Developing countries' abatement and sequestration policies and their implications for pricing carbon: status in Brazil

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1 – INTRODUCTION: Brazilian status in emissions and sequestration

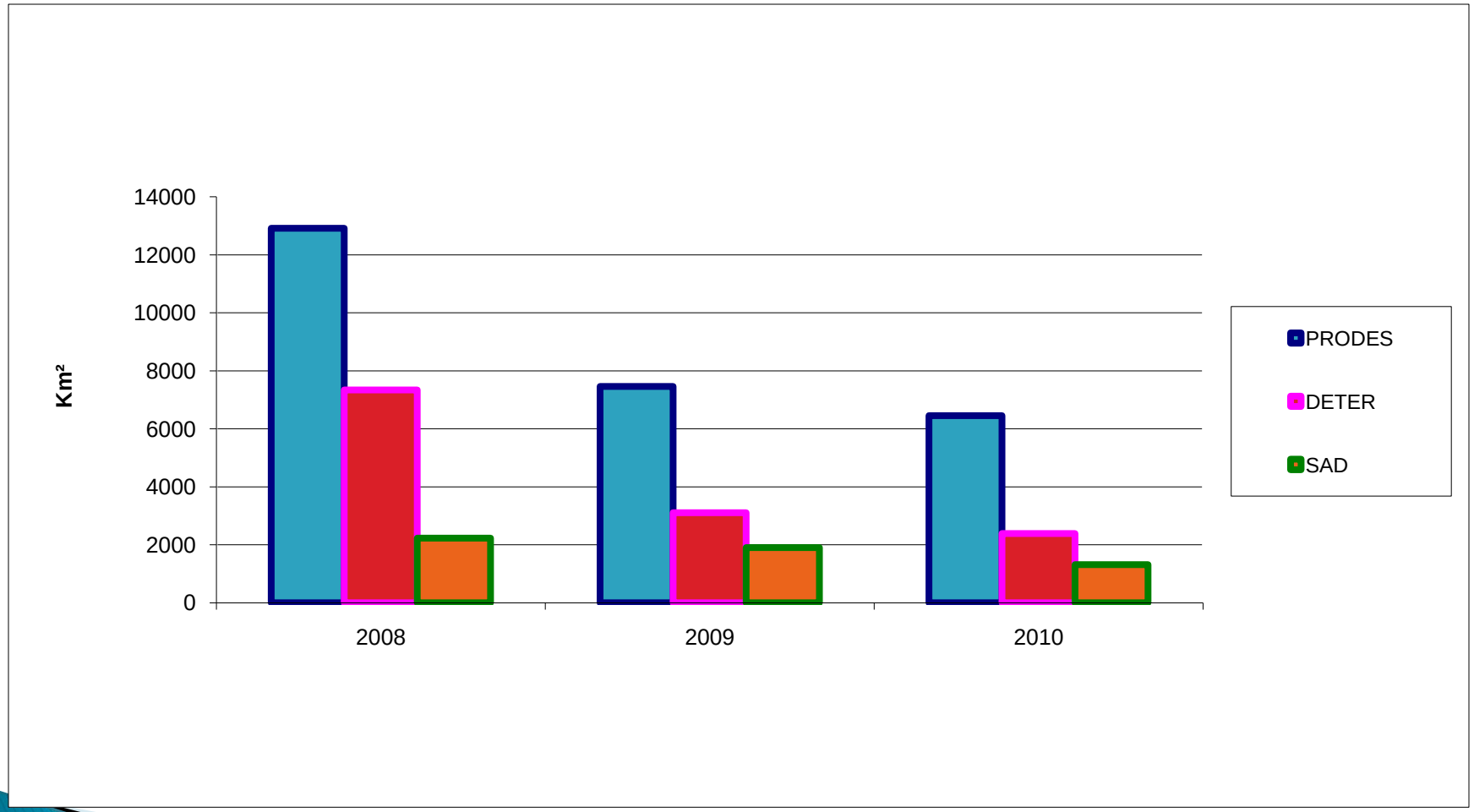
- Brazil: energy supply (hydro and biomass) and consumption – renewable energy sources have significant share
  - 85% energy produced in Brazil is hydroelectric and about 30% of gross domestic consumption of energy derive from biomass
  - Using a factor 0.70 (to compare efficiency with gasoline), ethanol contribution to avoid CO_2 emissions was estimated in 13 million tons/year since 1990 (MME/MCT, 2008)

- However deforestation and livestock production have a big contribution to emissions (2nd National Inventory of GHG emissions)
  - Brazilian emissions increased about 60% between 1990 and 2005 (when it reached 2,192 gigatons of CO_2e)
  - Land use change and forests: about 61% of total emissions

