BRACELPA

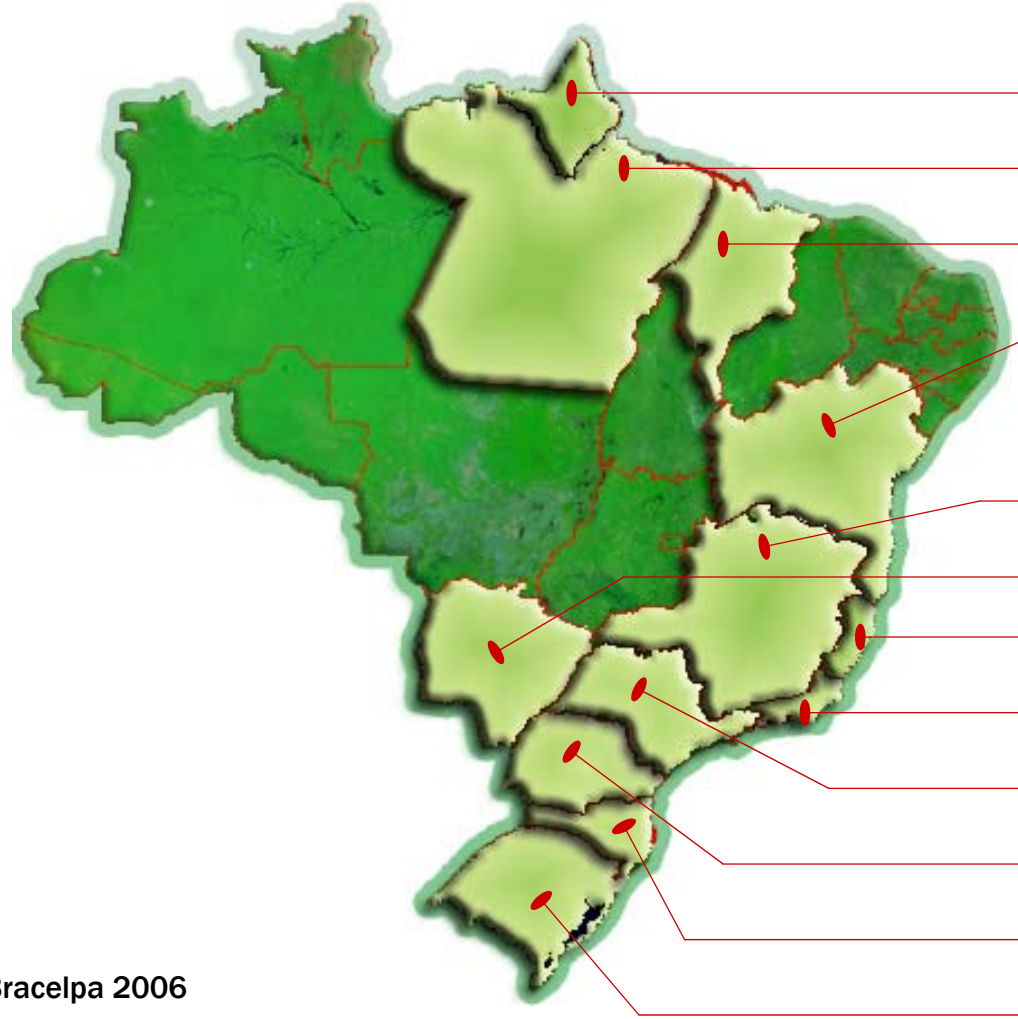
ASSOCIAÇÃO BRASILEIRA DE CELULOSE E PAPEL

Brazilian Pulp and Paper Planted Forests Carbon Sequestration

Elizabeth de Carvalhaes

August 2008

Planted Forests by the Pulp and Paper Industry
Brazilian States 1.7 million hectares



thousand hectares

78
46
4
340
176
90
130
1
383
225
110
94

Source: Bracelpa 2006

Brazilian Pulp and Paper Planted Forests and Carbon Sequestration

Eucalyptus

Total Reforest Area = 1,371,954 ha

Productivity = 41 m^3/ha. year

Density = 0.52 t/m^3

Carbon in Dry Wood = 50% of green wood

Factor (CO_2/C) = 3.67

1,371,954 ha	x	41 m^3/ha. year	=	56,250,114 m^3/ha. year
56,250,114 m^3/ha. year	x	0.52 t/m^3	=	29,250,059 t/ha. year
29,250,059 t/ha. year	x	50%	=	14,625,030 t C
14,625,030 t C	x	3.67	=	53,673,859 t CO_2 year

ABSORPTION = 54 million tons of CO_2 year

Brazilian Pulp and Paper Planted Forests and Carbon Sequestration

Pinus

Total Reforest Area = 342,989 ha

Productivity = 35 m^3/ha. year

Density = 0.42 t/m^3

Carbon in Dry Wood = 50% of green wood

Factor (CO_2/C) = 3.67

342,989 ha	x	35 m^3/ha. year	=	12,004,615 m^3/ha. year
12,004,615 m^3/ha. year	x	0.42 t/m^3	=	5,041,938 t/ha. year
5,041,938 t/ha. year	x	50%	=	2,520,969 t C
2,520,969 t C	x	3.67	=	9,251,957 t CO_2 year

ABSORPTION = 9 million tons of CO_2 year

Brazilian Pulp and Paper Planted Forests and Carbon Sequestration

1.7 Million hectares of Planted Forests

1 hectare (eucalyptus)

=

39 tons of CO_2 (absorbed) /per year

1 hectare (pinus)

=

27 tons of CO_2 (absorbed) /per year

TOTAL ABSORPTION

63 million tons of CO_2 year

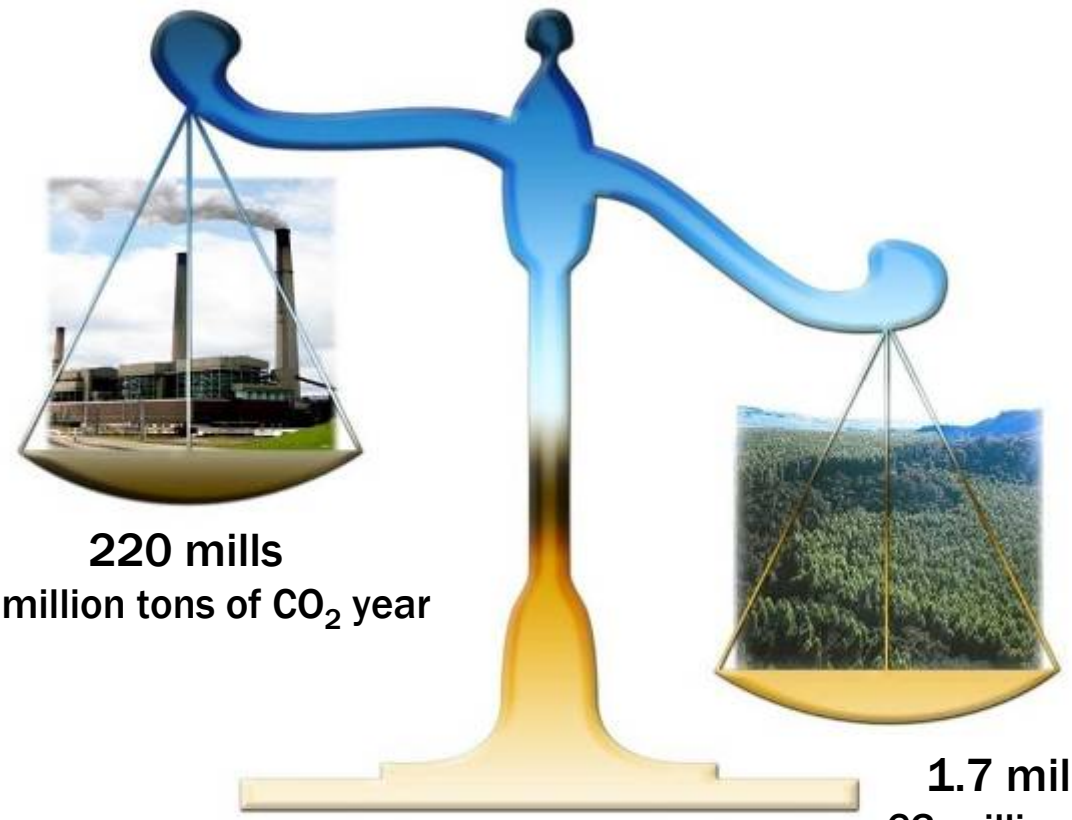
Brazilian CO_2 Emissions by Sector (Including Renewable)

