Climate Change - Brazilian context

Towards an equitable low carbon development:
a science policy dialog for COP21

June 15th-16th 2015
Paris, France

PARIS2015
COP21·CMP11

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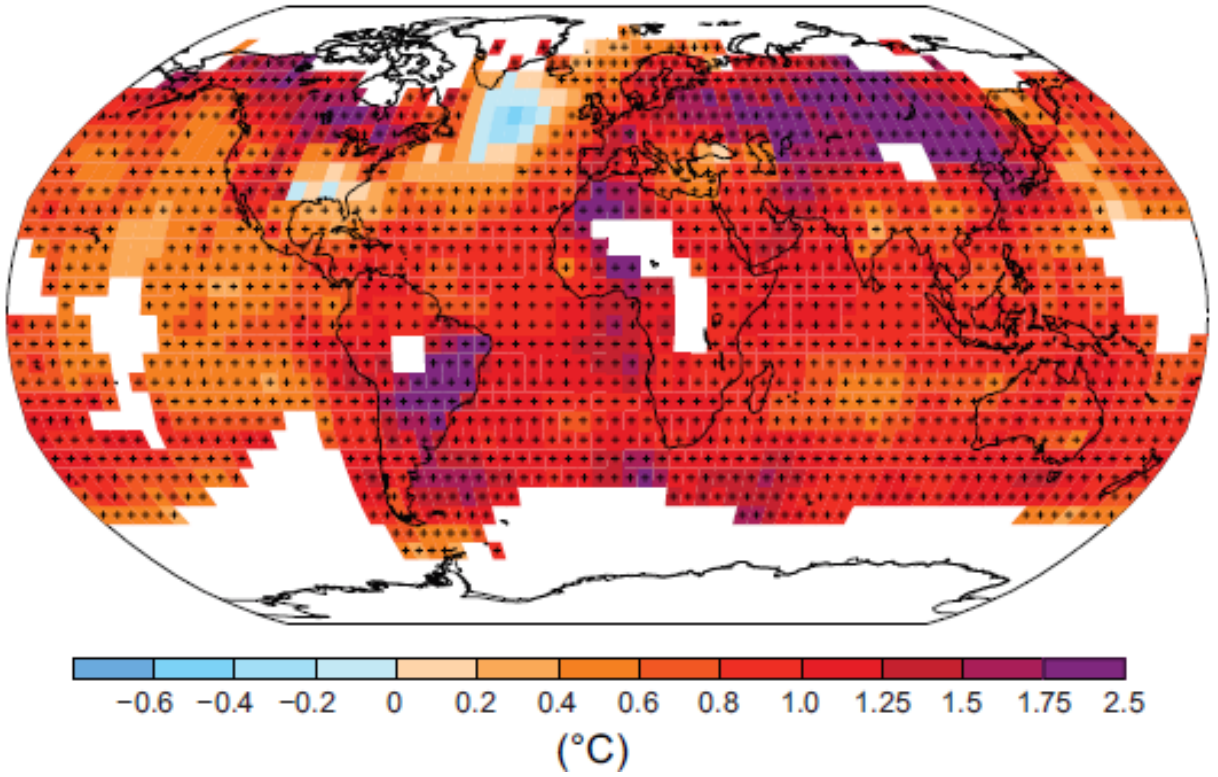
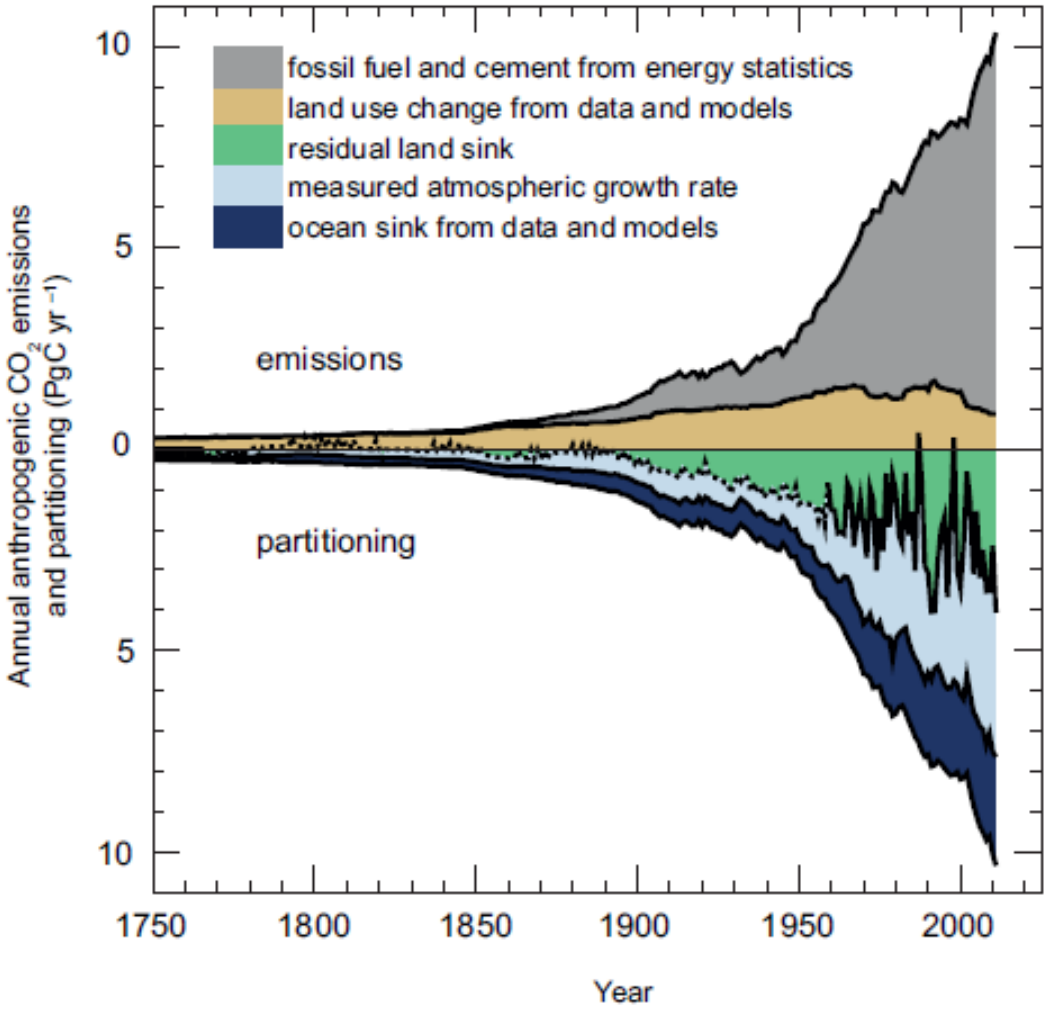
Observed change in surface temperature 1901-2012



Source: IPCC, 2013: Summary for Policymakers.

Brazil is among the regions with the largest observed temperature increases

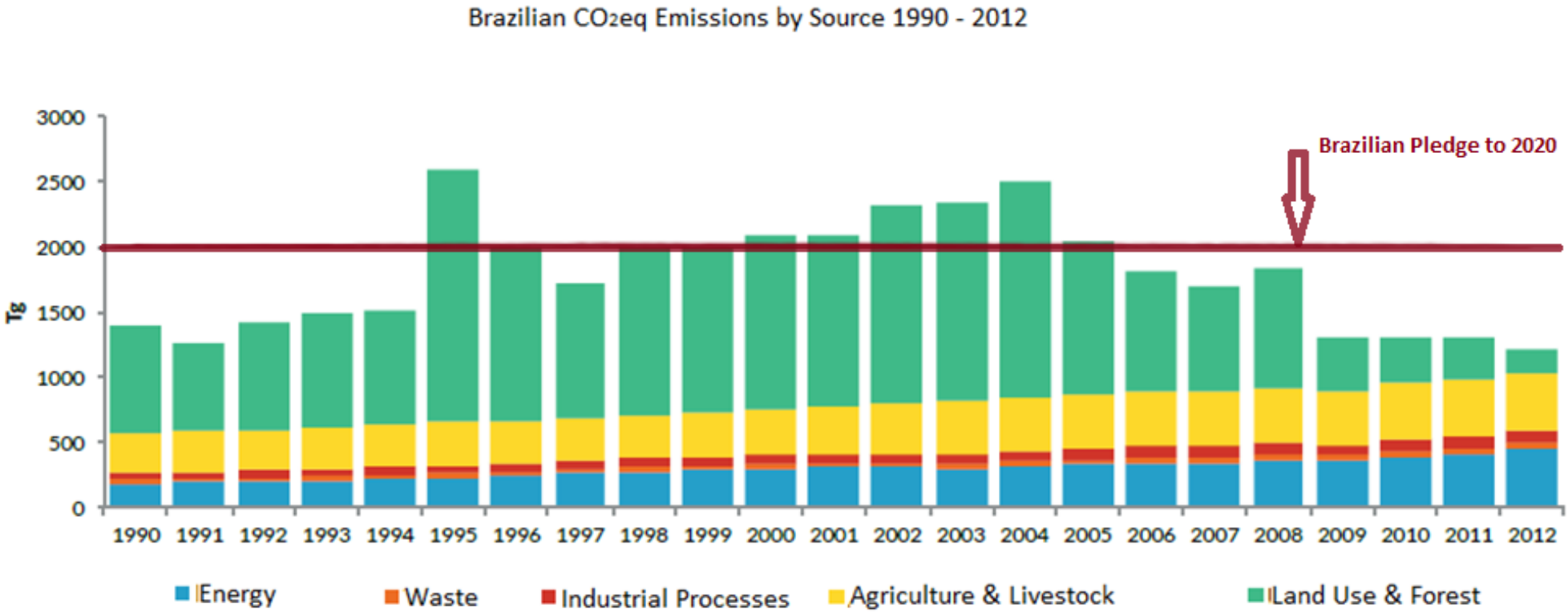
Observed CO_2 emissions



Source: IPCC, 2013: Technical Summary.

GHG emissions continue to rise because of human activities, especially from intense and growing fossil fuel combustion, followed by deforestation, whose contribution decreases and can be virtually absorbed by terrestrial sink.

