



Global Sustainable Bioenergy Project Latin American Convention

How can biofuels help the world to fulfill the GHG emissions reductions targets?

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University of São Paulo

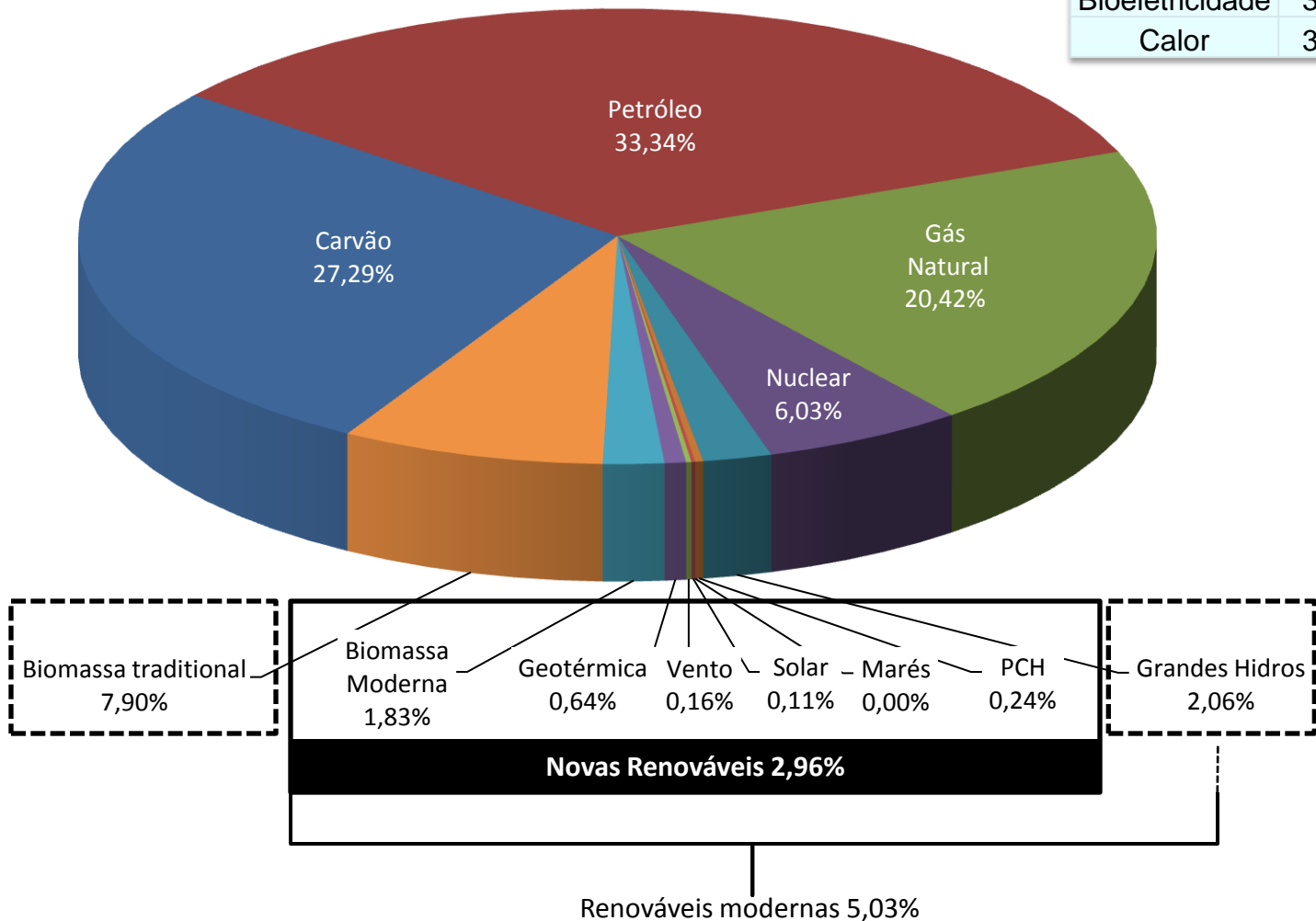
São Paulo, Brazil

São Paulo, March 23rd 2010

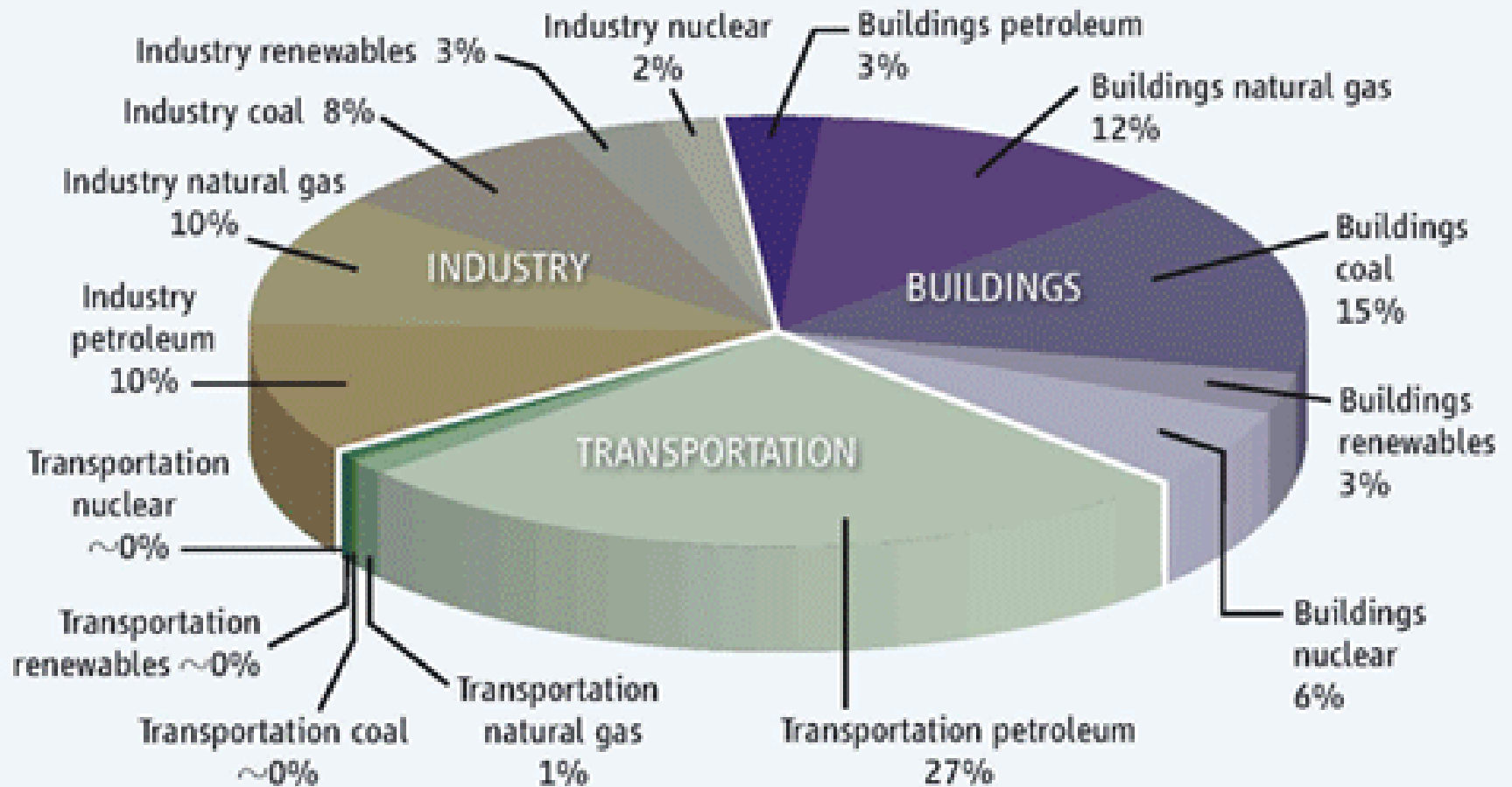
Demanda Mundial de Energia Primária (2008)