1,000 tons/year	2000	Share	2005	Share	Change
Energy	-85,894	-31%	-125,843	-43%	47%
Residential	38,643	14%	42,527	15%	10%
Commercial	2,649	1%	2,425	1%	-8%
Public	2,101	1%	1,723	1%	-18%
Agriculture and Living Stock	19,533	7%	22,103	8%	13%
Transportation	125,585	45%	138,850	48%	11%
Industrial	170,405	61%	201,148	69%	18%
Pulp and Paper	**17,000**	**6%**	**21,048**	**7%**	**24%**
Non-Energetic Consumption	7,523	3%	7,114	2%	-5%
TOTAL	**280,545**	**100%**	**290,047**	**100%**	3%

Source: Ministry of Science and Technology 2007
Economy and Energy Magazine n° 62 – July 2007

Brazilian Pulp and Paper Industry Carbon Sequestration Balance

Emission 1 ton = Absorption 3 tons

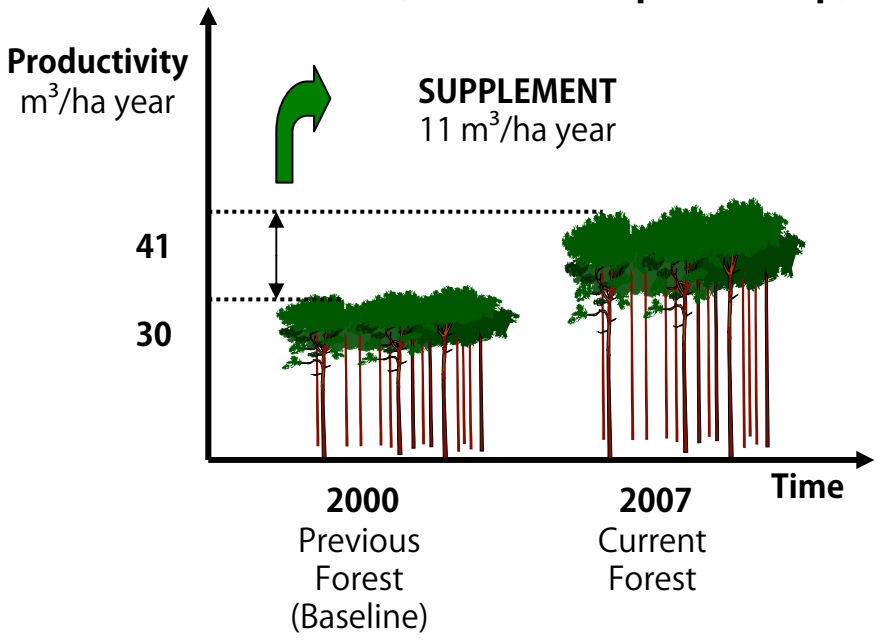


220 mills
21 million tons of CO_2 year

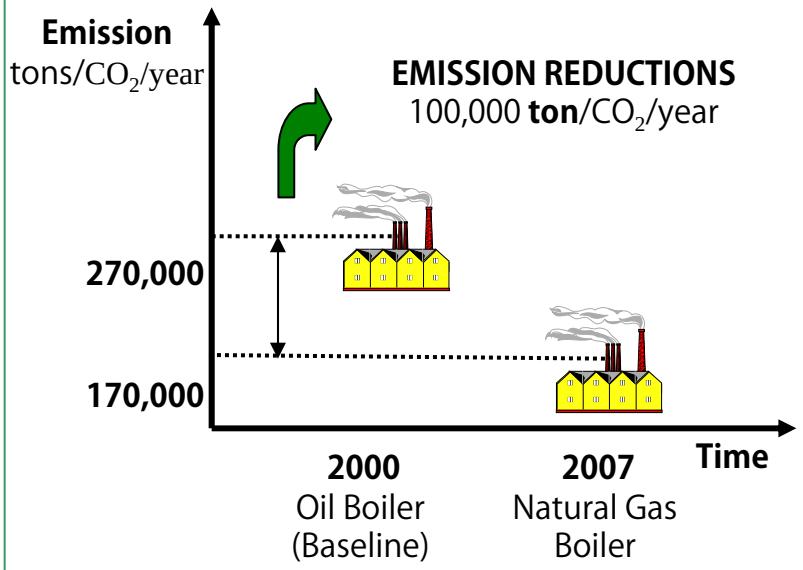
1.7 million hectares
63 million tons of CO_2 year

Carbon Market
(Certified Emission Reductions - CER)