Brazilian GHG emissions



Tg = millions of tons

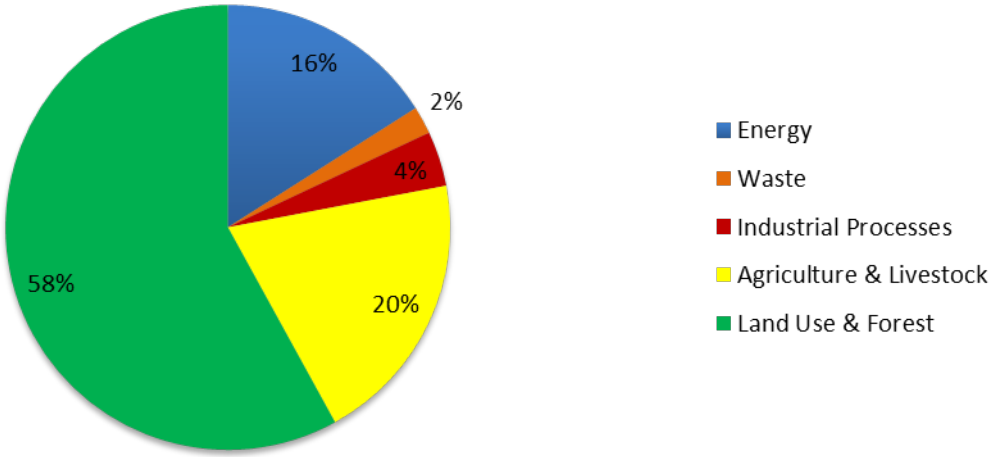
Source: MCTI, 2014: *Estimativas anuais de emissões de gases de efeito estufa - 2ª edição*

Brazilian pledge: to reduce between 36.1% and 38.9% of its projected GHG emissions by 2020, through National Appropriate Mitigation Actions (NAMAs)

Total emissions in 2010 were 60% below emissions projected for 2020

Brazilian GHG Emissions

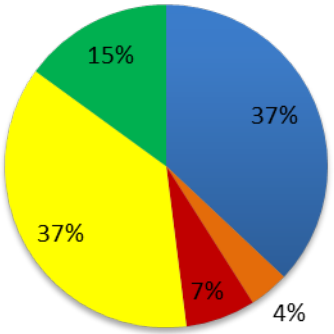
CO_2eq Emissions in 2005
2.04 Gt



10.98 tCO_2eq/ per capita

2.31 CO_2eq/ GDP
(constant 2005 US$)

CO_2eq Emissions in 2012
1.20 Gt



6.06 tCO_2eq/ per capita

1.06 CO_2eq/ GDP
(constant 2005 US$)

Source: MCTI, 2014: *Estimativas anuais de emissões de gases de efeito estufa - 2ª edição;* World Data Bank;

Forestry and land use sector showed a great decrease, but emissions from other sectors have increased, either if they are far below what was projected for 2020.

Main drivers: population; GDP per capta; energy per capta

Brazilian mitigation & adaptation plans

Savannah

Amazon forest

Energy

Health

Agriculture

challenges to be faced by the ministries and institutions involved with the plans

