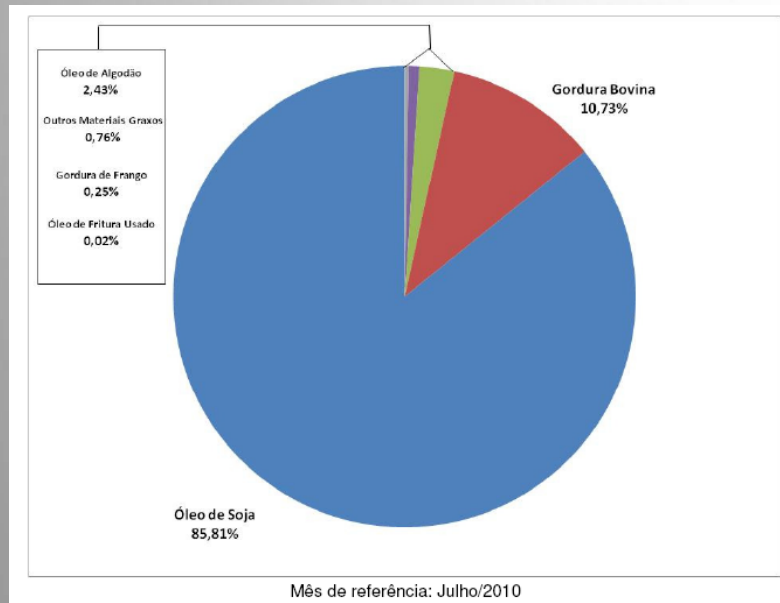
- **Early stages of the learning curve**
- **Reached the 5% blending with diesel oil target**
- **Several options of feedstock: but currently based on soybean**
- **Diversity of feedstock poses challenges and at least three technological routes**

8 - Energy role in economic development, some examples

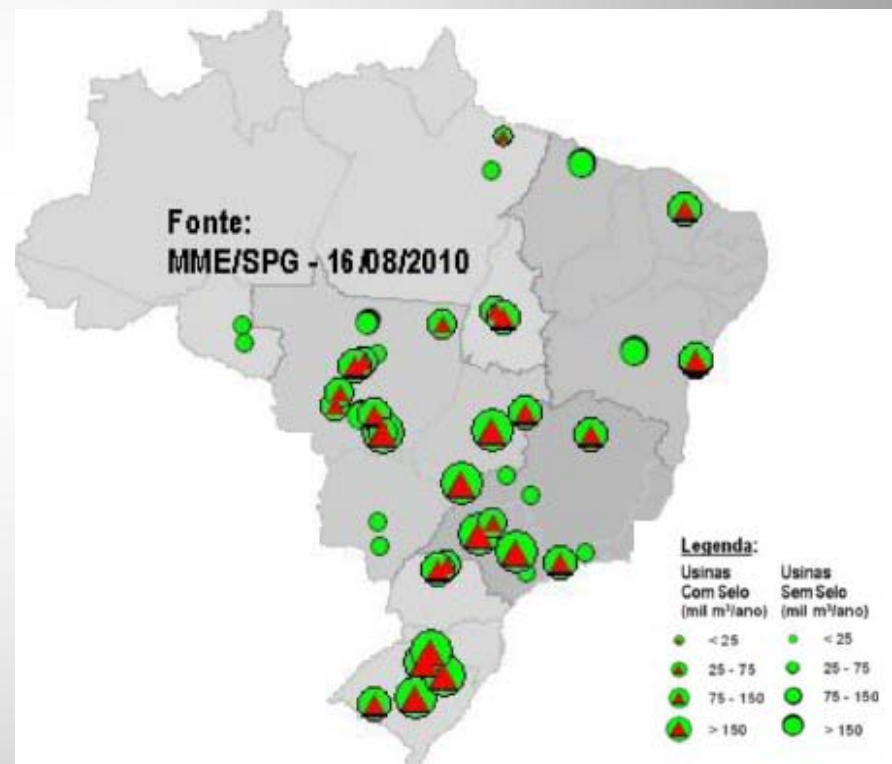
Biodiesel in Brazil

In six years:

- 63 plants licensed for operation
- Installed capacity of 4.689 million m³ per year