Partes de 516 EJ

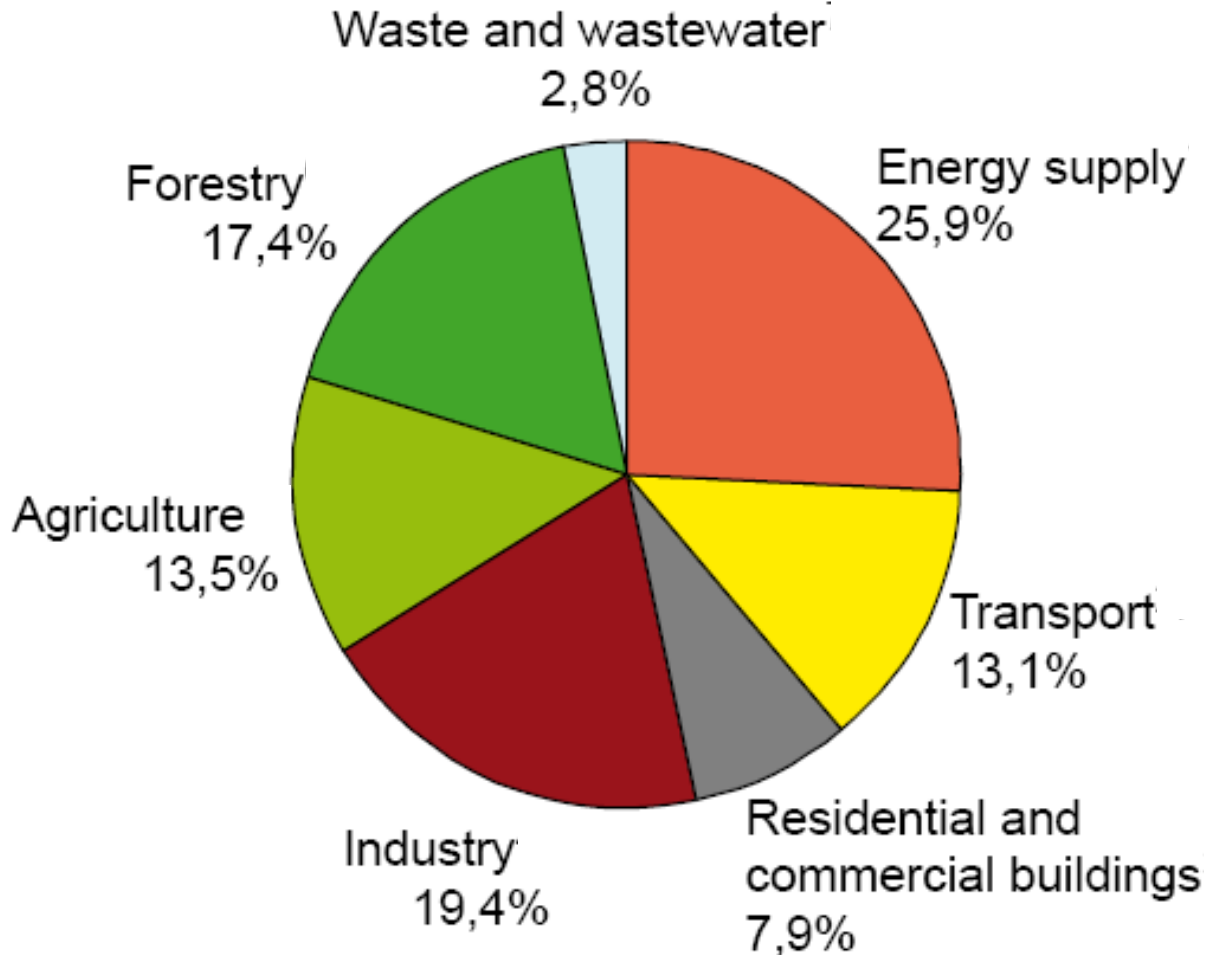
Biomassa Moderna	EJ	%
Bioetanol	1,7	0,32
Biodiesel	0,5	0,09
Bioeletricidade	3,6	0,70
Calor	3,7	0,71



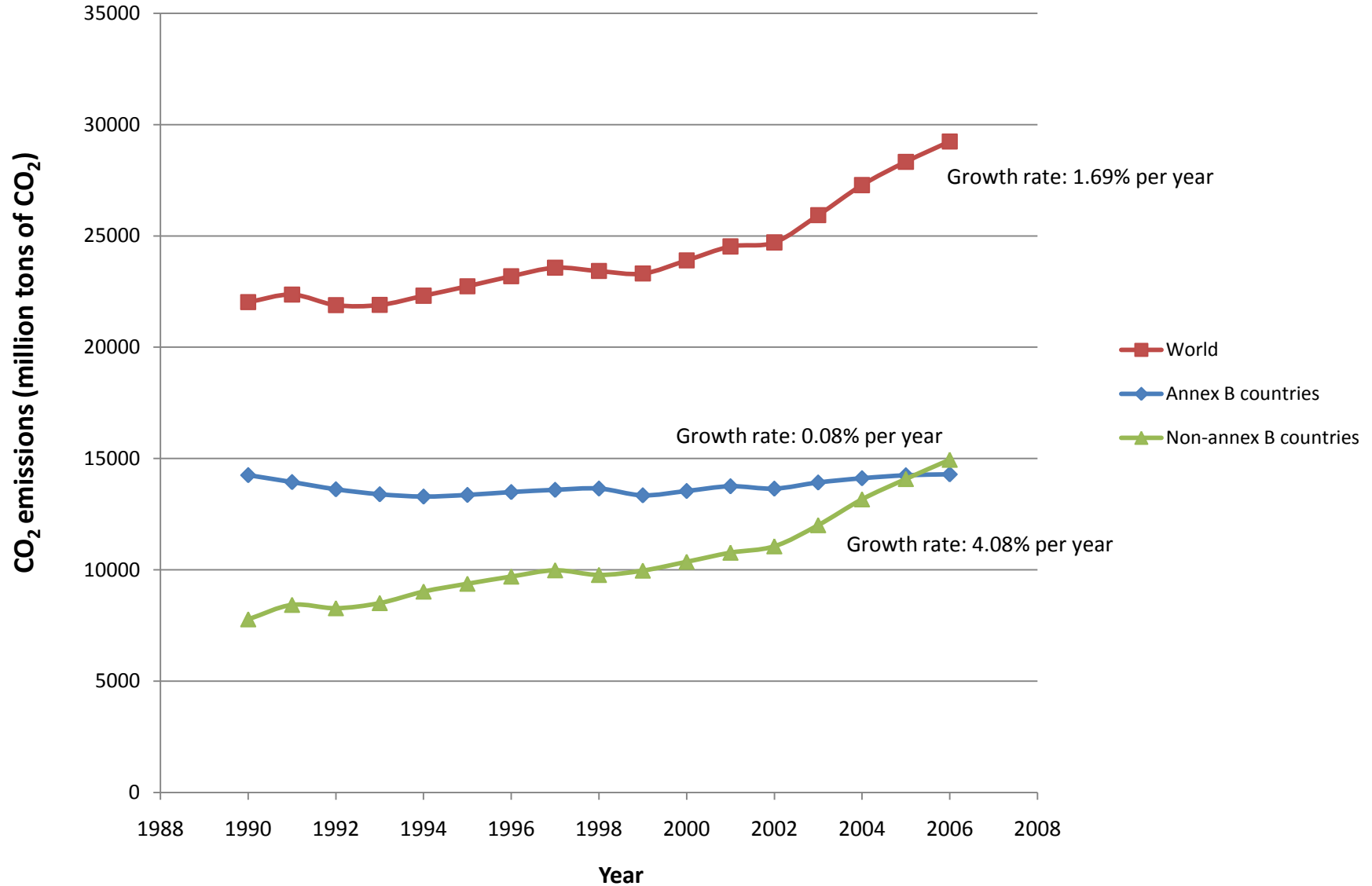
ENERGY USAGE IN THE UNITED STATES (2006)