cross-sectional analysis complementarities and synergies

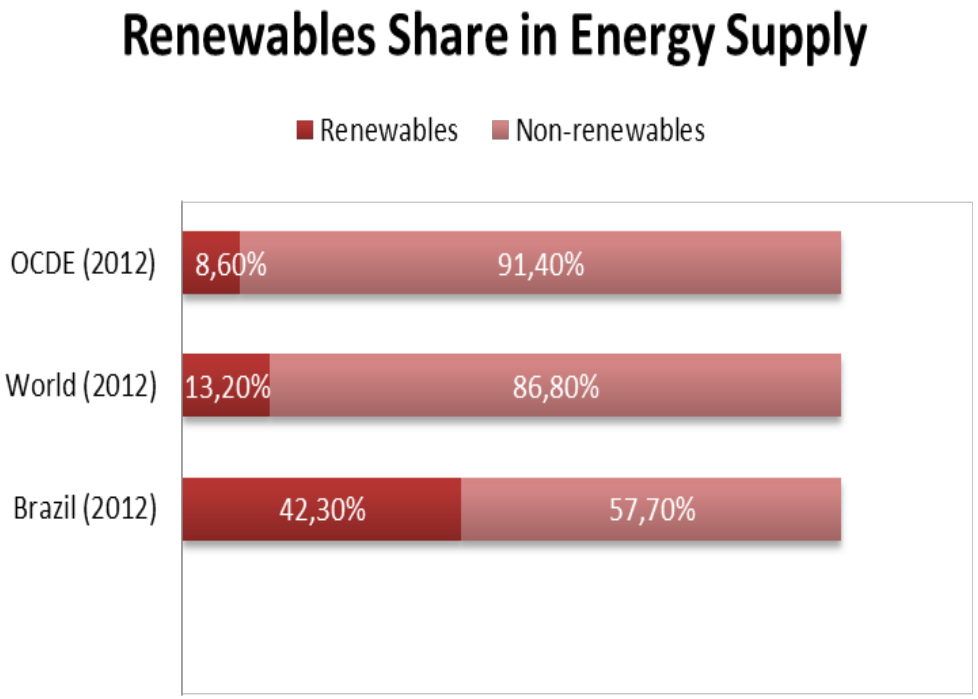
Steel industry

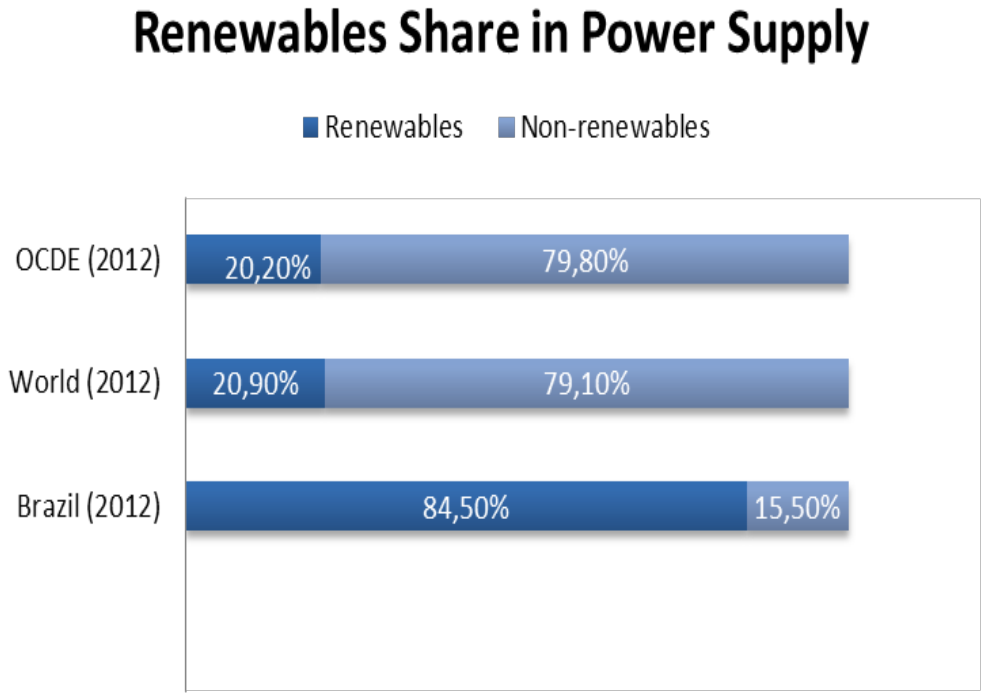
Mining

Transport

Industry

Renewables Share





Source: BEN, 2014: Relatório Síntese, ano base 2013; MME, 2014: Energia no Mundo

Brazilian energy supply in 2013

RENEWABLES >> 41.0%

SUGARCANE	HYDROPOWER[1]	WOOD	OTHER RENEWABLES
16,1%	12,5%	8,3%	4,2%




1 Includes hydropower electricity imports

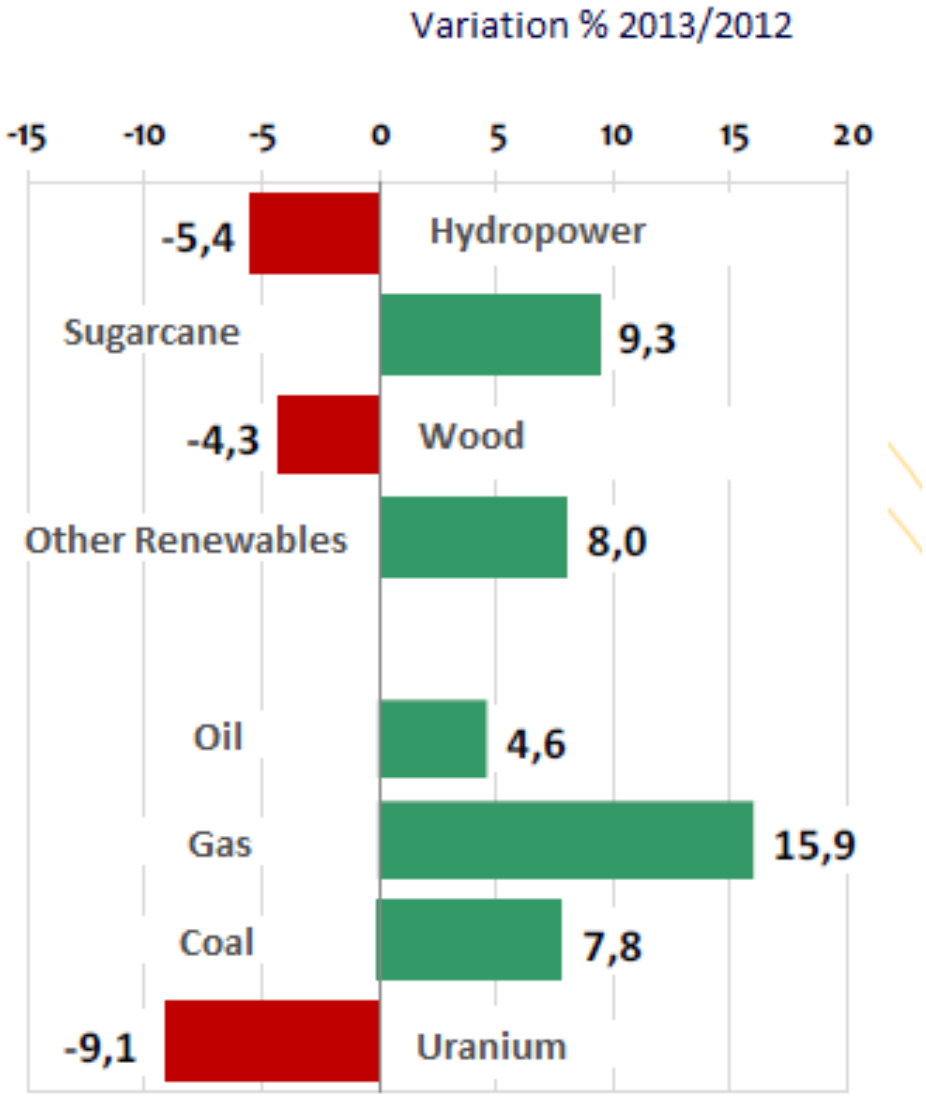
NON-RENEWABLES >> 59.0%

OIL	GAS	COAL	URANIUM
39,3%	12,8%	5,6%	1,3%




Source: BEN, 2014: Relatório Síntese, ano base 2013

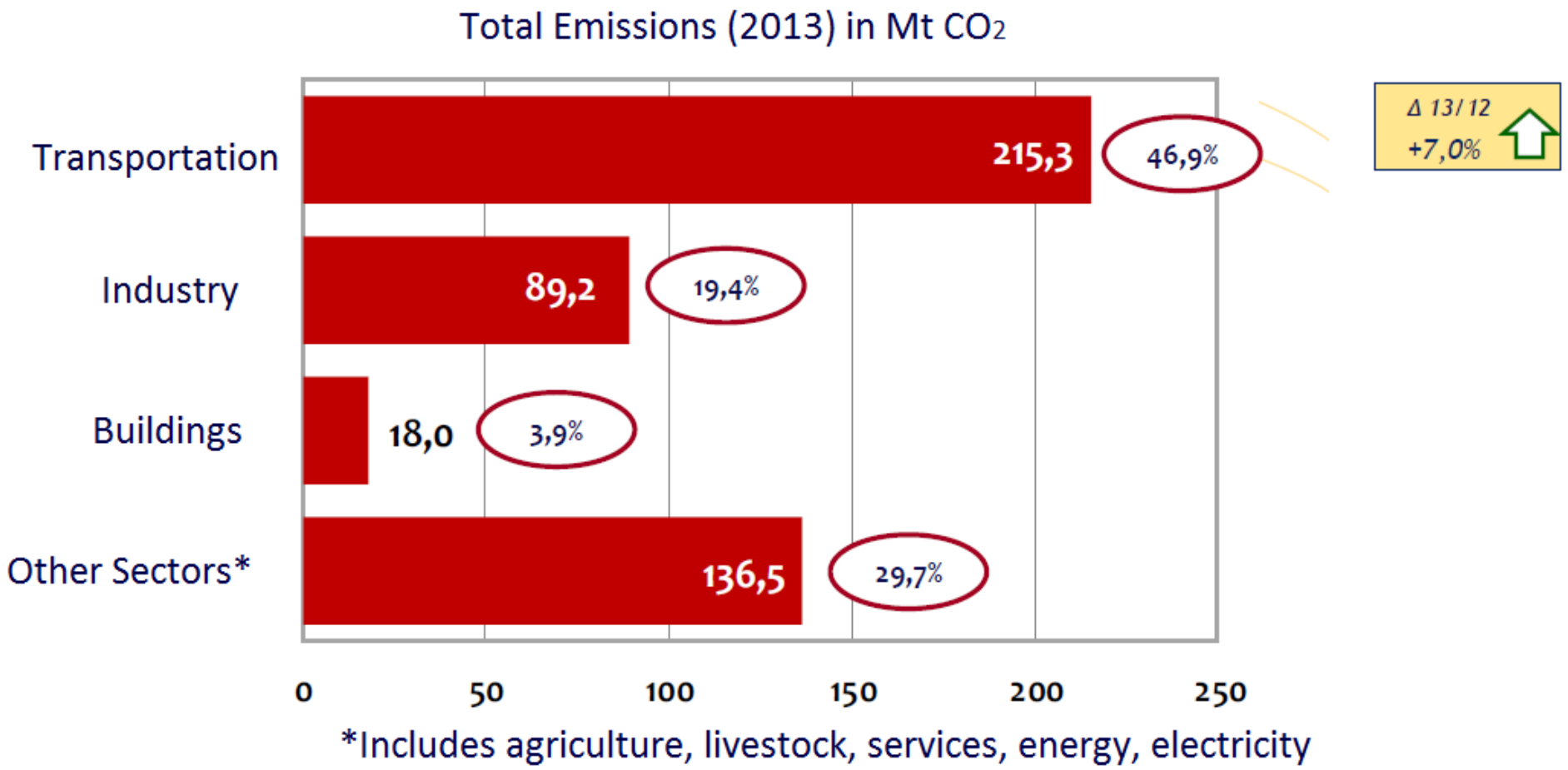
Brazilian energy supply variation 2012 - 2013



Source: BEN, 2014: Relatório Síntese, ano base 2013

Brazilian energy sector emissions

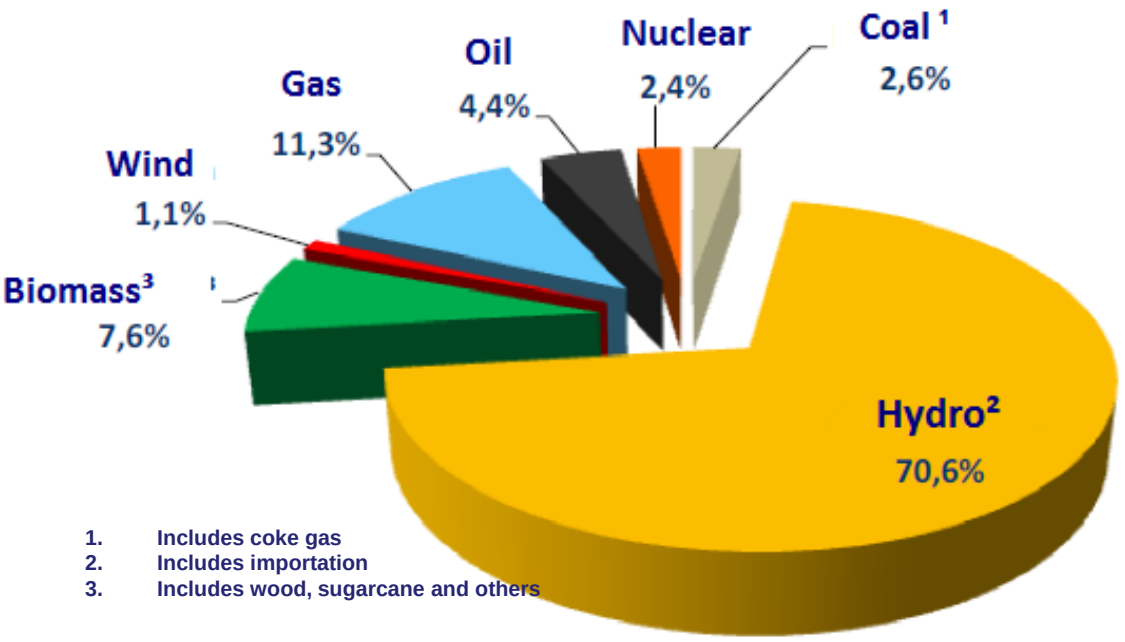
In 2013 total anthropogenic emissions related to the Brazilian energy sector summed up to 459 MtCO2eq



Source: BEN, 2014: Relatório Síntese, ano base 2013

Brazilian power supply

BRAZIL (2013)

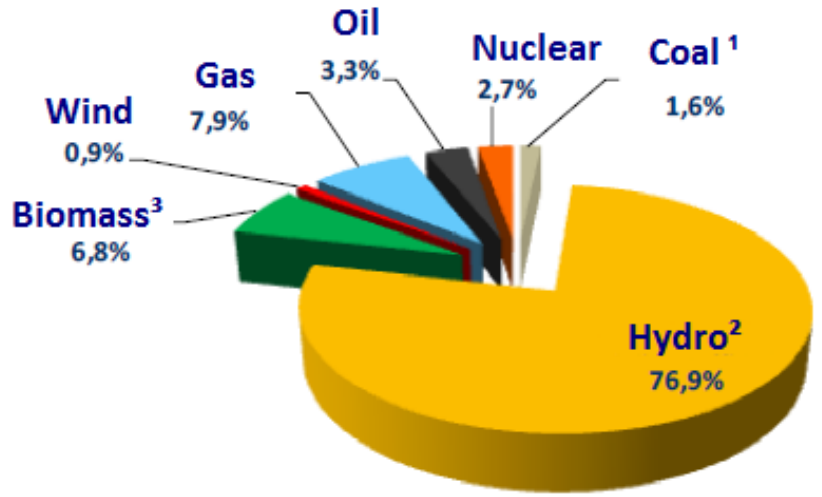


1. Includes coke gas
2. Includes importation
3. Includes wood, sugarcane and others

Hydro generation² in 2013: 430,9 TWh

total generation in 2013: 609,9 TWh

BRAZIL (2012)



Hydro generation² in 2012: 455,6 TWh

total generation in 2012: 592,8 TWh

Source: BEN, 2014: Relatório Síntese, ano base 2013

Brazilian pathways to deep decarbonization

Main pillars:

- Fuel switching*
- Efficiency gains
- Zero net deforestation, reforestation and forest restoration

Additional measures and deeper pathways might be designed considering:

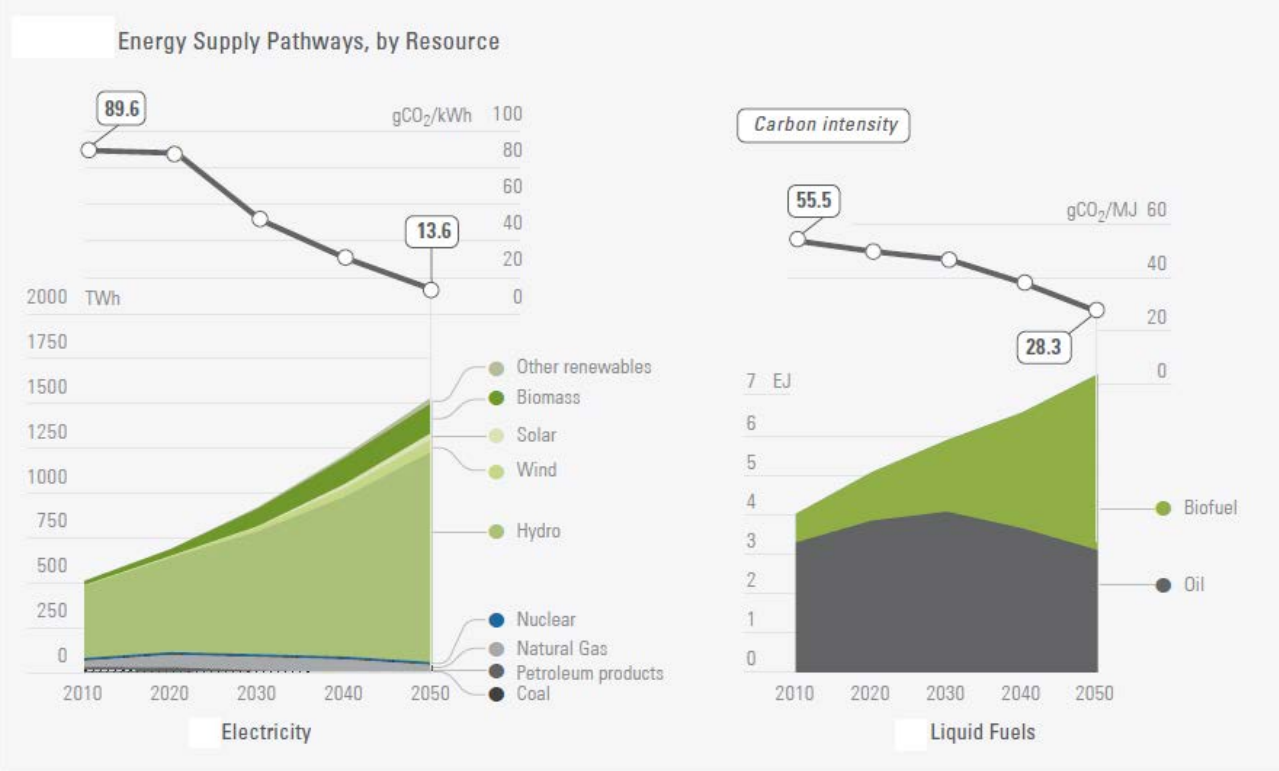
- Combination of high-efficiency biomass production and use including biopower, biodiesel and aviation biofuel (biokerosene), associated with carbon capture and sequestration (BECCS)
- Substantial expansion of public transport and modal shifts towards railways and waterways in the mobility and transportation sector
- Strengthening of renewable power generation, smart grids and electricity storage, and development of electric plug-in vehicles