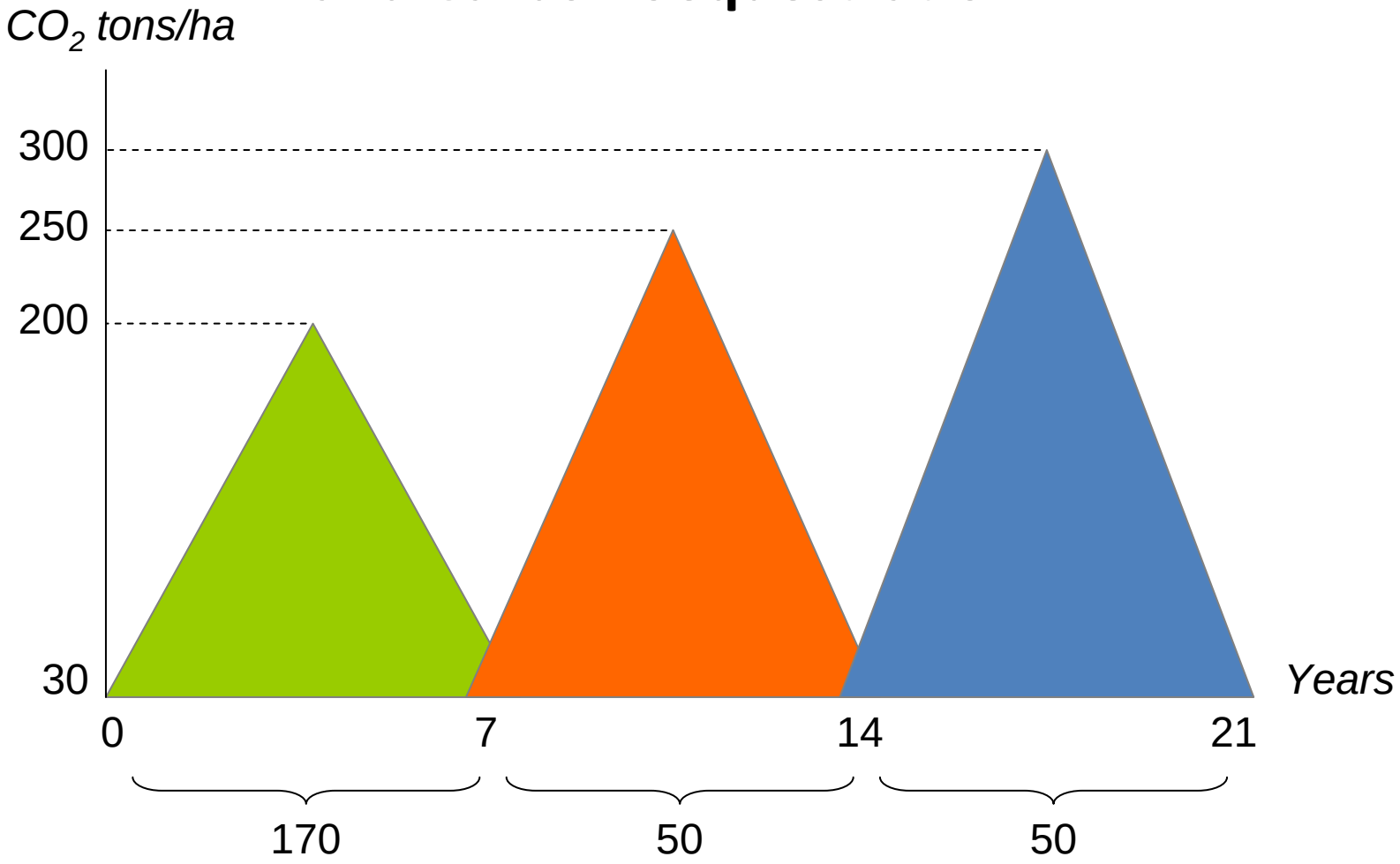
FOREST SITE → **Carbon Sequestration:** Productivity Increasing or New Planted Areas (own areas or partnership)



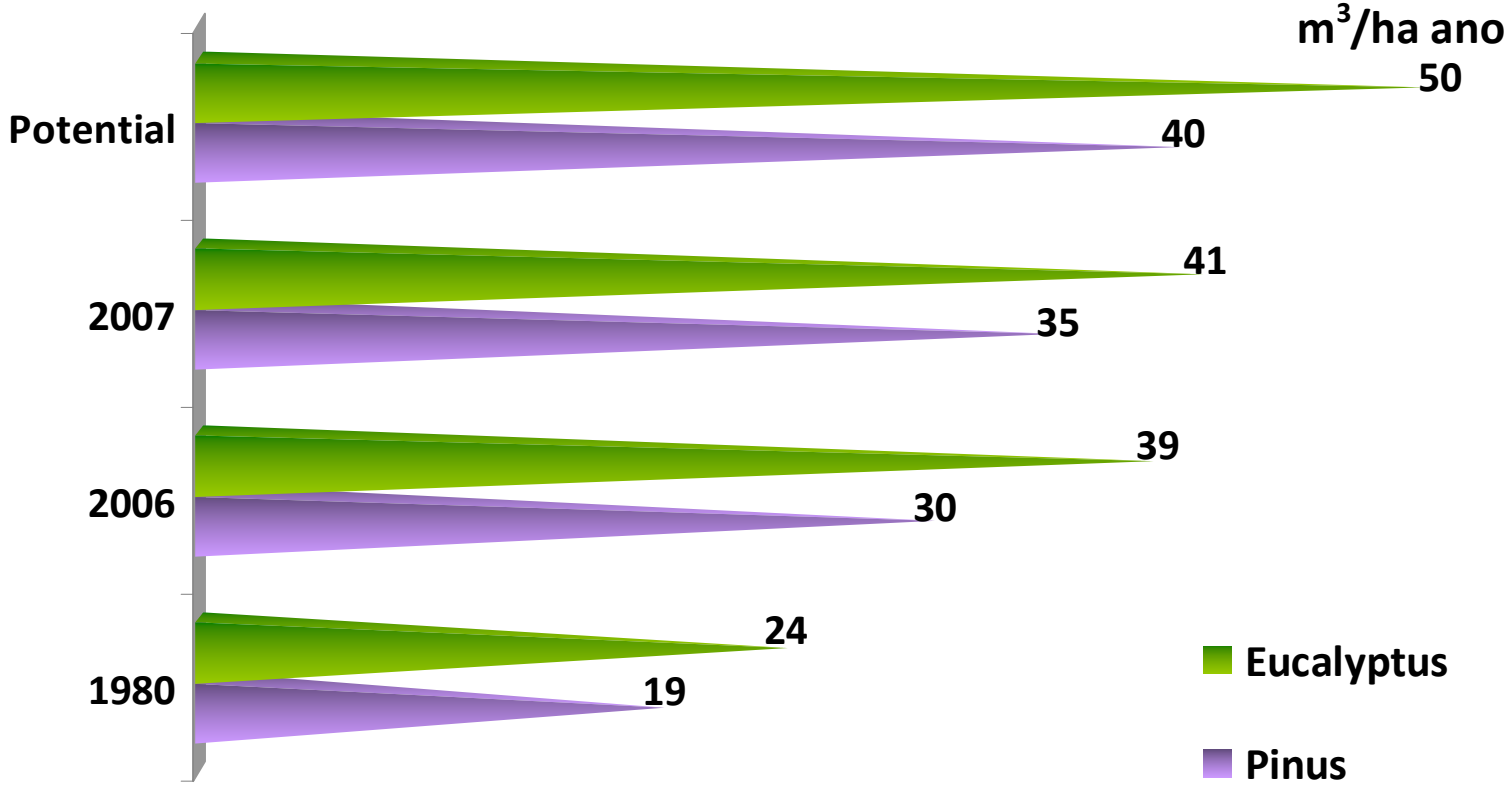
MILL SITE → **Emission Reductions:** Energy Substitution Projects