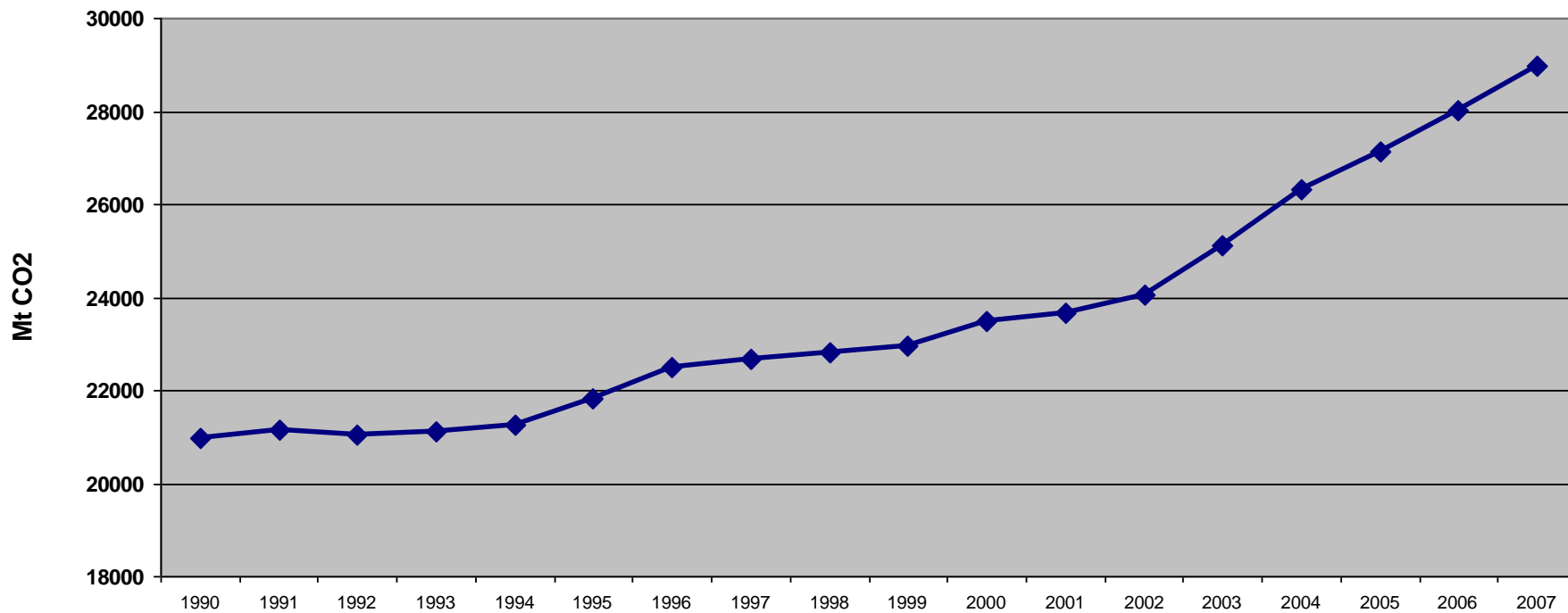
GHG emissions by sector in 2004



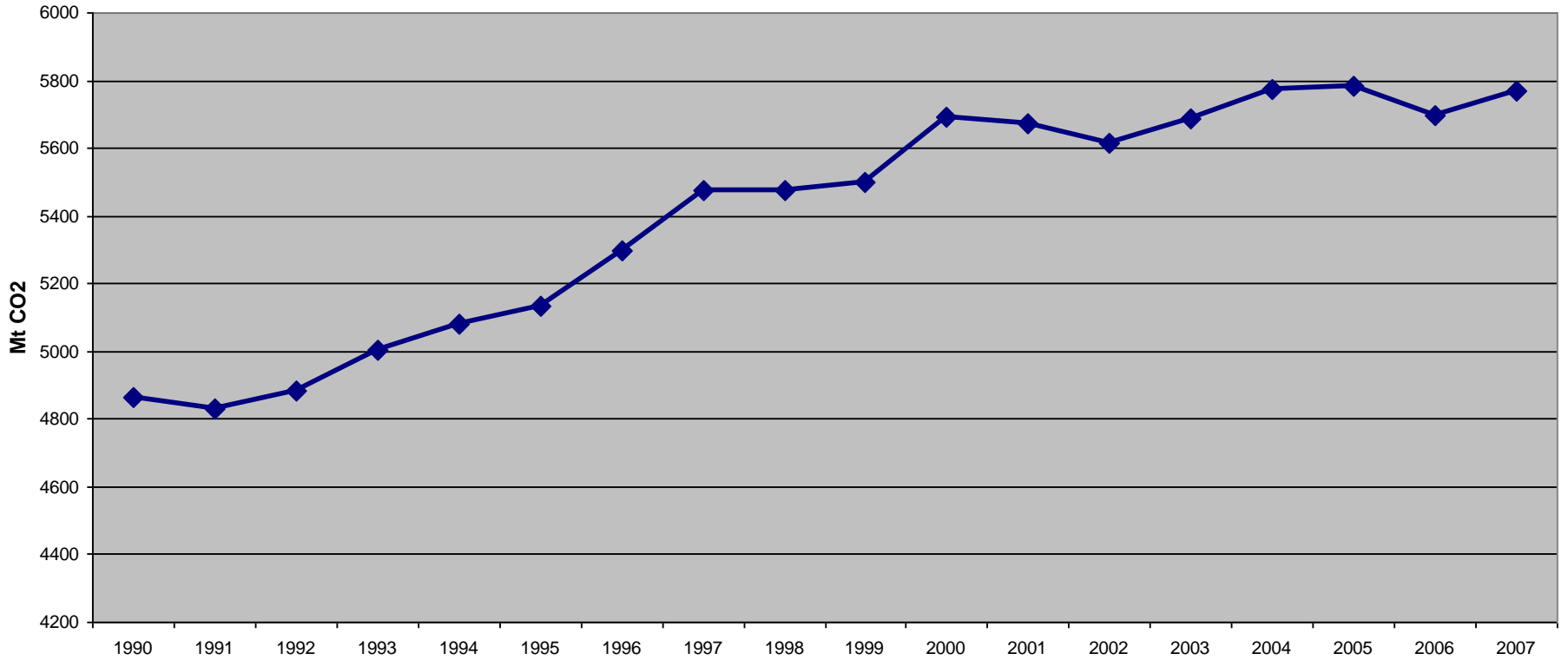
World Fossil-Fuel CO₂ Emissions



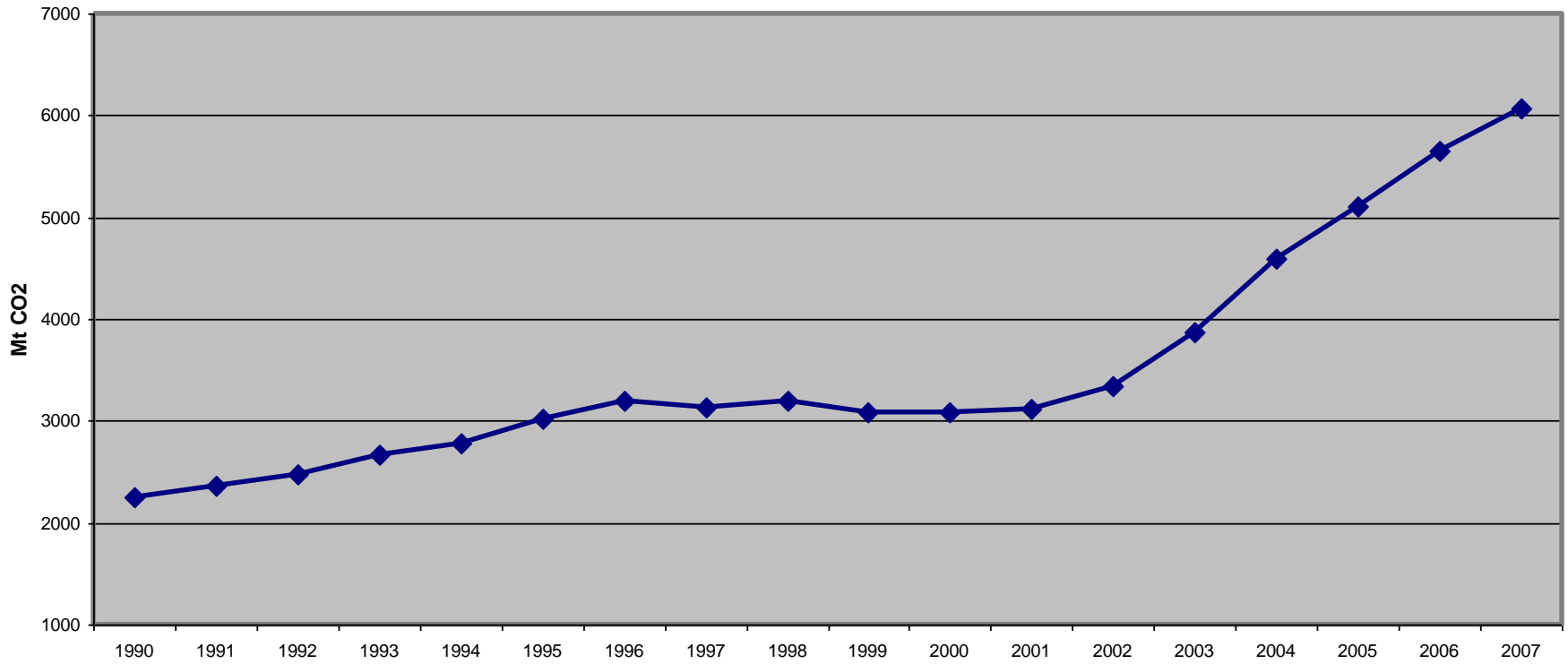