* Production of bioethanol from sugarcane is acknowledge as an advanced first generation biofuel and production levels can be considerably extended without compromising food security, moreover aggregating second generation technologies and utilising high-biomass cane (energycane)

Source: DDPP 2014 report: Pathways to Deep Decarbonization

Brazilian pathways to deep decarbonization

Electricity generation deep decarbonization pathway

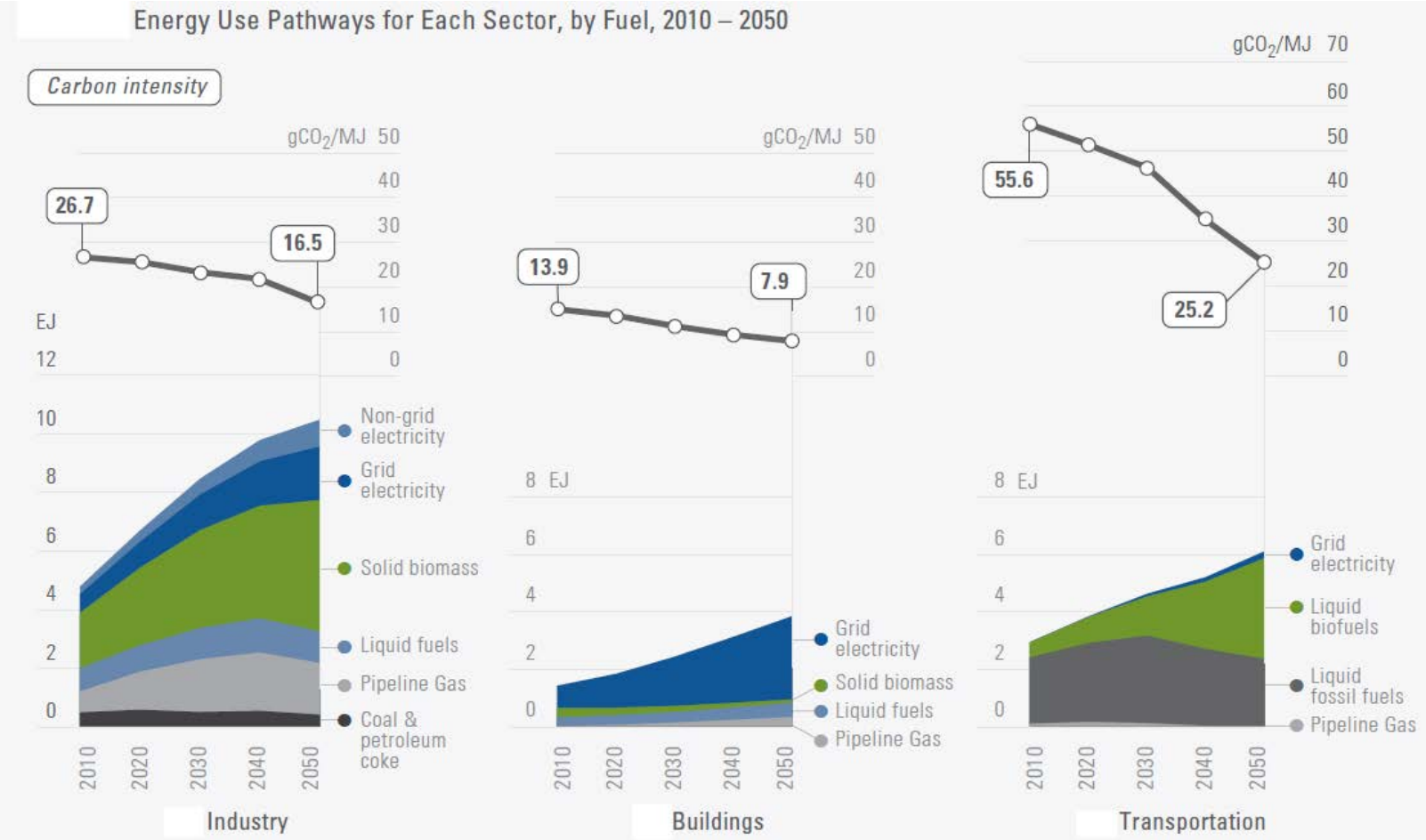


- Expansion of hydropower with environmentally acceptable projects
- Growth of bioelectricity generation
- Increasing amount of wind and solar
- Development of smart grids and electricity storage

Source: DDPP 2014 report: Pathways to Deep Decarbonization

Brazilian pathways to deep decarbonization

Industry, Buildings and Transportation Energy Use Pathways, by Fuel, 2010 - 2050



Source: DDPP 2014 report: Pathways to Deep Decarbonization

Liquid biofuels in the world

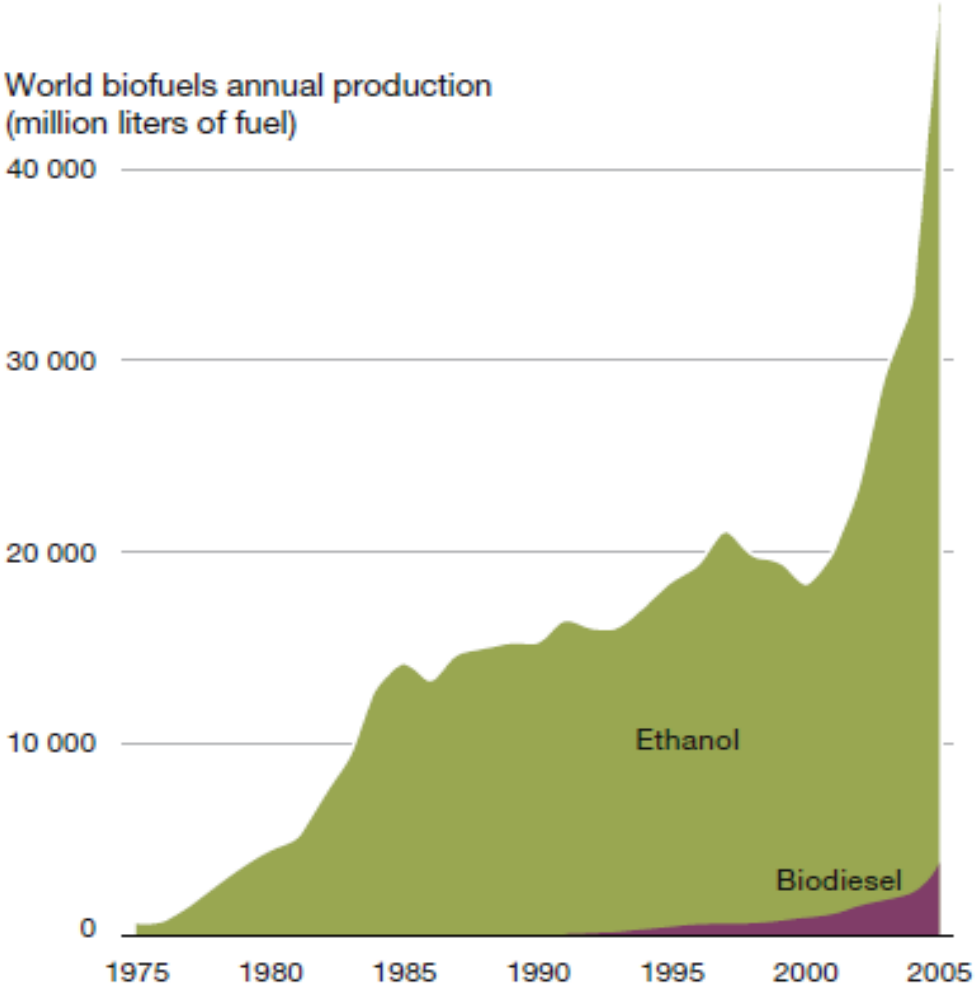


Figure 14: The production of biodiesel and ethanol has increased substantially in recent years. (Source: Earth Policy Institute, 2006).