Brazilian Pulp and Paper Eucalyptus Planted Forests and Carbon Sequestration

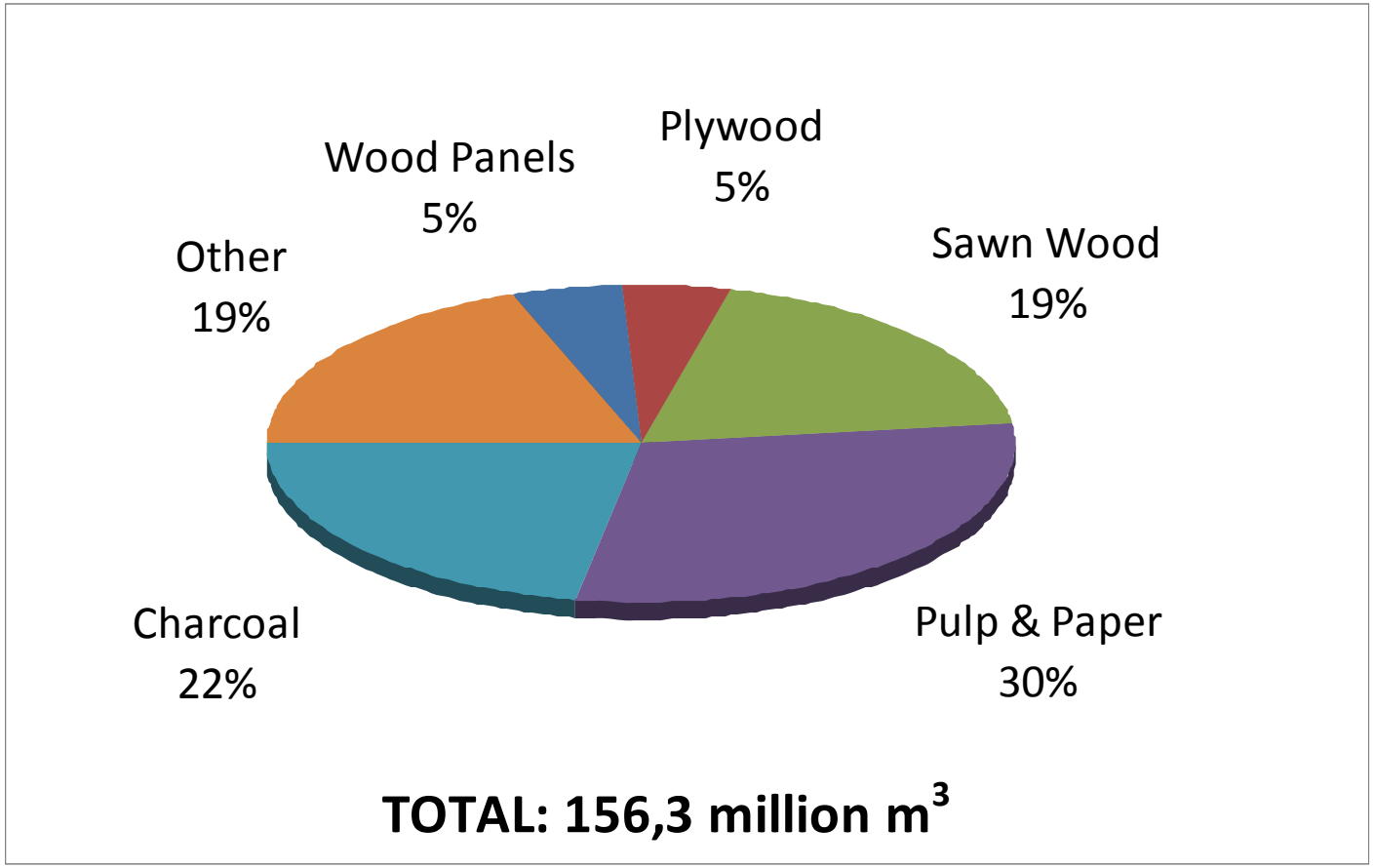


Brazilian Pulp and Paper Planted Forests Productivity Average



Source: Bracelpa

Brazilian Wood Consumption in 2007



Source: ABRAF

Pulp and Paper Industry
Main Investments - Brazil

2007
Completed

	Location	Product	US$ Million
Aracruz	ES	Market Pulp	200
Bahia Pulp	BA	Dissolving Pulp	400
Suzano	BA	Market Pulp	1,350
Klabin	PR	Paperboard	1,090
Total			**3,040**

2008 - 2009
Ongoing

	Location	Product	US$ Million
VCP	MS	Market Pulp	1,500
International Paper	MS	Printing and Writing Paper	260
Total			**1,760**

2010 - 2012
Planned Investments

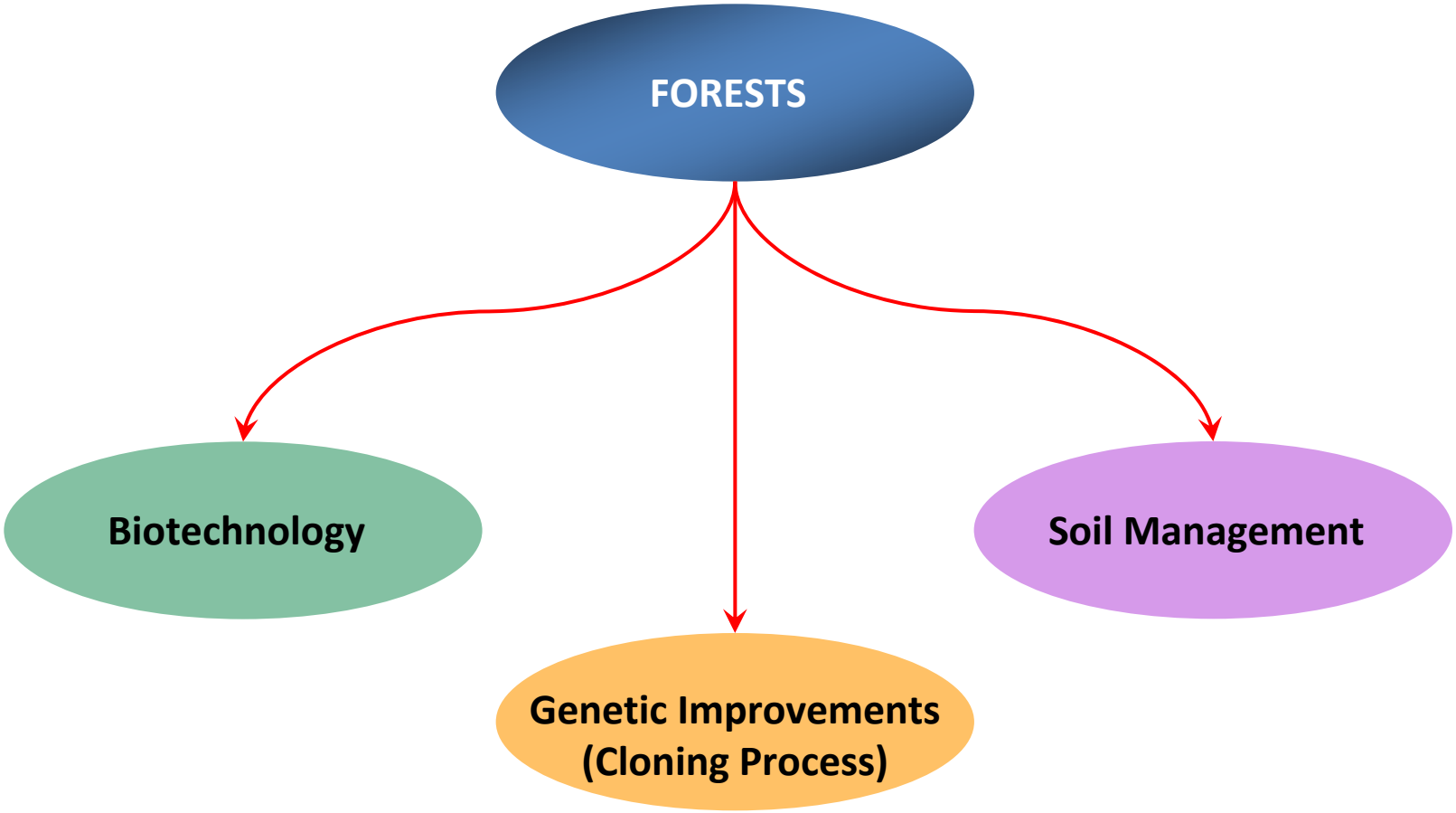
	Location	Product	US$ Million
Aracruz (*)	RS	Market Pulp	1,800
Veracel	BA	Market Pulp	1,500
VCP	RS	Market Pulp	1,500
Cenibra	MG	Market Pulp	680
Stora Enso	RS	Market Pulp	1,500
Total			**6,980**

(*) Approved Project. Start up in August/2010.