Emissões Mundiais de CO₂



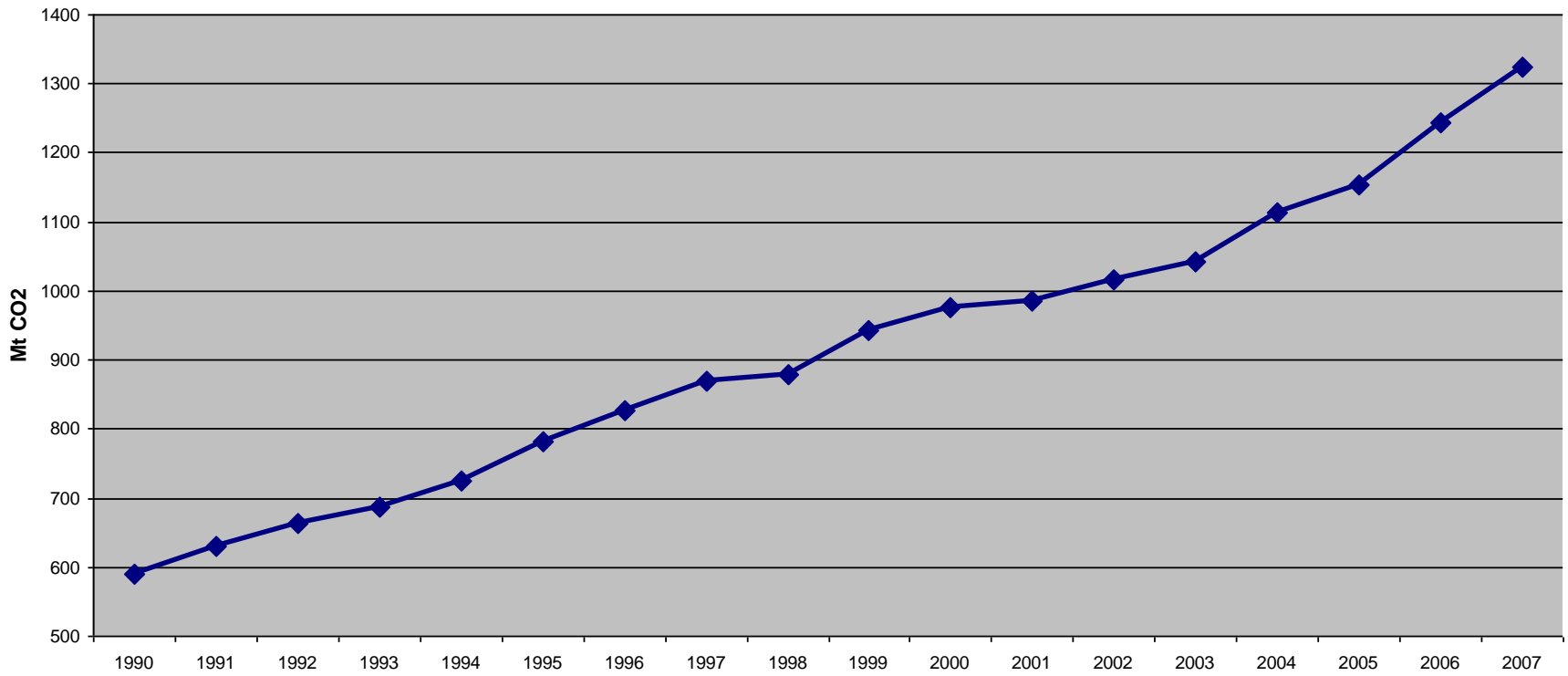
Emissões Americanas de CO₂



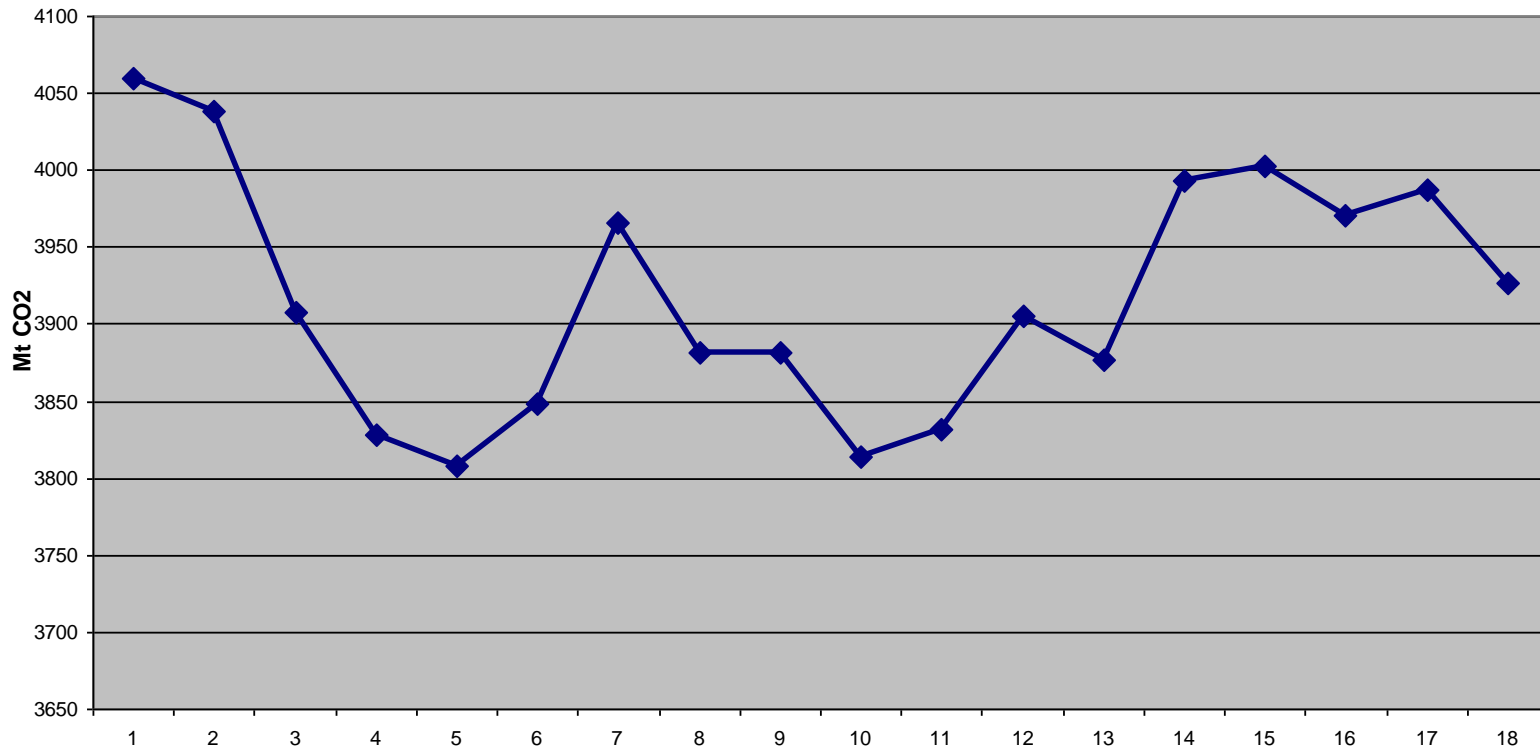
Emissões Chinesas de CO₂



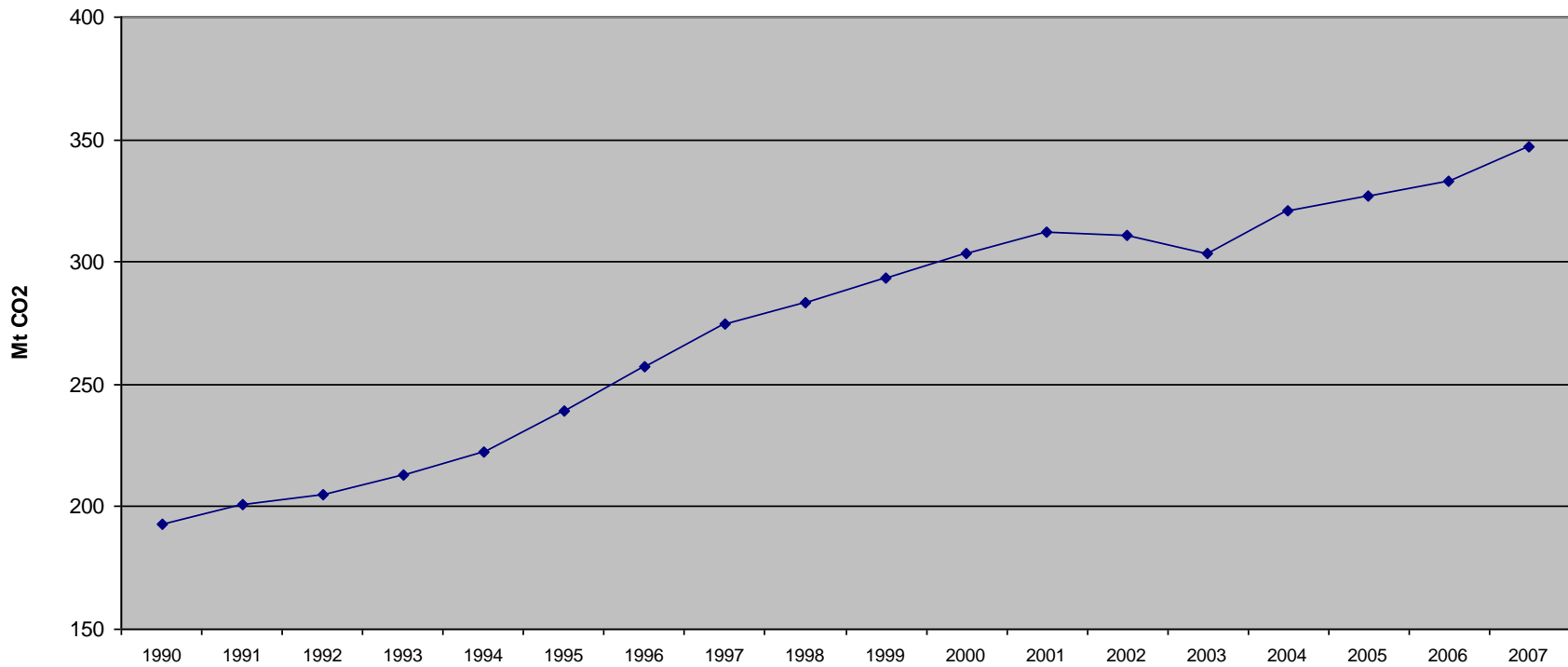