PRODUCTIVE UNITS

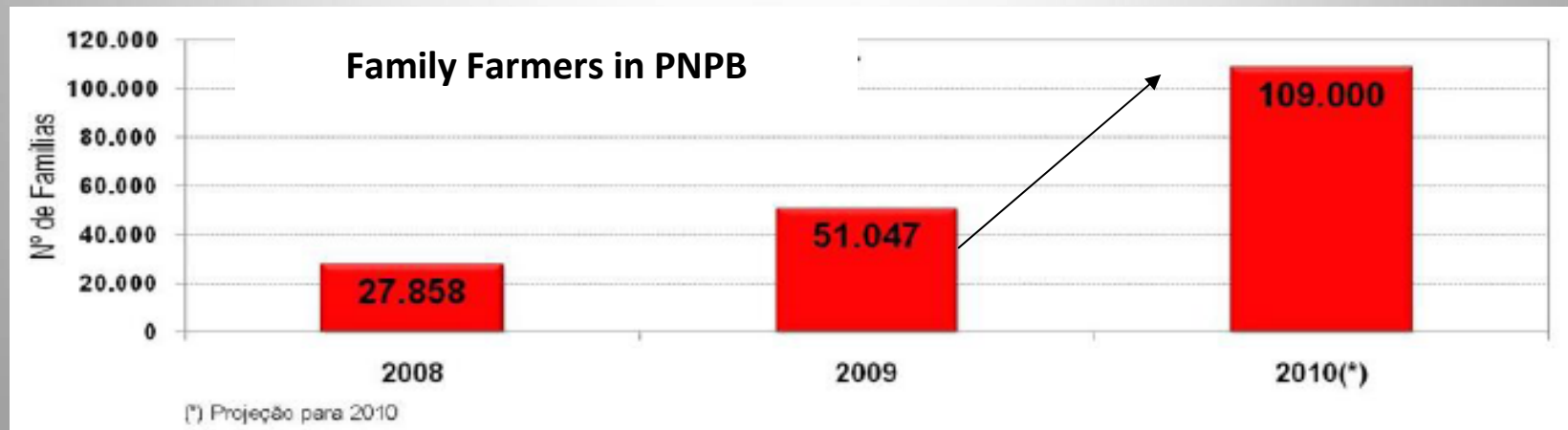


8 - Energy role in economic development, some examples

Biodiesel in Brazil

SOCIAL

- Biodiesel program aim to promote social inclusion and regional development by generating jobs and income for family farmers.
- This is accomplished through tax incentives for the production of this family farmers.



Fonte: MME – boletim de combustíveis renováveis – edição nº 31



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Muchas Gracias!

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Transport Sector and Climate Change Issues

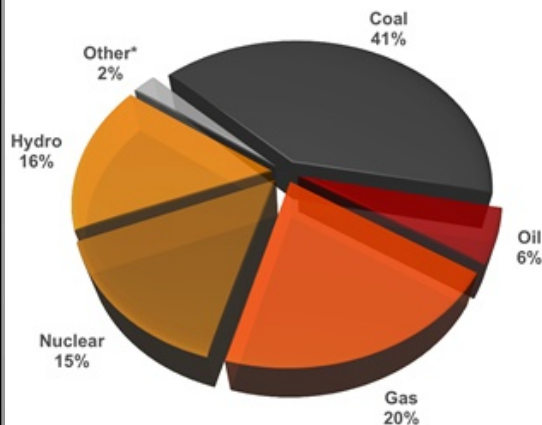
In order to address the issues of climate change, the world needs to change the transportation sector in three ways:

- Change mass transport systems and solutions for big cities;
- Change the fuel mix currently used (new, with low carbon content in its life cycle)
- Change the car

One of the solutions that is put toward today is the Electric cars, but...

- Coal fuels over 40% of electricity worldwide;
- So... are we going to substitute oil for coal?

Global Electricity Generation (2008)



Coal in Electricity Generation (2009) – Some Countries

South Africa: 93%	Poland: 92%	PR China: 79%
Australia: 77%	Kazakhstan: 70%	India: 69%
Israel: 63%	Czech Rep: 60%	Morocco: 55%
Greece: 52%	USA: 49%	Germany: 46%

4 - Energy and economic development

Evolution of the National Energy Matrix 2007 / 2030)