Pulp and Paper Investment Program
2003 - 2012

	Original Program			Finished	Revised Program		
	2003	Forecast 2012	Change 2012/2003	2003 - 2007	Planned Investments 2008 - 2012	Forecast 2003 - 2012	Change 2012/2003
Investments (US$ billion)		14.4		6.5	8.7	15.2	
Production (Million tons)							
- Pulp	9.1	14.5	**59%**	11.9		17.5	**92%**
- Paper	7.9	11.5	**46%**	9.0		11.5	**46%**
Exports (Million tons)							
- Pulp	4.5	7.4	**64%**	6.6		10.5	**133%**
- Paper	1.8	2.0	**11%**	2.0		2.0	**11%**
Exports (US$ billion)							
- Pulp/Paper	2.8	4.3	**54%**	4.7		7.5	**168%**

Brazilian Goals



Non Kyoto Compliance CO_2 Market
Chicago Climate Exchange - CCX

- First and North America's only active voluntary
- North American Companies Initiative (2000)
- Negotiation Aspects – VOLUNTARY
  - Carbon Financial Instrument (CFI)
  - 1 CFI = 100 ton CO_2e
- 2nd Largest Carbon Chamber
  - 2007 Carbon Credit Negotiated: 3.6 million tons of CO_2e
  - Carbon Credit Price: US$ 5.75/ton CO_2 (Feb, 2008)
  - Chamber Portfolio: 410 million tons (12% of American Emissions)
  - 330 members
- Main Carbon Credit Projects
  - Agricultural Methane, Coal Mine Methane, Landfill Methane
  - Agricultural Soil Carbon
  - Rangeland Soil Carbon Management
  - Forestry - Planted Forests **are** Eligible
  - Renewable Energy
  - Ozone Depleting Substance Destruction

Kyoto Compliance CO_2 Market
European Union Emission Trade Scheme

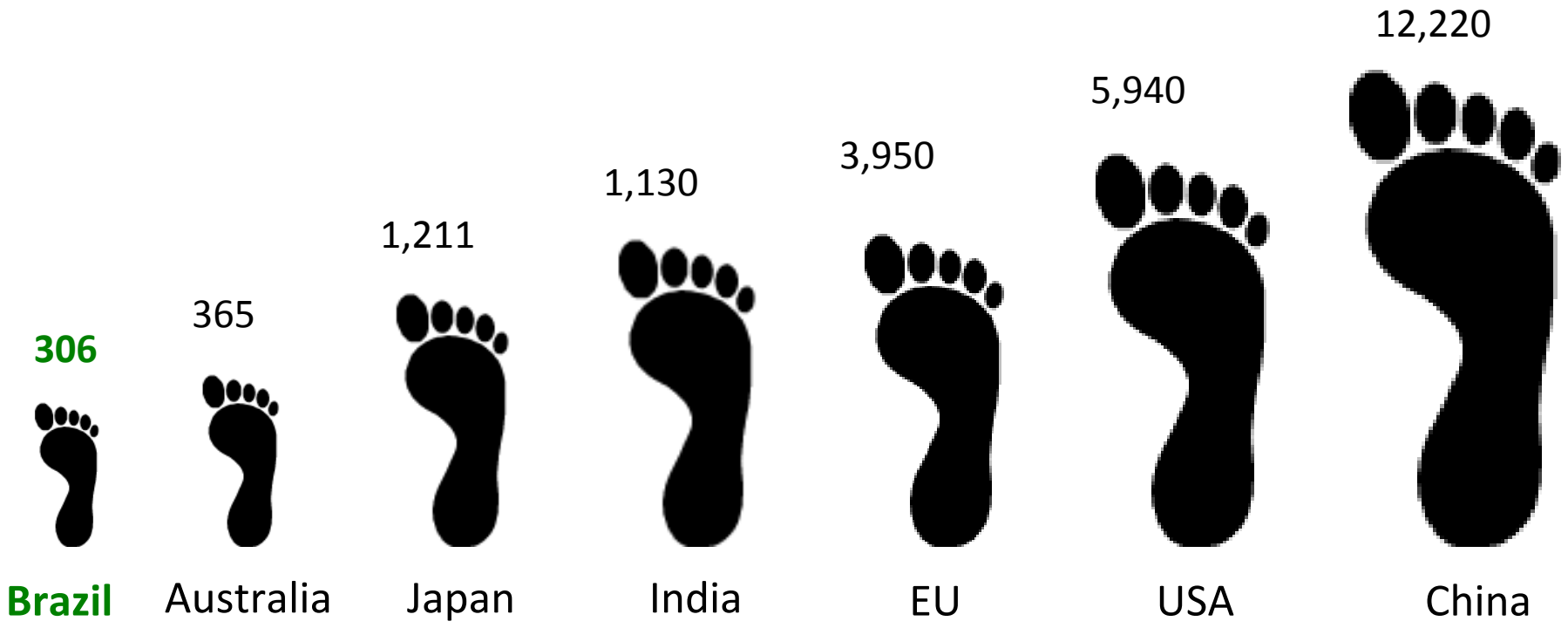
- European Market Focused
- Based on Kyoto Protocol
- Negotiation Aspects - MANDATORY
  - Emission Reduction Units (ERU)
  - Certified Emission Reduction Units (CER)
  - Emission Reduction Goals until 2012: 8% (Baseline – 1990)
  - Carbon Emitted Fees: € 100/ton CO_2
- World's Largest Carbon Chamber
  - Daily Volume Negotiated: 1 million ton CO_2
  - Carbon Credit Price: € 20/ton CO_2
- Carbon Credit Projects
  - JI (Join Implementation) – Renewable Energy Utilization
  - CDM (Clean Development Mechanism) – New Planted Forests **must be** Eligible

Brazilian Legislation

- Legislative Decree N° 144/2002.
  - Approved the text of the Kyoto Protocol to the United Nations Framework Convention on Climate Change.
- Resolution N° 1 of the Interministerial Committee for Global Climate Change.
  - Regulates the assessment and approval of project activities under the CDM – Clean Development Mechanism.
- Law Project N° 3535/2008, sets up the National Climate Change Policy.
  - The text and the content will be discussed at the Brazilian Congress.
  - The objectives are to update national inventories of anthropogenic emissions, to stimulate CDM activities and to create measures of adaptation and mitigation of the GHG – Greenhouse Gases.