2. Brazilian policies for climate change: mitigation and adaptation

- In the 70's: PROALCOOL
- **2000:** National Program of Forests
- **2004:** Plan of Action to Prevent and Control Deforastation in Amazon Legal Region
- **2004:** National Program to Biodiesel Production and Use
- **2004:** PROINFA (Estimates of **2.8 million tCO_{2e}/year** by implementing this program)
- **2007**: In November , creation of the Interministerial Committee on Climate Change (CIM) and its Executive Group **2009:** Federal Law nº12.187/2009: institutes the National Policy on Climate Change (PNMC)
  - Tax and credit policies; adaptation and mitigation measures are being included as a preferential choice criteria in public purchases and processes
- **2010:** Program ABC

2.1. Reduction of emissions from deforastation in Brazilian Amazon: Deforestation in Legal Amazon region (in Km²)



Source: INPE and Imazon, 2011

2.2. Program Agriculture of Low Carbon Emissions (ABC)

- Launched in June 2010
- Goal: to produce both food and energy, and at the same time, reduce GHG emissions
- Especific agriculture tools promoted:
  a) Integration crop-livestock-forest and Agriculture-Forest Systems (SAF)
  b) No-tillage production
  c) Pasture land recovery
  d) Biological Nitrogen Fixation
  e) Cultivated Forests
  f) Treatment of animal waste

Targets of ABC Federal Program: to be achieved by agriculture sector in 10 years

Tecnique	GHG emissions reduction (Million tons CO_{2e})	Current area applied (million ha)	Target Area (million ha) or additional area*
No-tillage	16 to 20	25	33
Crop-Livestock-Forest integrated system	18 to 22		4*
Forest production	8 to 10	6	9
Pastures land recovery	83 to 104		15*
Nitrogen biological fixation		11	16.5

Mitigation opportunities to Brazil according to Margullis e Dubeux (2010)

- **Deforastation**: an average price for carbon credits in Amazon around US$ 3/ton or US$450/ha could decrease livestock activities by 70% to 80%. Carbon prices around US$ 50/t could reduce in 95% the deforestation.

- **Biofuels**: Switching from fossil fuels to biofuels could avoid 92 million to 203 million tons of CO_{2e} domestic emissions in 2035. Ethanol exports could add more 187 to 362 million tons of avoided emissions (according to performance and importing countries)

- **Carbon taxes**: a study estimated that a tax of US$30 to US$ 50/ton of carbon could reduce national emissions by 1.16% to 1.87%, although could reduce GPD by 0.13% to 0.08%.

- **Energy sector**: considering the National Energy Plan to 2030, the estimated potential to reduce emissions is 1.8 billion tons of carbon equivalent accumulated from 2010 to 2030.

3.1. Regulated markets: Clean Development Mechanism (CDL) – Brazilian participation

- From a total of **7742 projects** (validated, approved or registered): 499 projects are in Brazil (31 June, 2011)

- **Brazil:** 3rd in the world ranking in number of projects and CO_{2e} sequestered (China 1st; India 2nd)
  - More than 52% of projects on the energy sector

- Therefore, 67% of projects are CO_2 sink, followed by 32% for methane (CH_4) and 1% of nitrous oxide (N_2O).

Brazilian carbon projects in validation presented by sector. June 2011

Projects in validation	Number of projects	Number of projects (%)	Emissions reduction in the 1st period of credits
Renewable Energy	261	52.3%	157,315,462
Landfills	38	7.6%	91,071,614
Reduction of N_2O	5	1.0%	44,617,272
Pig farming	77	15.4%	39,435,666
Replacement of fossil fuel use	46	9.2%	27,958,720
Energetic Efficiency	30	6.0%	20,928,010
Reforestation	3	0.6%	13,132,369
Industrial processing	14	2.8%	7,449,083
Residues	21	4.2%	5,616,091
Fugitive emissions	4	0.8%	5,721,011
Total	499	100%	413,245,298

Source: MCT (2011)

3.2. Voluntary Markets – Recent regional and global performance (Hamilton et al, 2010)

- The voluntary carbon markets remain a small fraction (1% or about 93.7 $MtCO_{2e}$ transacted in 2009) of the regulated markets.

- Methane destruction projects captured 41% of Over-the-Counter (OTC) market transactions, followed by forestry projects (24%), and renewable energy (17%).

- **2009**: growth in the importance of Latin America as a regional player, particularly in the forest carbon projects.
  - LA countries: accounted for 16% of carbon credits transacted (80% from forest carbon projects and 14% from energy efficiency and fuel switching)