Emissões Indianas de CO2



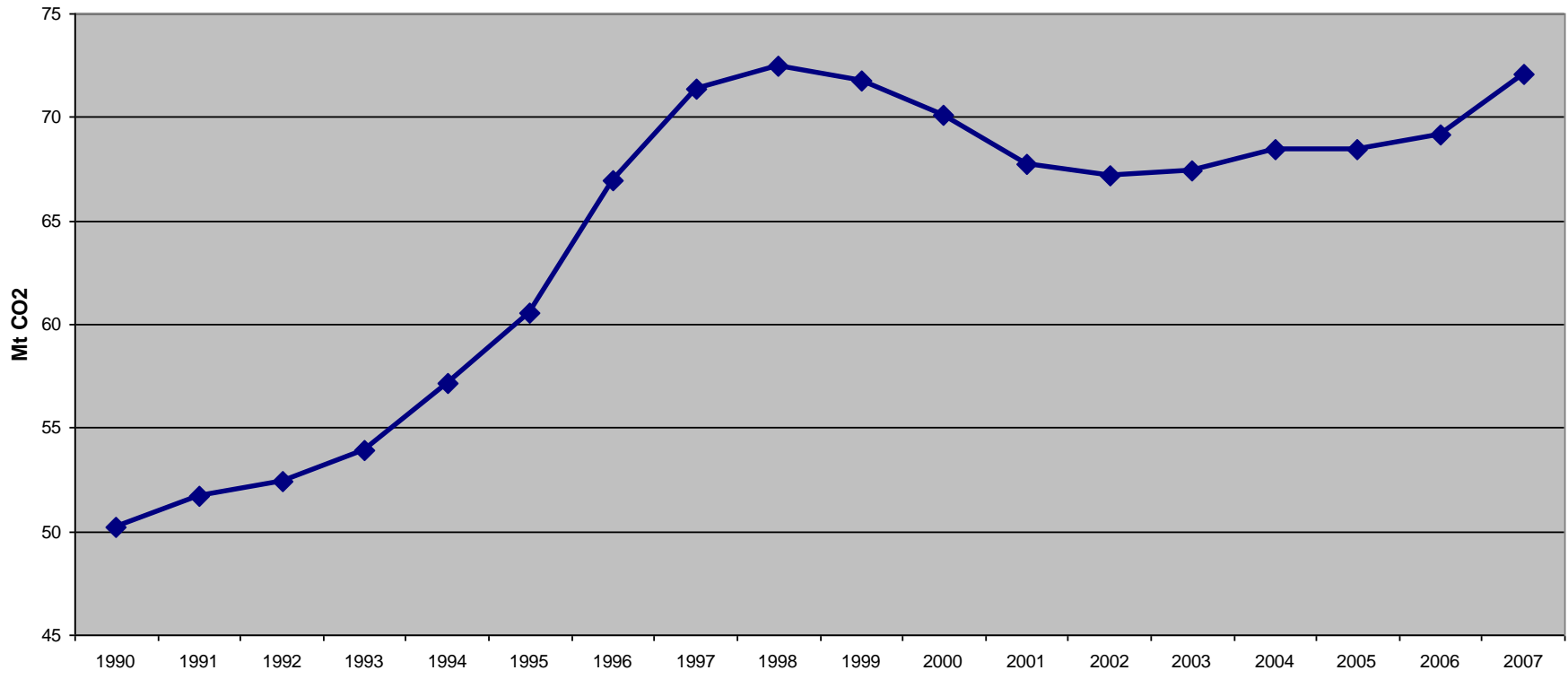
Emissões da União Europeia de CO₂



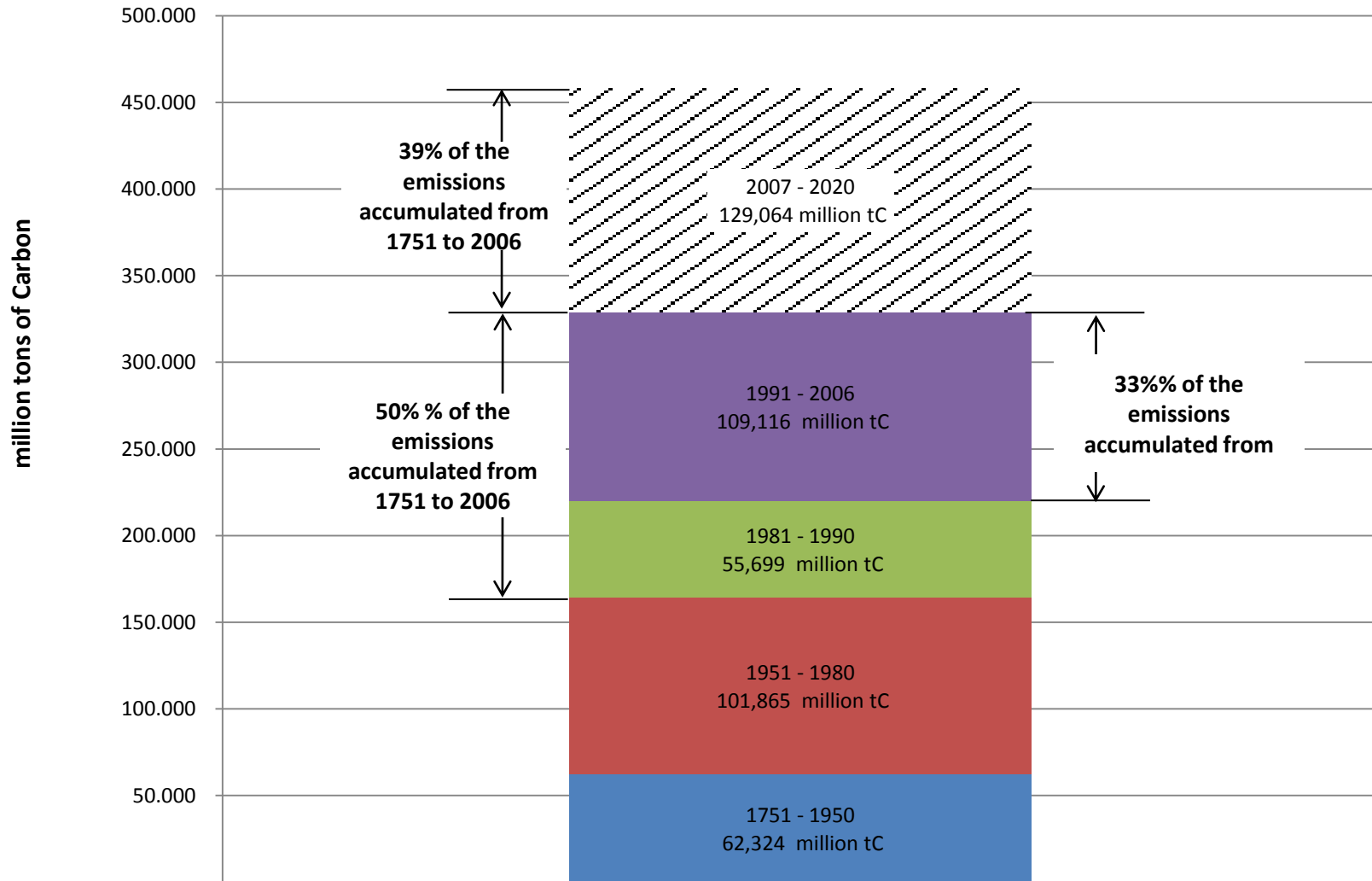
Emissões Brasileiras de CO₂



Emissões Paulistas de CO2