The Carbon Footprint of People Across the World Differ Widely

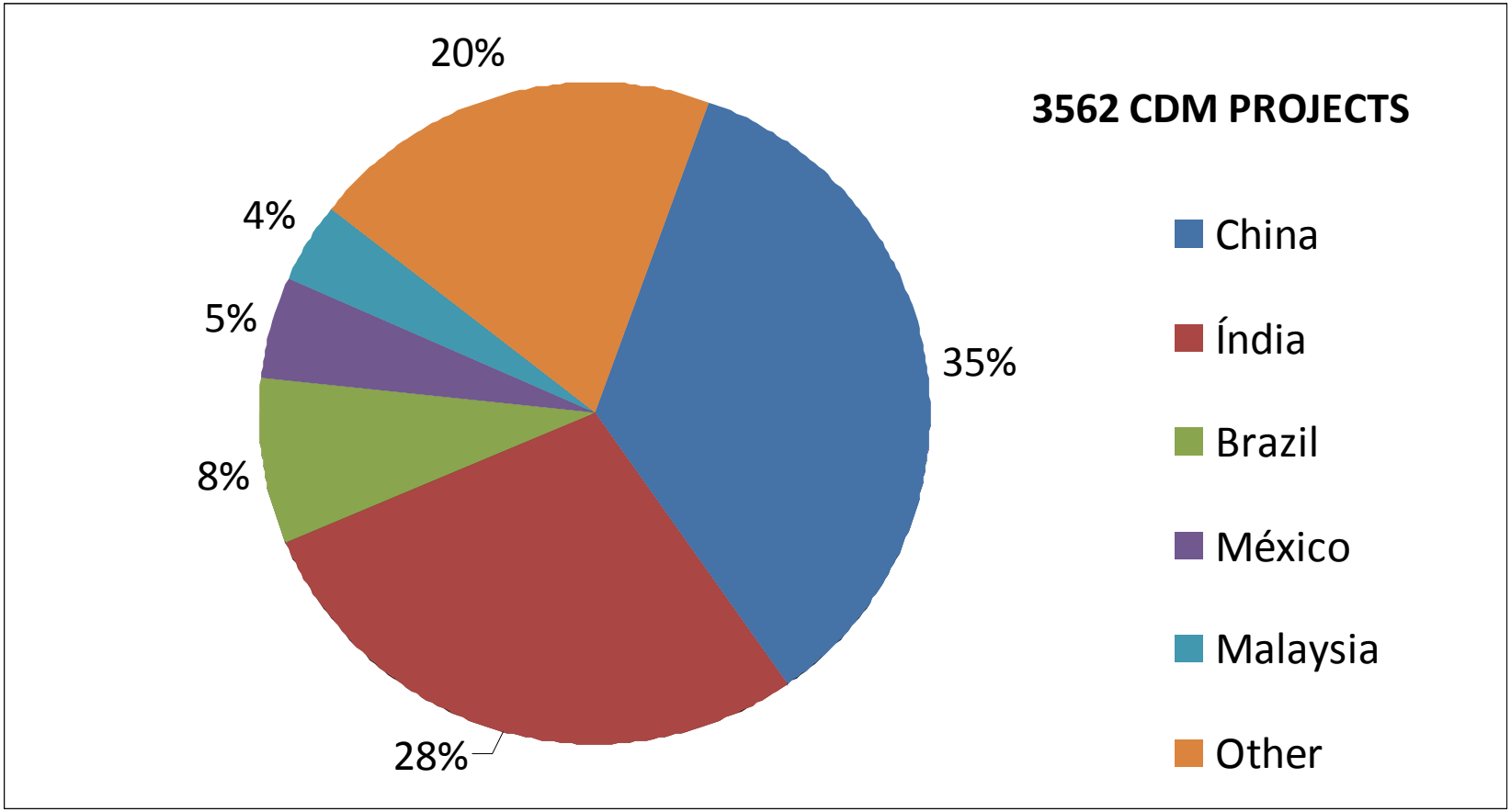
CO_2 Emission Intensity (million tons CO_2 / year)



CO_2 World Emission: 27 billion tons World Population: 6.65 billion CO_2 World Emission: 4 ton per capita

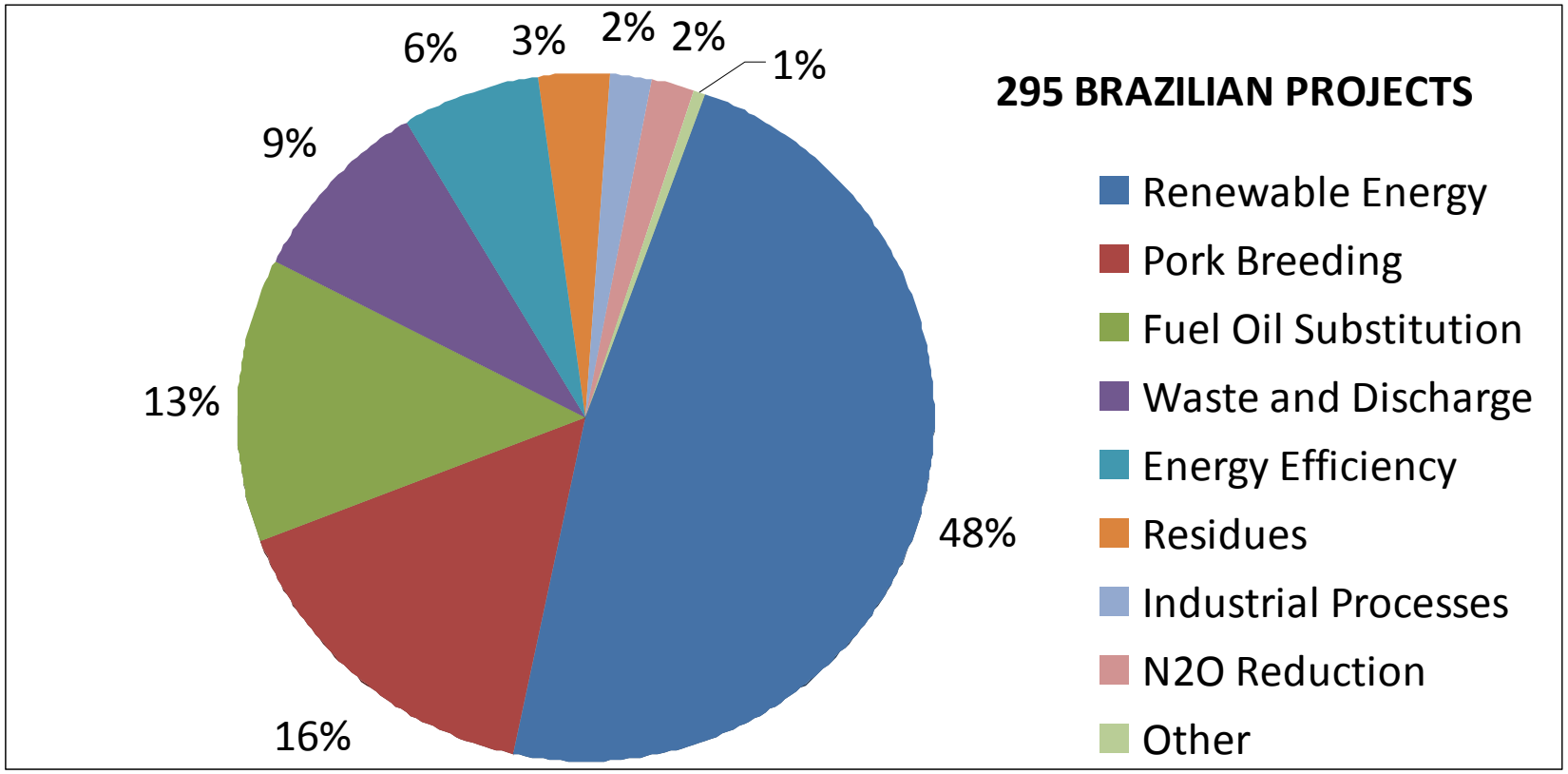
Source: Key World Energy Statistics 2007

Number of CDM projects in the World by country



Source: Ministry of Science and Technology 2007

CDM Projects Opportunities in Brazil



In the first period of carbon credits, these projects will represent 222 million tons of CO_2 emission reductions.