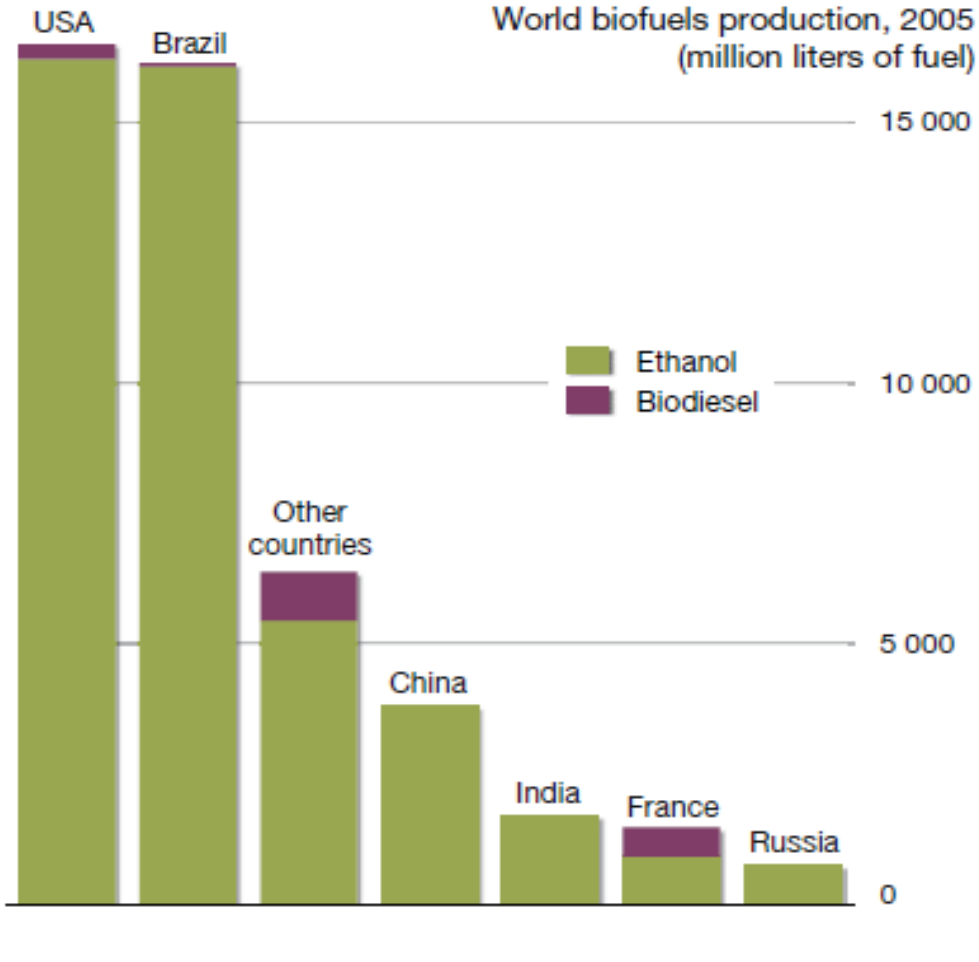
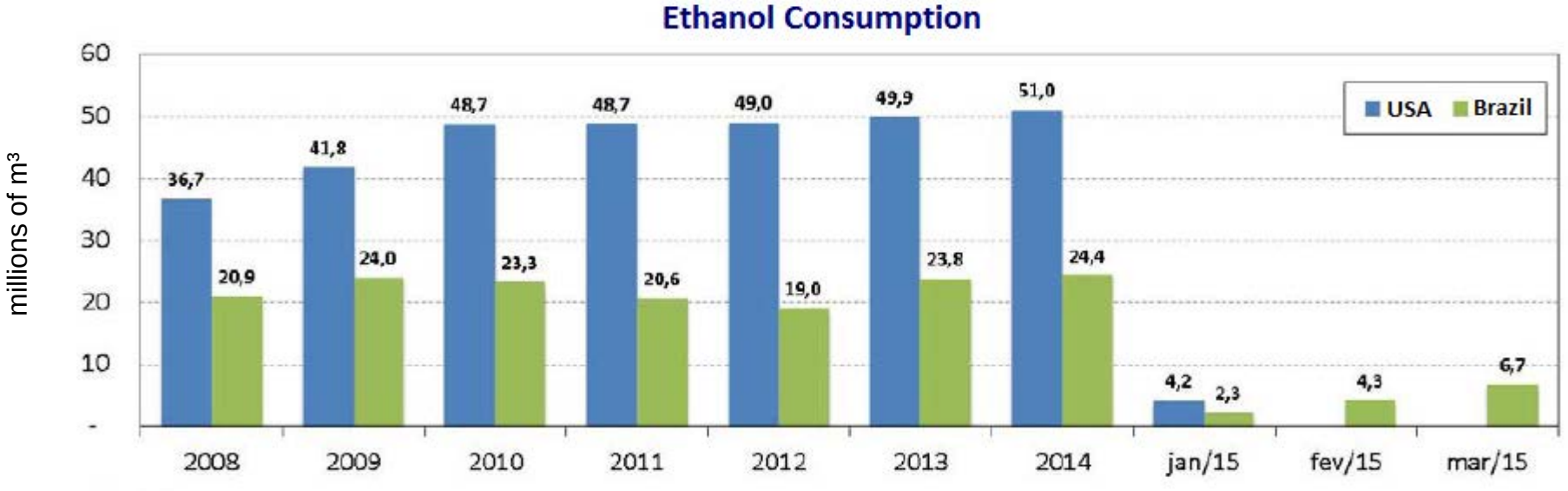
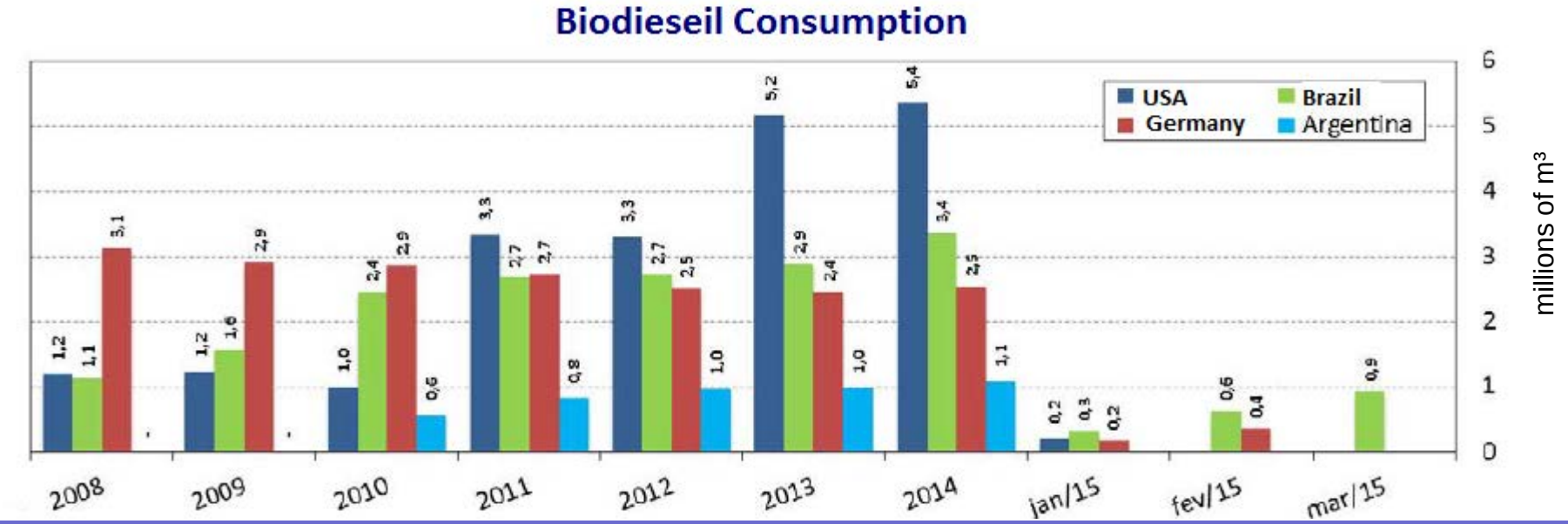


Figure 15: United States and Brazil are among the greatest producers of biofuels today. (Source: Earth Policy Institute, 2006).

Liquid biofuels in the world

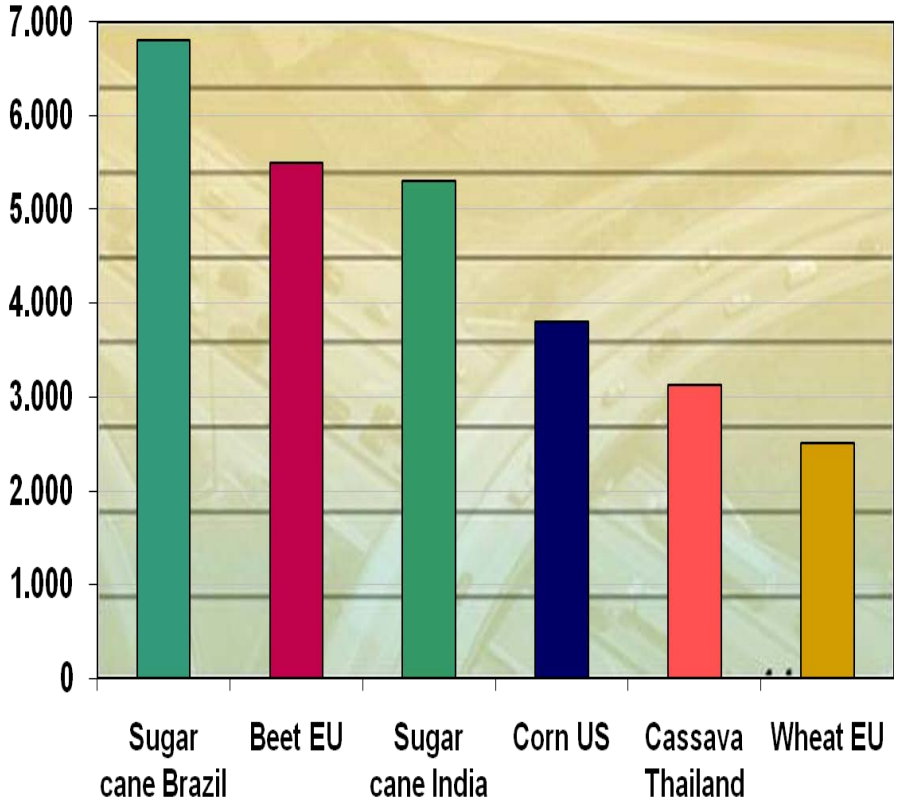




Source: ANP, IEA/DOE, MAPA, UFOP, INDEC

Bioethanol productivity and energy balance

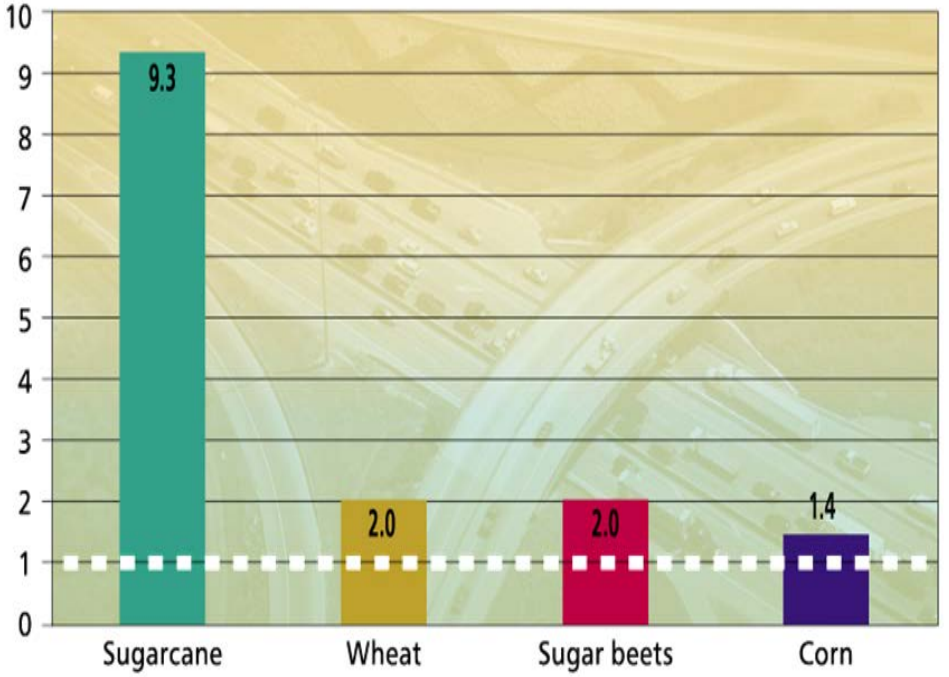
Bioethanol yields (liters per hectare)