CO₂ Cumulative Emissions



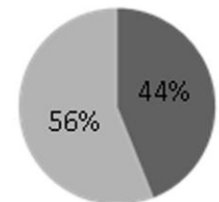
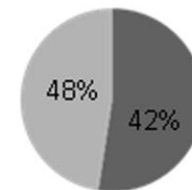
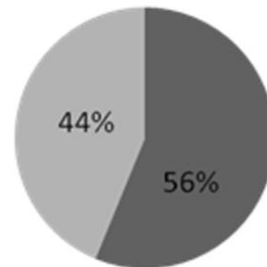
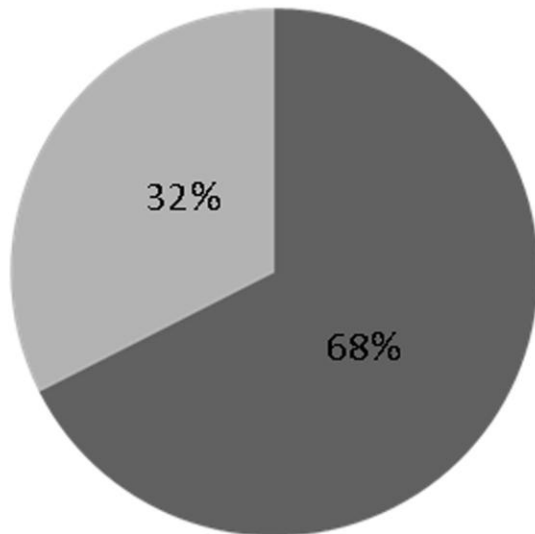
GHG Cumulative Emission