Source: Ministry of Science and Technology 2007

Expected Emission Reductions by Year

- In terms of reductions in emissions of greenhouse gases designed for the first commitment period, Brazil occupies the third position, accounting for annual reductions of 40 million tons of CO_2, representing 7% of the world total.
- In the first and second position are China and India, with reductions of 285 million tons of CO_2 and 115 million tons of CO_2.
- In these countries, the energy matrix is very dependent on consumption of fossil fuels, especially coal, hence the gap that China and India have in relation to Brazil, which has an energy matrix based mainly on renewable sources (hydroelectricity).

Source: Brazilian Contribution to Avoid Climate Change - MCT 2007

Brazilian Cases
Sales of Carbon Credit

Klabin

- Klabin is the biggest producer, exporter and recycler of paper in Brazil.
- Market leader in packaging paper and board, corrugated boxes and industrial sacks, it also produces and sells timber in logs.
- 62% of its production is exported to more than 60 countries.
- 1st Brazilian company to join the CCX in 2004.
- In 2005, Klabin became a full member of the Chicago Climate Exchange - CCX and undertook the commitment to reduce greenhouse gas emissions by 1% a year starting in 2003 and reaching 6% by 2010.
- In July of 2006, Klabin had its first CDM project registered at the United Nations Framework Convention on Climate Change (UNFCCC).

Brazilian Cases
Sales of Carbon Credit

FIRST SALE

- January of 2007 - Chicago Climate Exchange (CCX).
- 29.5 thousand tons of CO_2 were sold.
- This project involved 32,000 hectares of planted eucalyptus forests.
- The sequestered carbon represents about 25 tons of CO_2 per hectare/year of carbon credits.

Brazilian Cases
Sales of Carbon Credit

SECOND SALE

- June 2008 – European Allowance (EUA).
- 87 thousand tons of CO_2 were sold.
- The CDM project replaced fuel oil with natural gas in its Piracicaba Plant (São Paulo), with a reduction capacity of CO_2 emissions of 26%. This project will generate about 150 thousand tons of carbon credit by 2010.
- The amount sold is a result of reductions achieved from January 2001 to May 2007.

Brazilian Cases
Sales of Carbon Credit

- International Paper is a global uncoated freesheet paper (UFS) and packaging company and in Brazil hold two printing and writing paper units and produce 800k tons of UFS paper year.
- International Paper in Brazil has an expressive share on the Brazilian non-coated papers market and boasts a considerable share of Brazilian paper exports.
- In 2008 International Paper do Brasil registered a carbon offset project in the Chicago Climate Exchange (CCX).

Brazilian Cases
Sales of Carbon Credit

SALE

INTERNATIONAL PAPER

- From 2004 to 2008 - Chicago Climate Exchange (CCX).
- 210 thousand tons of CO_2 were sold.
- This project substituted fuel oil with natural gas in two boilers and this conversion was installed in 2004 at Mogi-Guaçu paper mill (São Paulo).
- The Project essentially comprised the construction of a low pressure pipeline inside IP's fence, which reaches the existing pipe racks located near the boilers. This pipeline delivers low-pressure natural gas to the power boilers to feed the boilers' multiple burners

Brazilian Cases
Sales of Carbon Credit

SUZANO
PAPEL E CELULOSE

- Suzano is one of the leading integrated pulp and paper producers in Latin America.
- Its main products, sold both in the domestic and foreign markets, include eucalyptus pulp, coated and uncoated printing and writing paper and paperboard.
- The largest BEKP – Bleached Eucalyptus Kraft Pulp single line in the world.
- 2nd largest BEKP – Bleached Eucalyptus Kraft Pulp producer.
- One of the 10 largest market pulp producers in the world.
- Suzano Forests and Production Chain are 100% certified by FSC.
- The world largest BEKP – Bleached Eucalyptus Kraft Pulp certified FSC company.
- In 2004, Suzano became a member of Chicago Climate Exchange (CCX).

Brazilian Cases
Sales of Carbon Credit

SALE

- From February 2007 to March 2008 - Chicago Climate Exchange (CCX).
- 15 thousand tons of CO_2 were sold.
- This project involved 40,000 hectares of planted eucalyptus forests.

Brazilian Cases
Sales of Carbon Credit

- Celulose Irani is an integrated pulp and paper producer.
- The company produces kraft pulp, paper, corrugated cardboard sheets and cartons, Pinus furniture and resins.
- Celulose Irani developed the ability, safety and excellence to supply products from a renewable forest base.
- 1st Brazilian company of the pulp and paper sector with carbon credit under the Kyoto Protocol.
- Celulose Irani received Carbon Neutral Certification for its industrial and forest activities by ISO 14.064.

Brazilian Cases
Sales of Carbon Credit

FIRST SALE

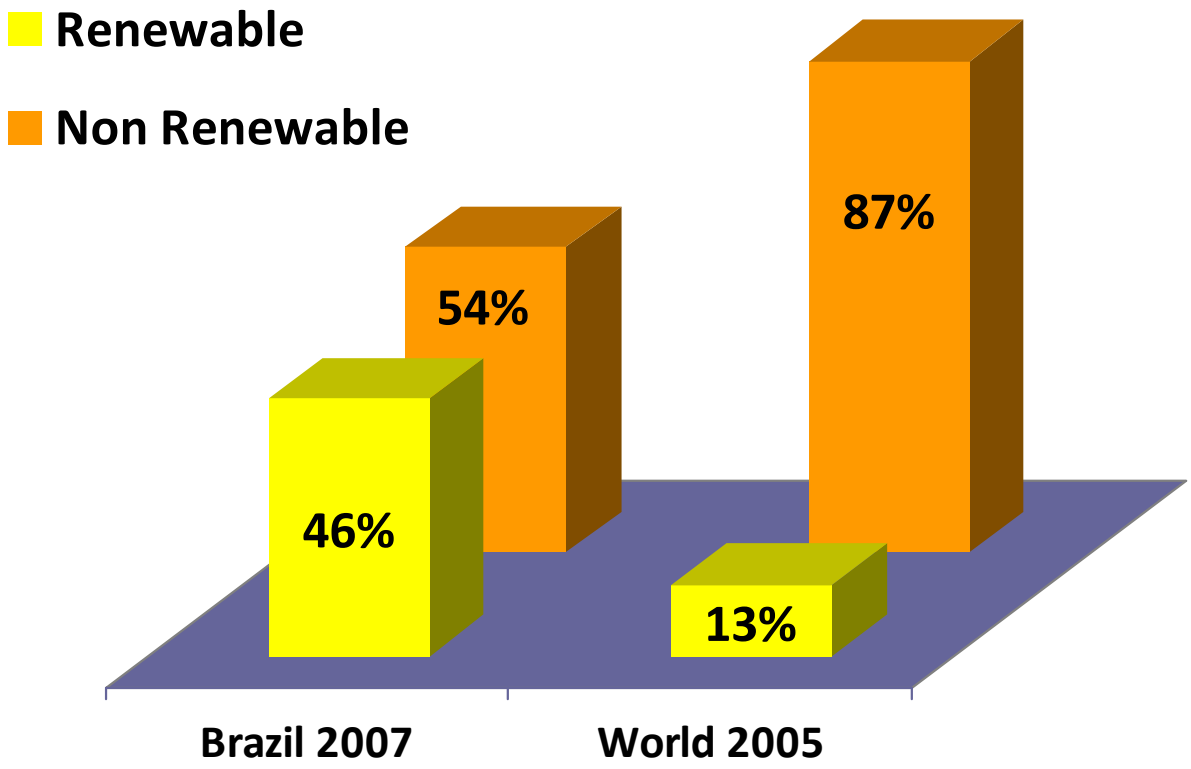
- From 2005 a 2007 – CDM Project.
- 408 thousand tons of CO_2 were sold.
- The CDM co-generation project substituted fuel oil with biomass from forest residues, with a consumption reduction of 700 tons a month of fuel oil.