Source: IEA, 2005

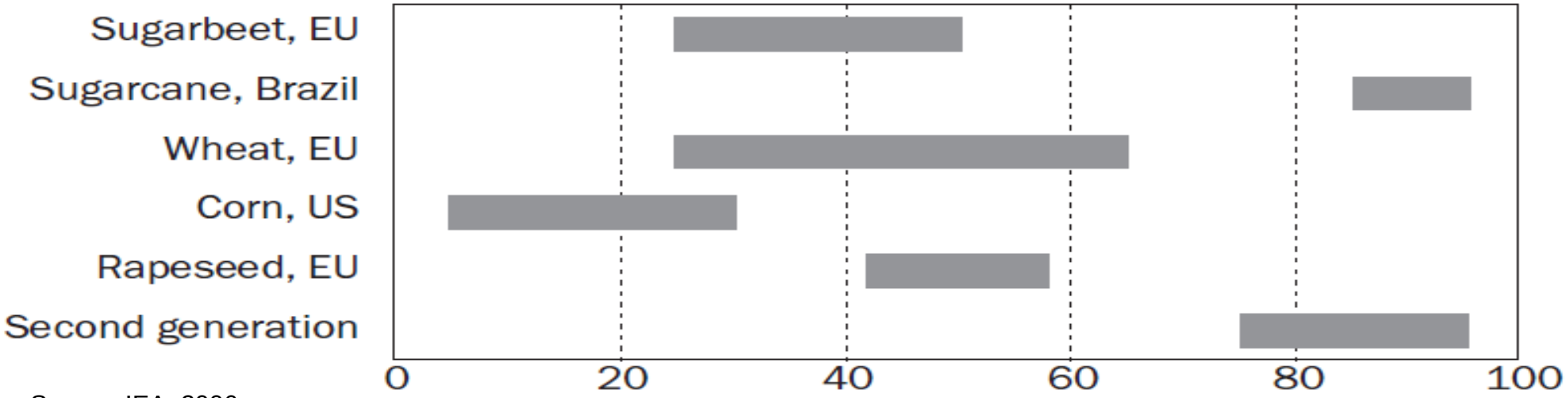
Energy Balance

Data represent the amount of energy contained in ethanol per unit of fossil fuel input.

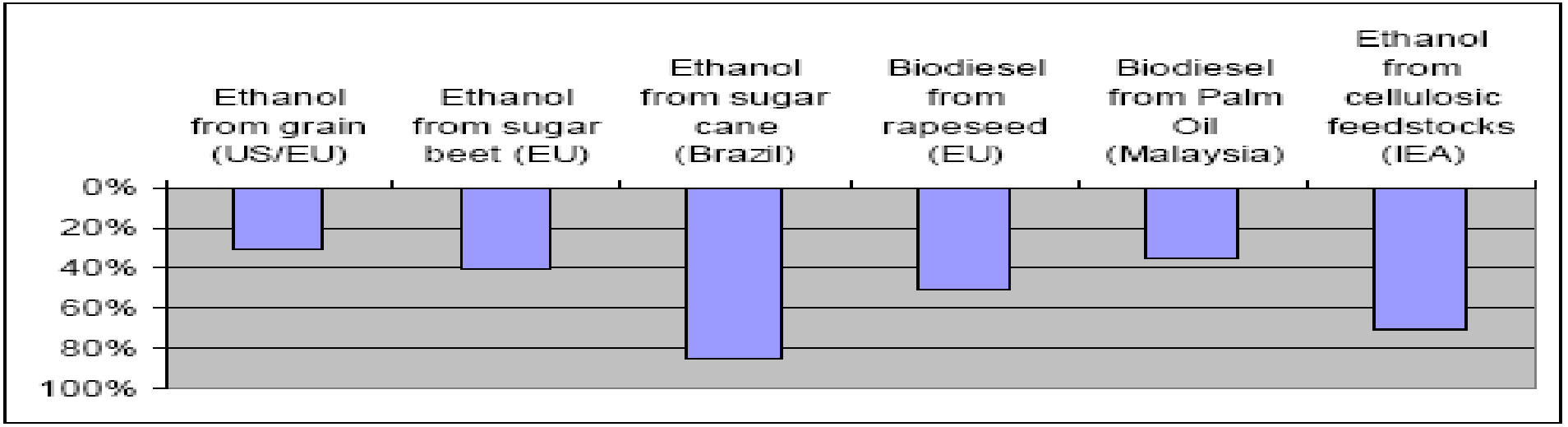


Note: *estimated data*
Source: *World Watch Institute (2006) and Macedo et al (2008).*
Data compiled *by Icone and Unica*

Biofuels GHG emission reduction

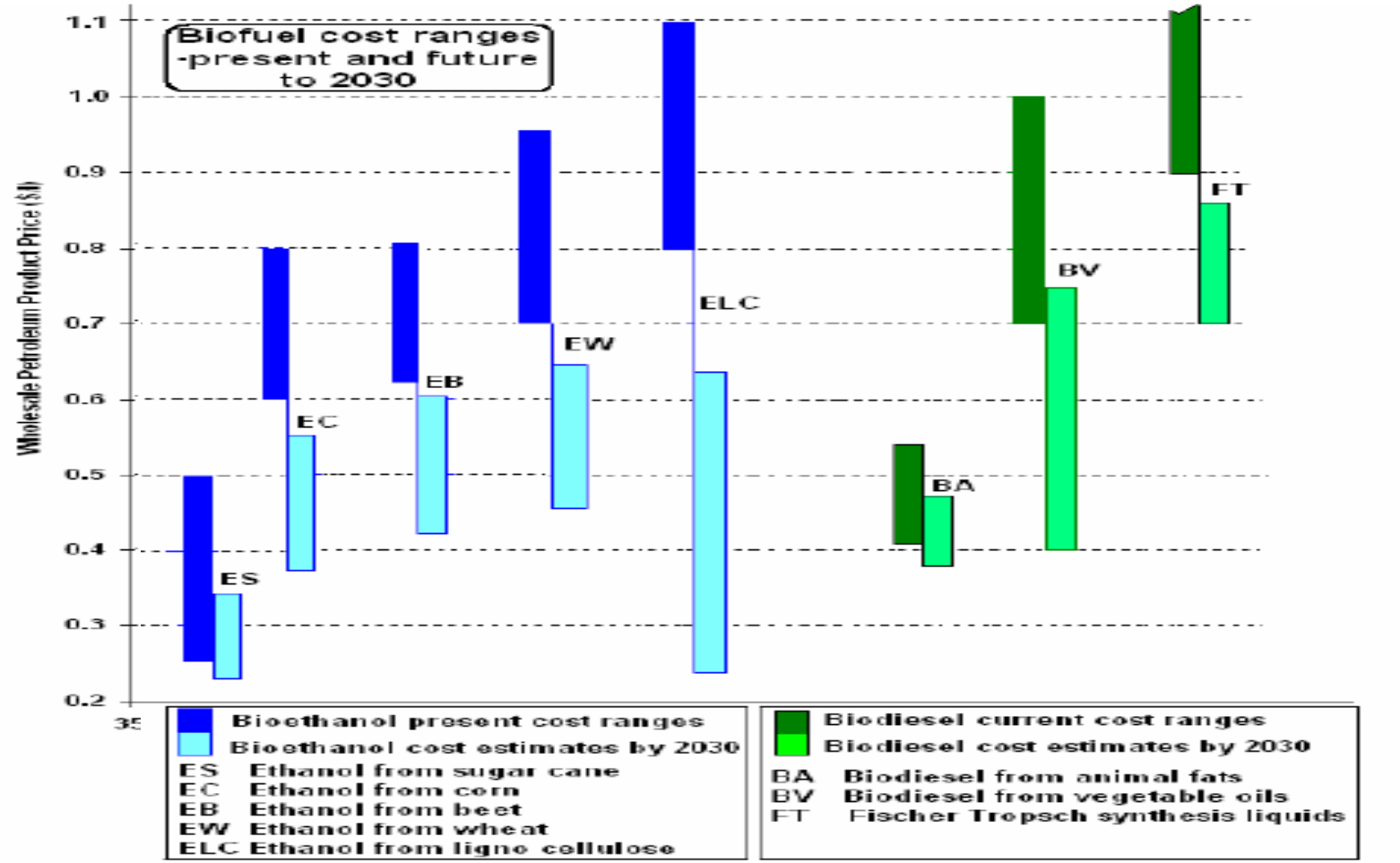


Source: IEA, 2006



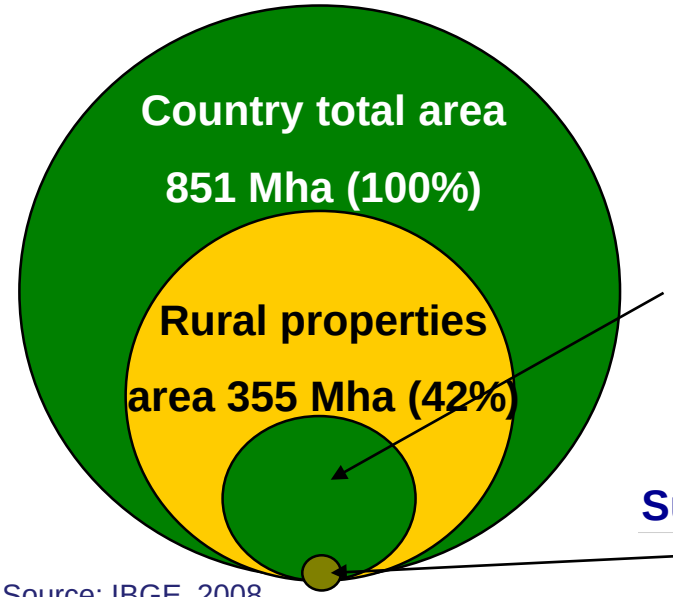
Source: Doornbosch and Steenblik, OECD 2007