1850 - 2006

1980 - 2006

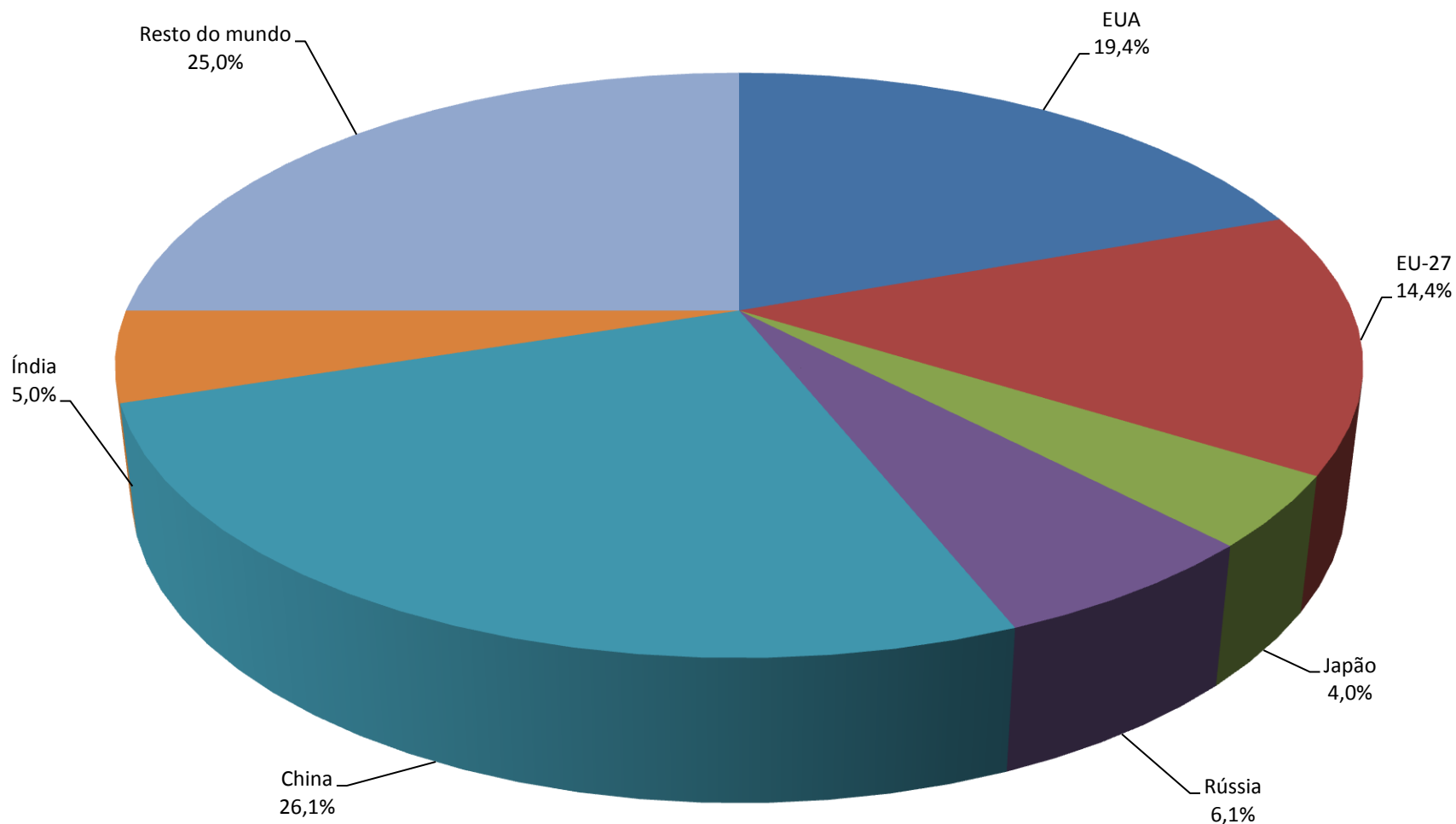
1990 - 2006

1990 - 2020

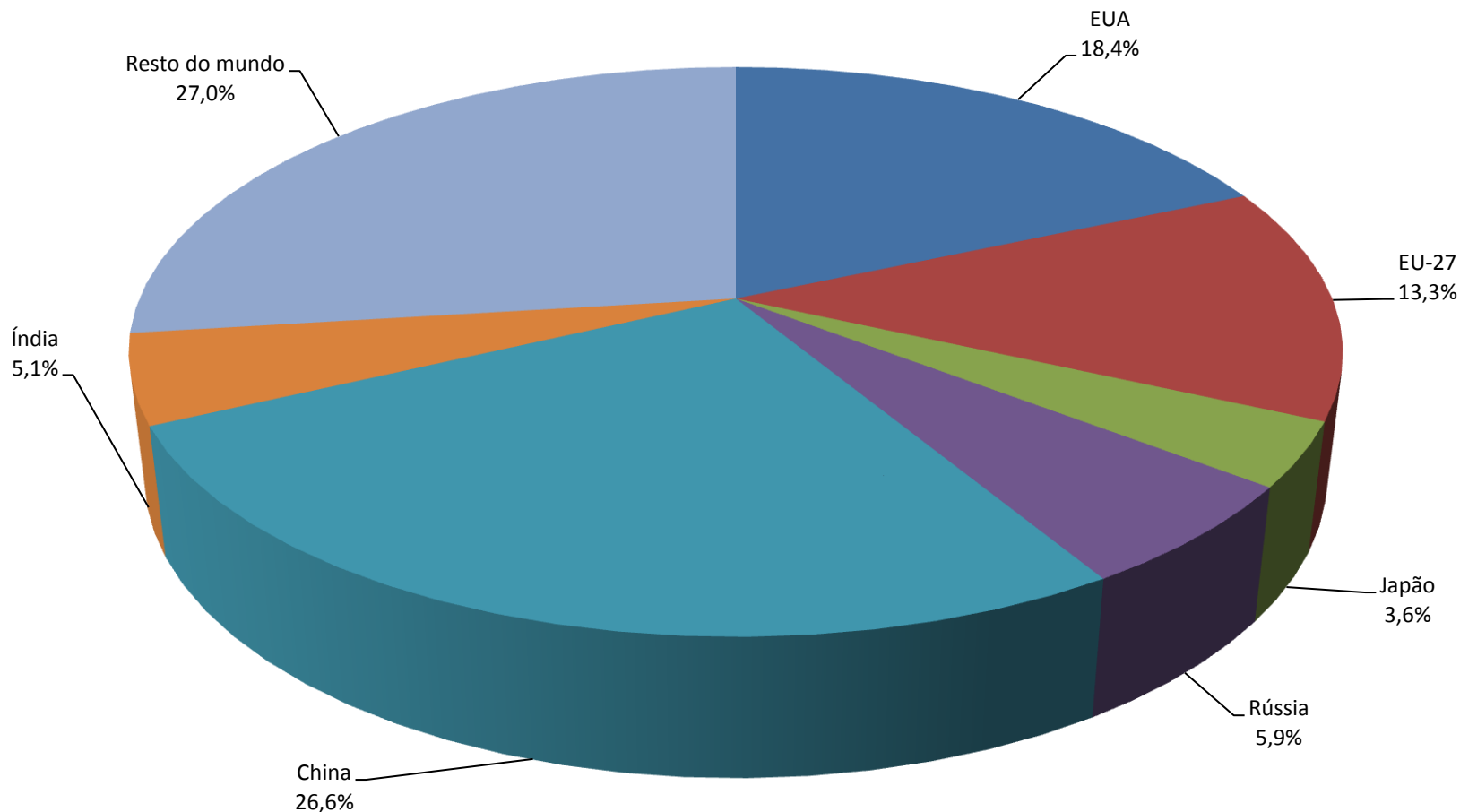


■ Developed countries - Annex I
■ Developing countries - non-Annex I

Acumulado 2007 - 2020 sem Acordo de Copenhague



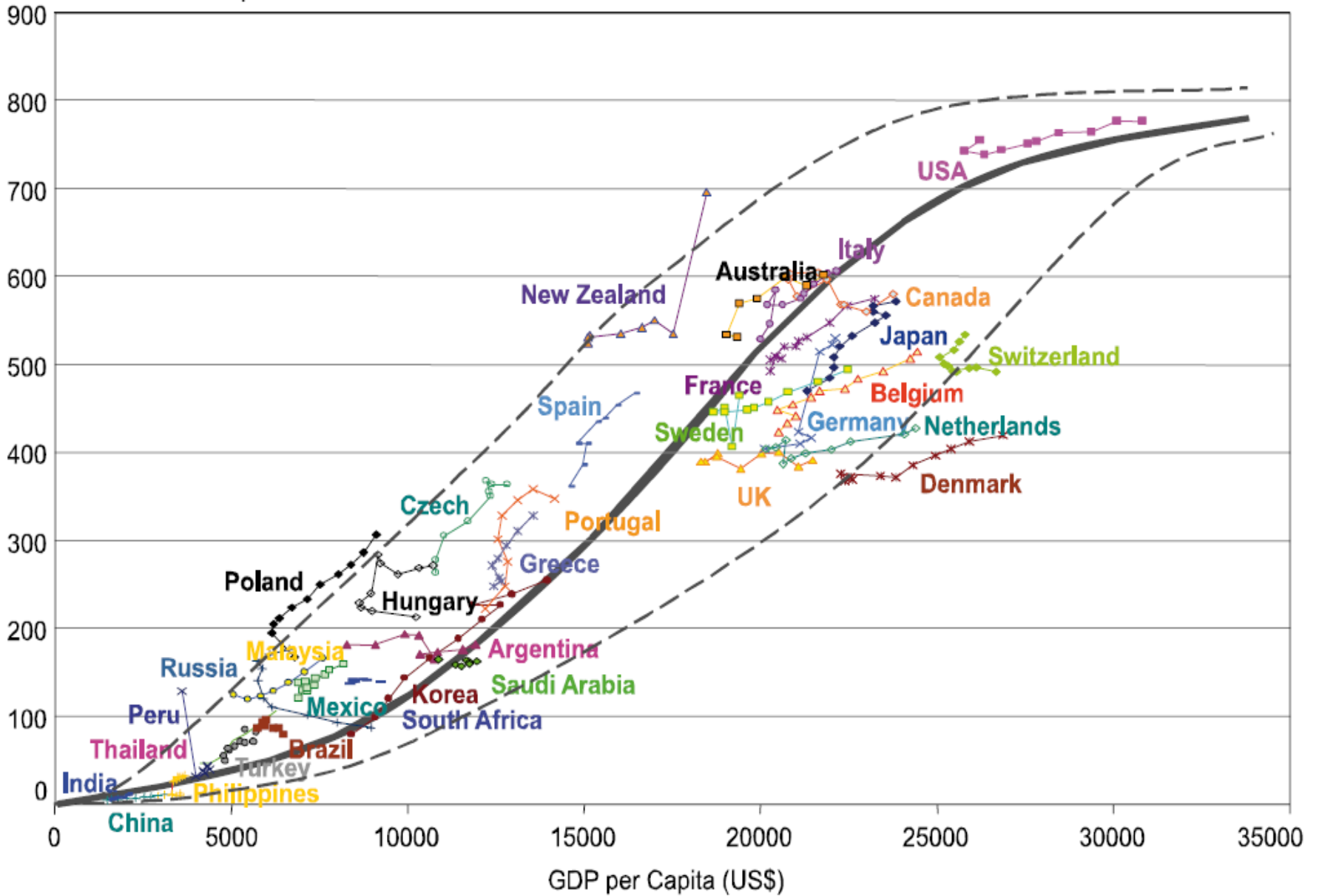
Acumulado 2007 - 2020 com Acordo de Copenhague



Fonte: elaboração dos autores baseados em CAIT, 2009.

Premissas assumidas: EUA reduzirá emissões em 17%; EU-27 em 24% e Japão em 30%. China aumentará suas emissões em 120%; Índia em 73% e Rússia em 13%. Os demais países manterão as taxas de crescimento do cenário “business as usual”