Brazilian Cases
Sales of Carbon Credit

SECOND SALE

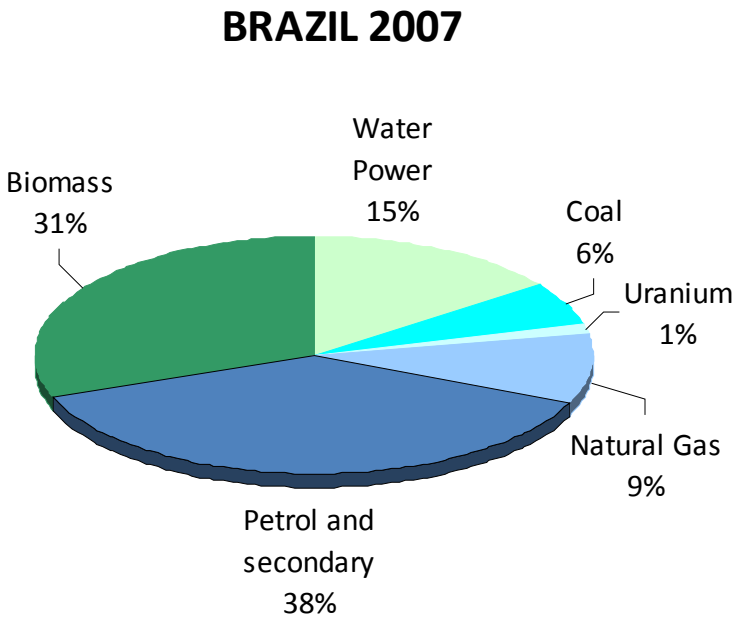
- January 2008 – CDM Project of ETS – Effluent Treatment Station (Wastewater Methane Avoidance).
- 50 thousand tons of CO_2 were sold.
- The project avoids the generation of methane, by replacing the anaerobic process of degradation of organic matter (of effluent), by an aerobic process.

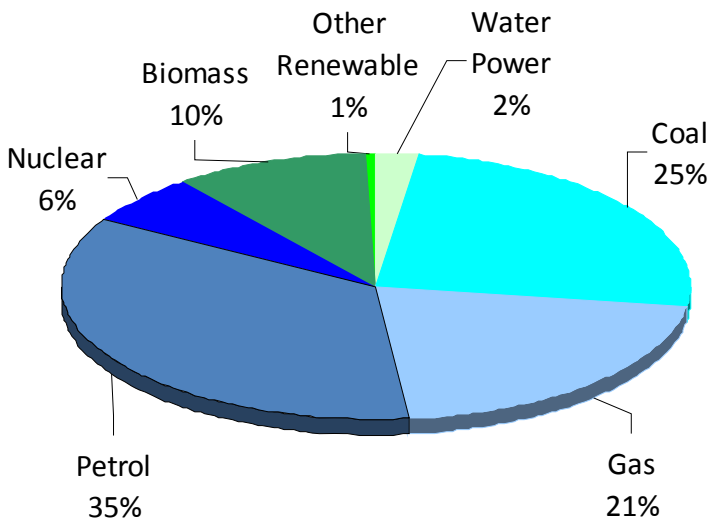
Energy Supply
Brazil and World



Source: Brazilian Energetic Review – MME 2007

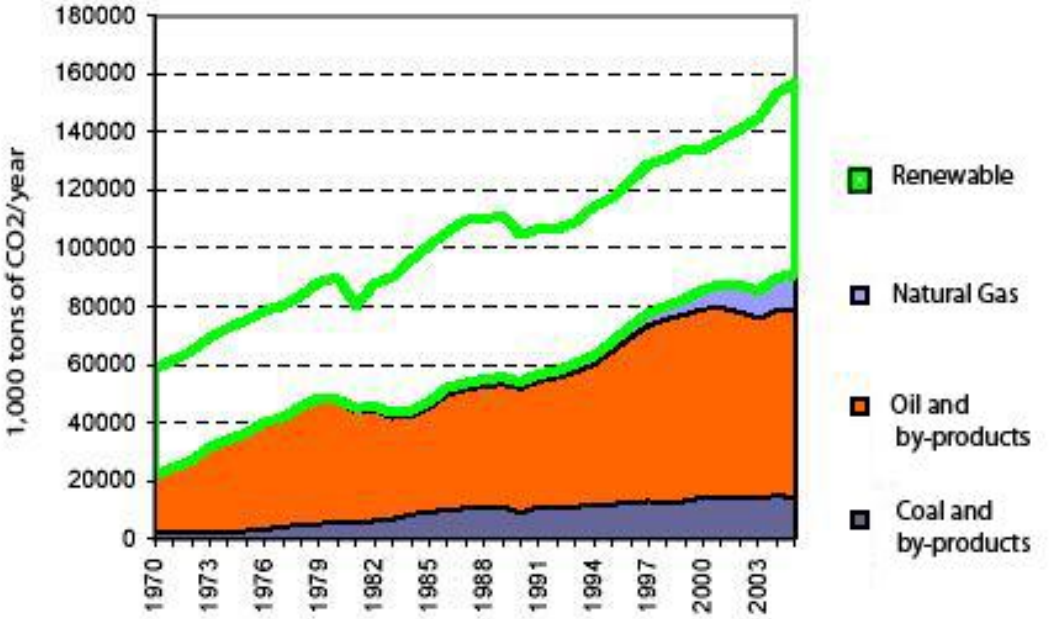
Energy Supply Matrix





Source: Brazilian Energetic Review – MME 2007

Carbon Emission in the Final Use and Energy Processing



CO_2 emissions avoided due to the use of biomass as fuel is presented in the picture by the empty area. The shocks in the price of oil in 1979 and today, caused the return to the use of biomass, whose historic tendency was to be reduced.

Source: Ministry of Science and Technology 2007
Economy and Energy Magazine n° 62 – July 2007

Alternative Energy Sources

WINDMILL

SOLAR

NUCLEAR

BIOMASS

WATER POWER

THERMIC OCEAN

GEOTHERMIC

Brazilian Challenges

- Climate Change discussion increased the demand for forest products.
- Planted Forests are a source of clean and renewable energy.
- It is important to know the climate change impact and the planted forests dynamic to preserve and make a sustainable use of land and forests.
- Firewood for energy generation is increasing.
- It is expected more projects to replace fuel oil with renewable fuels.
- Brazil will most likely become the world bioenergy market leader.
- At COP-14 in Poznan on December 8th, Brazil expect to see the planted forests included in the Kyoto agreement pos-2012.