Cost perspective of biofuel technology

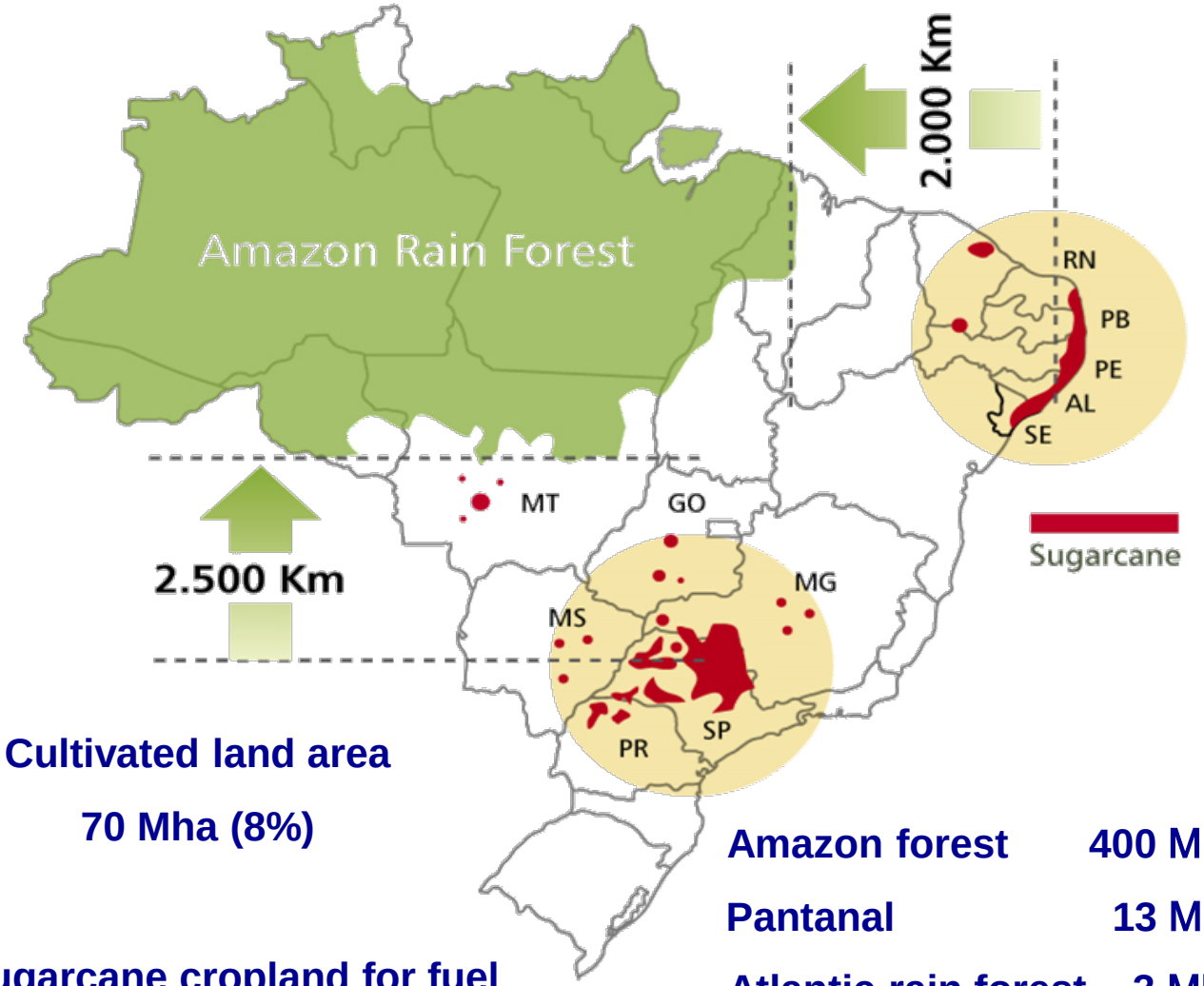


Sugarcane land use in Brazil

Farming (2007)	Area (Mha)
Soya	23
Corn	12
Sugar cane	7
Agriculture	70
Cattle	180



Source: IBGE, 2008



Cultivated land area

70 Mha (8%)

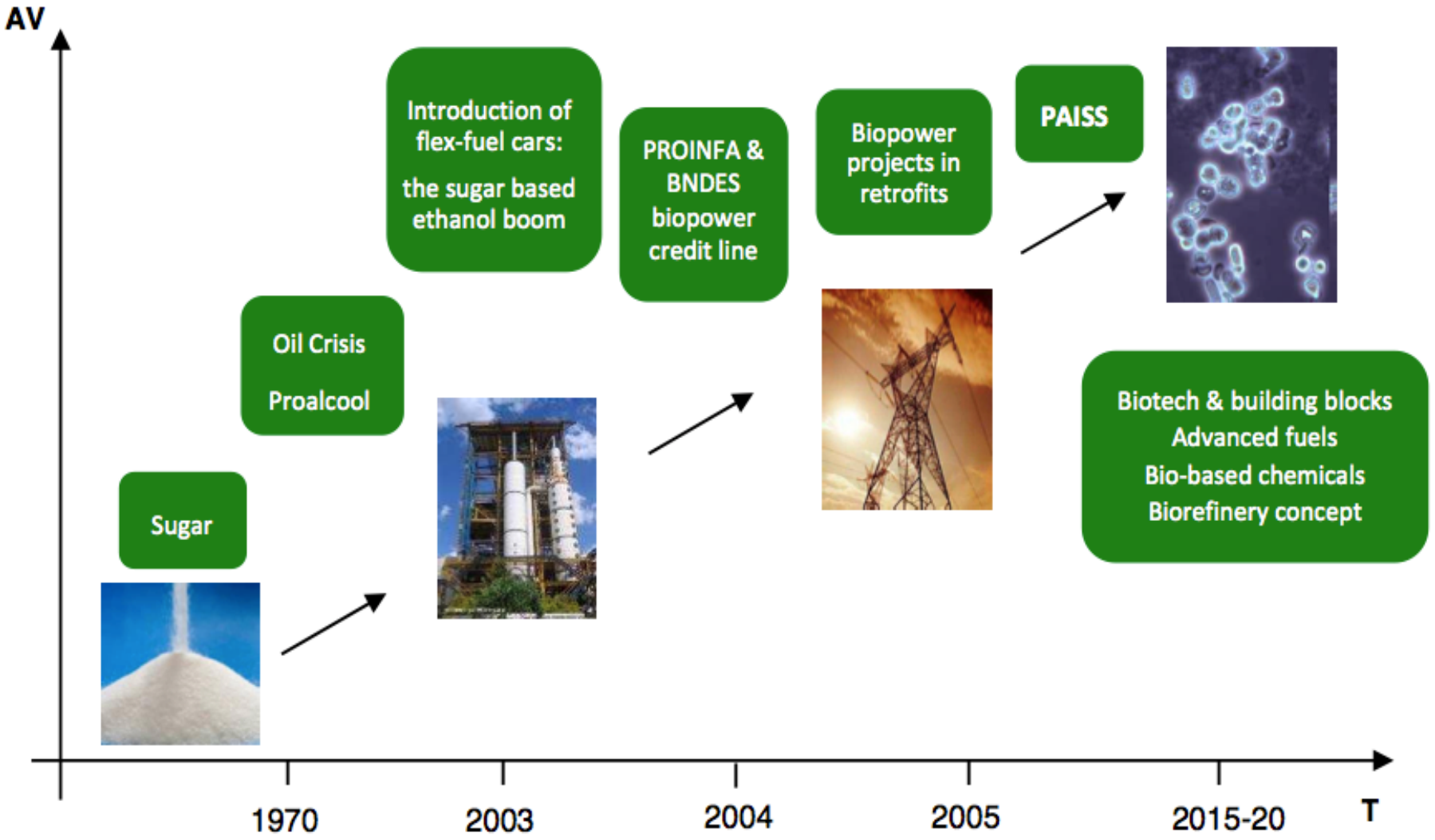
Sugarcane cropland for fuel

3,5 Mha (0.5%)

Amazon forest	400 Mha
Pantanal	13 Mha
Atlantic rain forest	3 Mha

Sources: CGEE - NIPE-Unicamp, IBGE and CTC

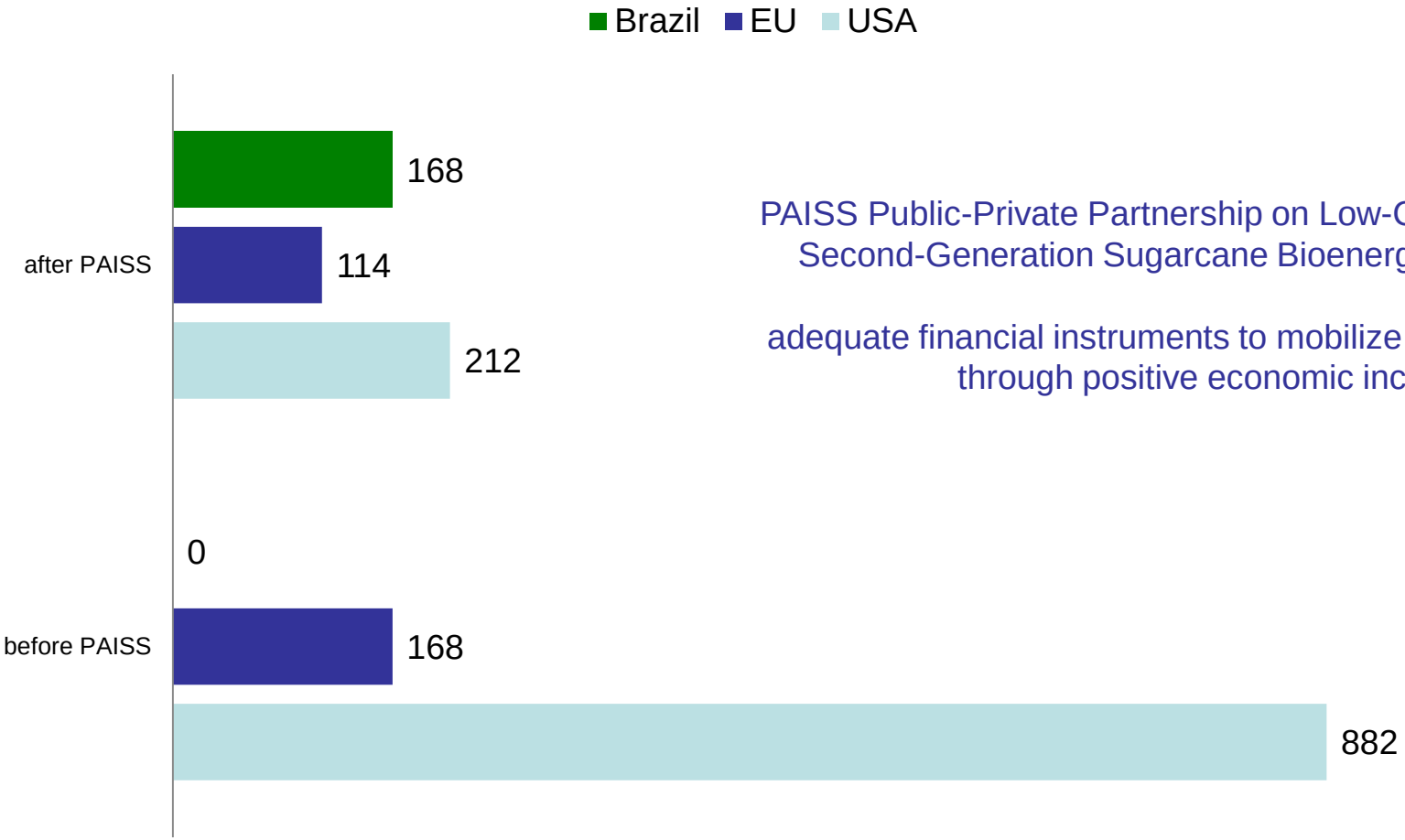
Sugarcane bioindustry



Source: BNDES

Cellulosic ethanol

Production projection for the year 2015 (millions liters)