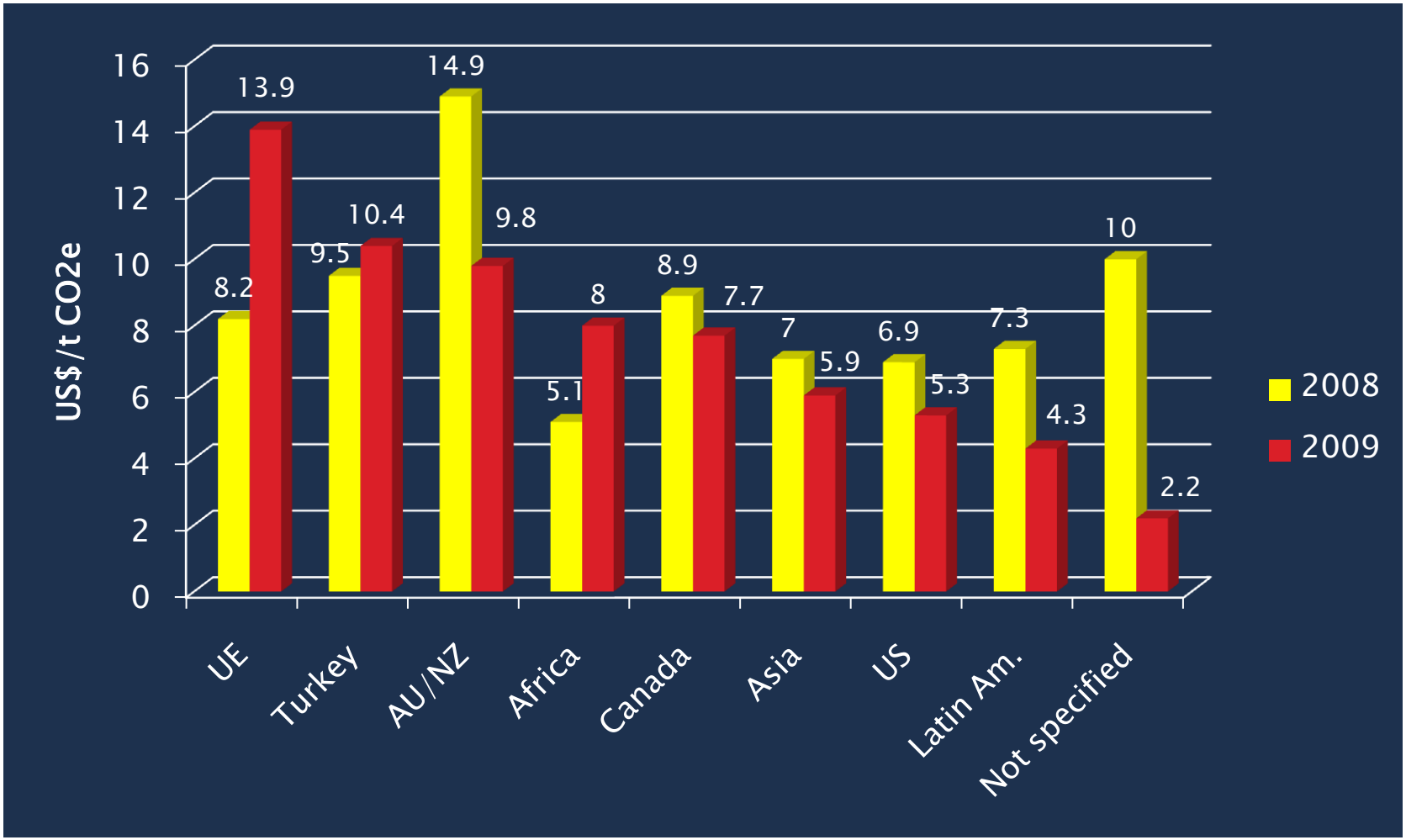
Carbon Prices

Prices for carbon transacted in voluntary and regulated markets vary drastically according to: nature of projects, volume of credits, standards, location of project and other benefits that buyers might have from specific projects

- **In 2009**: Credits were transacted for as low as $0.3/tCO2e and as much as $111.0/tCO2e in voluntary market (Hamilton et al, 2010). Average price (OTC) of $6.5/tCO2e .
- The 5 highest-earning project types on the market were predominantly **renewable energy activities (solar, biomass)**
- **The credits with lowest average prices originated from large hydropower projects ($1.7/tCO2e) and agricultural soil credits** ($1.2/tCO2e). **This is of particular interest to Brazil**
- Average price for micro projects: $ 16.6/tCO2e; large projects: $4.5/tCO2e
- Hamilton et al (2010): in 2009, the biggest loss in prices was seen in Latin America – prices dropped (41%) to an average of $4.3/tCO2e

This is explained by a number of large-scale forestry transactions

Average credit price by region, OTC 2008 and 2009 (US$/t CO_{2e})



Source: Ecosystem Marketplace, Bloomberg New Energy Finance, extracted from Hamilton et al (2010)

4 – A look into the future

- Brazilian government has been adopting command and control policies as well as incentives to promote more sustainable choices by both producers and consumers
- As Brazil is investing in other alternative energy sources (solar, eolic etc) it is possible that mitigation projects face better prices in the future
- For carbon projects: Voluntary markets seem to be more attractive in the short and medium term for Brazilian agents
- Sugarcane and byproducts are still a promising sector to invest in terms of energy and carbon emissions reductions

Some literature references

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