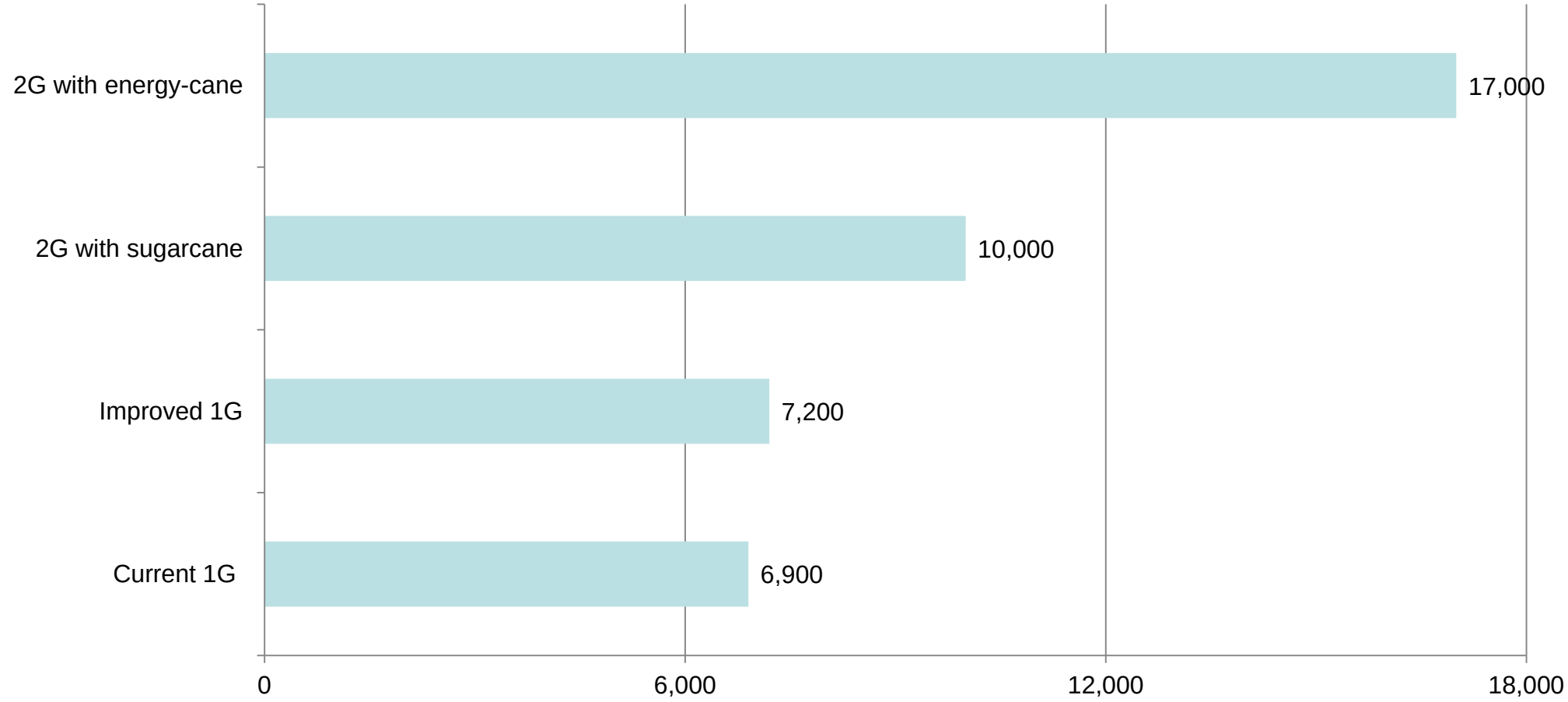
PAISS Public-Private Partnership on Low-Carbon Technologies
Second-Generation Sugarcane Bioenergy & Biochemicals

adequate financial instruments to mobilize private investments
through positive economic incentives

Adapted from.: AEO/EIA 2014, BNDES 2013

Bioethanol yields

Technological scenarios of first and second generation – litters/hectare



Source: CGEE, BNDES

Building Brazilian INDCs

- Consultation to the Brazilian society, conduced by the Ministry of International Relations
- Civil society and economic sectors feedback and views during the preparation of INDCs, in order to extend transparency
- Referring to National Climate Change Plan and the more recent Adaptation Plan
- Contributions from technical domestic initiatives, such as:
  - Economic and Social Implications of GHG Mitigation Scenarios 2030/2050 - IES-Brazil – Brazilian Climate Change Forum (FBMC)
  - Mitigation GHG Emissions Options in Brazil Key Sectors – Ministry of Science Technology and Innovation (MCTI)

General assumptions

- Have sustainable development as a pillar
- Be consistent with the principles and provisions of the UNFCCC, including differentiation between developed and developing countries
- Take into account the 5th IPCC Assessment Report, including its mitigation scenarios
- Consider updated data of national emissions and removals of greenhouse gases (GHG) and already made efforts in the last years
- Ponder industry analysis to consider the cost-effectiveness of combating climate change actions
- Allow for the capacity to implement these actions in the context of a new agreement or protocol
- Consider that the risks associated to severe climate change impacts outweigh risks associated to implement mitigation actions and that relative costs to additional mitigation tend to get higher in the long term

Means of implementation

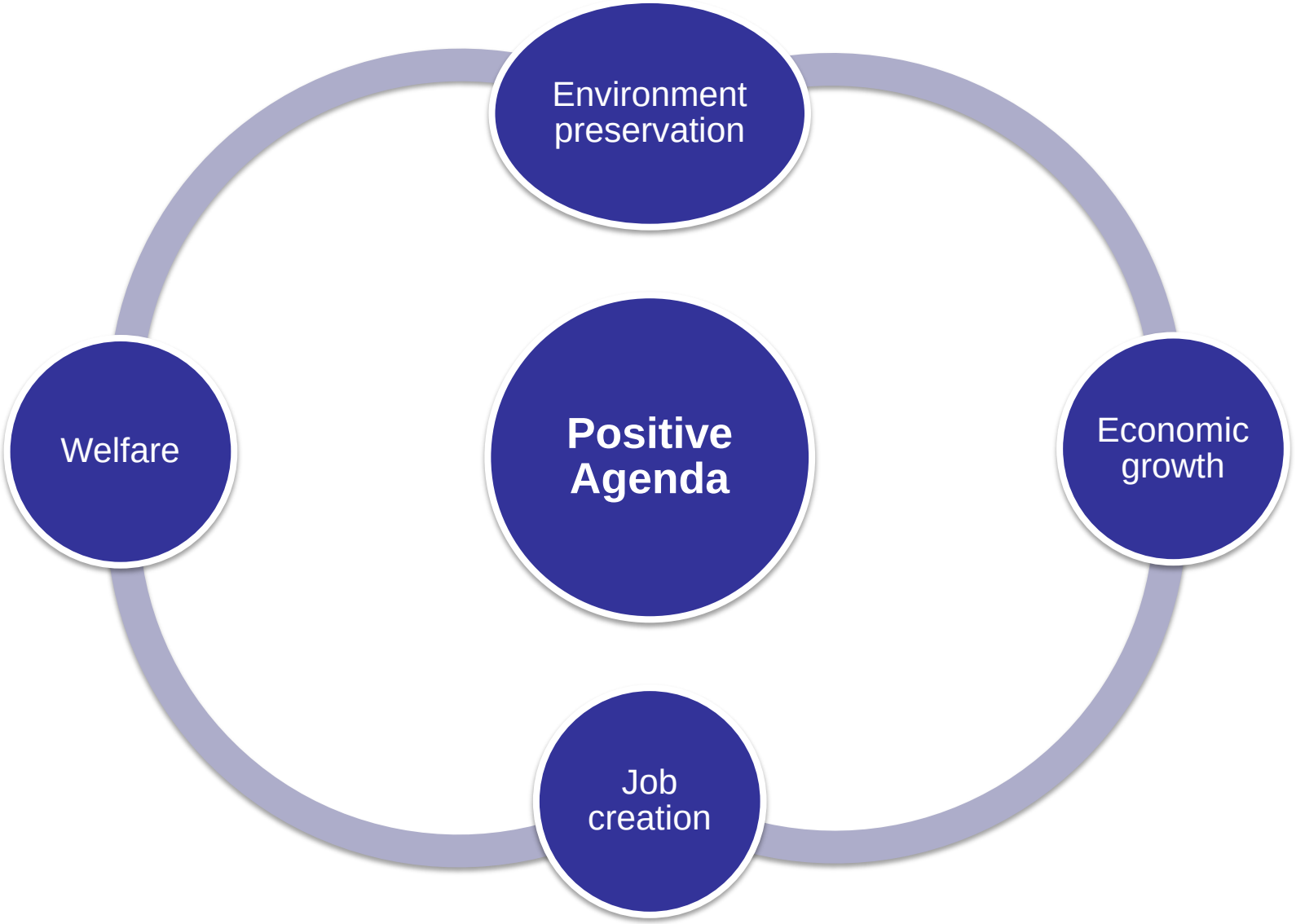
- International support to reach Country's full implementation potential
- Partly implemented with own resources, without refrain international encouragement or the use of mechanisms under the Convention for economic valuation of mitigation actions implemented by the Country
- Identify and promote good practices and foment international cooperation with other developing countries within priority areas, based in the implementation of the National Climate Change Plan and the Adaptation Plan

Enhanced climate action

Views on accelerating the implementation

- The recognition of the social and economic value of mitigation activities could create positive incentives for accelerating the implementation of enhanced climate action
- Instruments to recognize the results of early and additional action undertaken by Parties and to translate them into units of convertible financial value should be developed
  - Early action could include pre-2020 activities that present quantified emissions reduction that have been undertaken voluntarily by Parties, with verified results
  - Additional action could include post-2020 activities that exceed the achievement of Nationally Determined Contributions (NDC) that Parties will commit to under the 2015 agreement
- Multilateral recognition of the social and economic value of early and additional carbon mitigation activities would greatly contribute to closing the ambition gap before 2020 and to supporting further ambition by Parties in the post-2020 period
- The agreement may achieve this objective through a continuous process of presentation and update of NDC over time, with a view to enhance ambition in a sustained and balanced manner, in all pillars of the Convention

Low carbon transition



Thank you!

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