Vehicle Ownership/1000 Persons



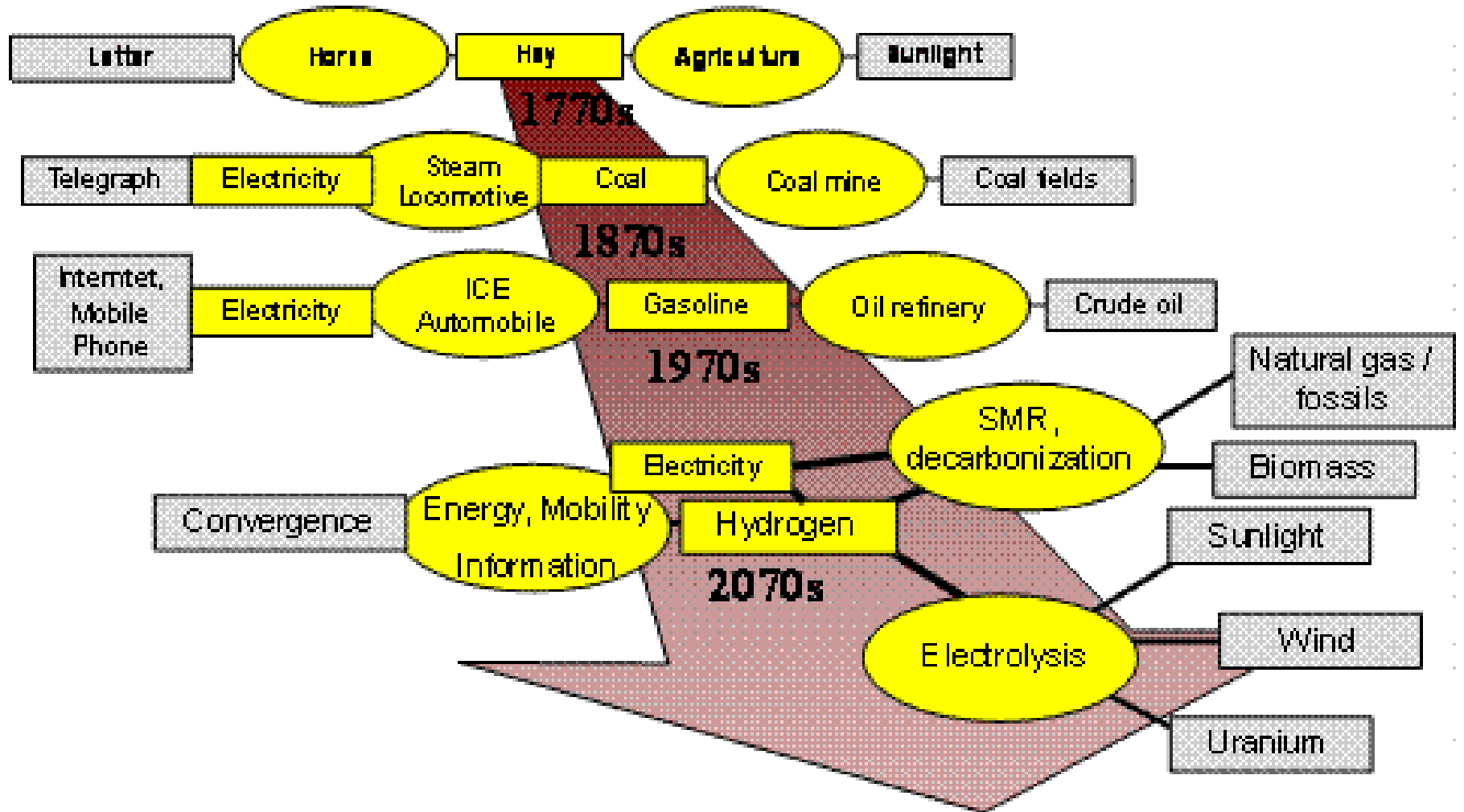
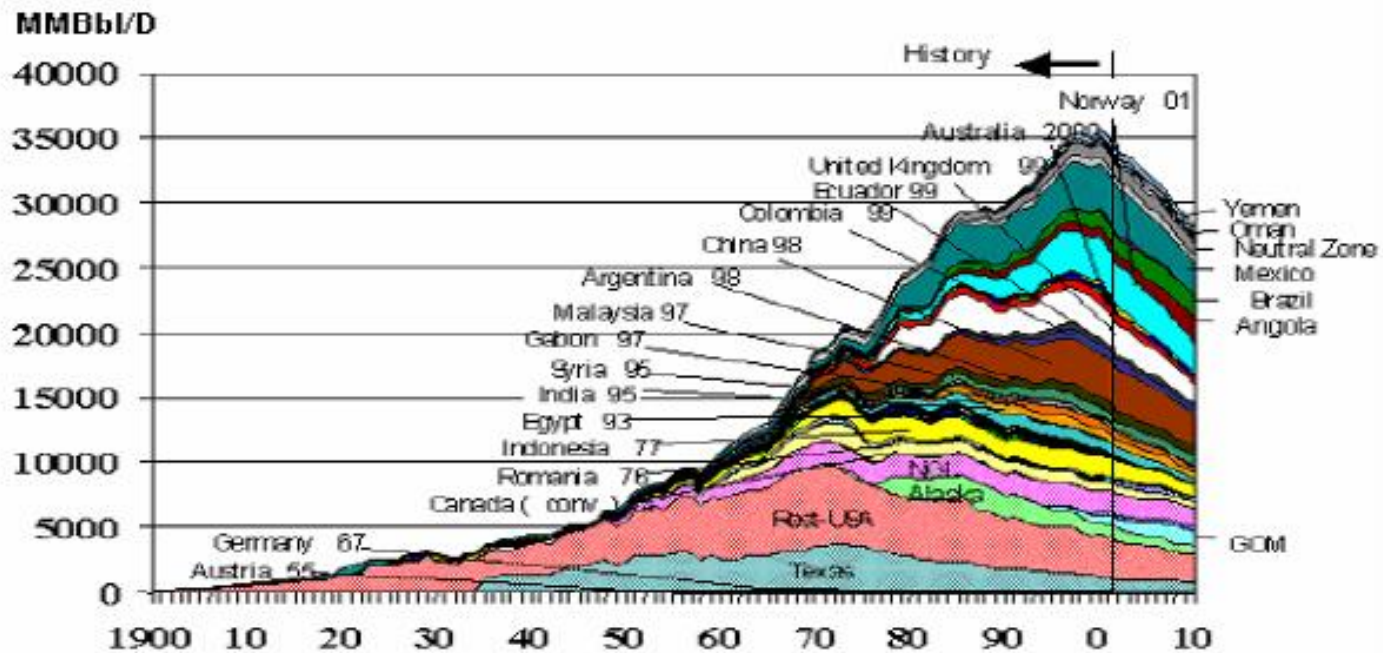
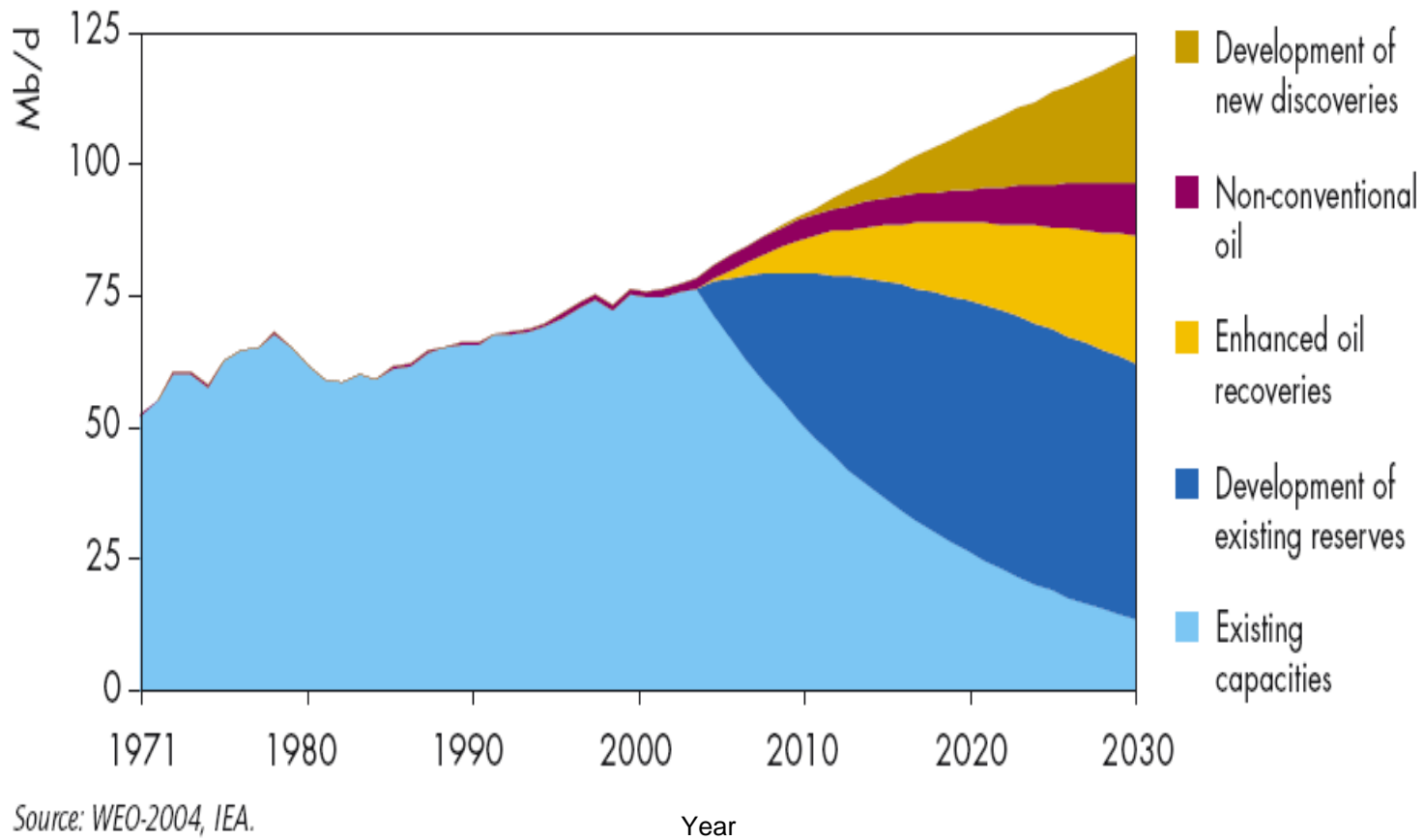
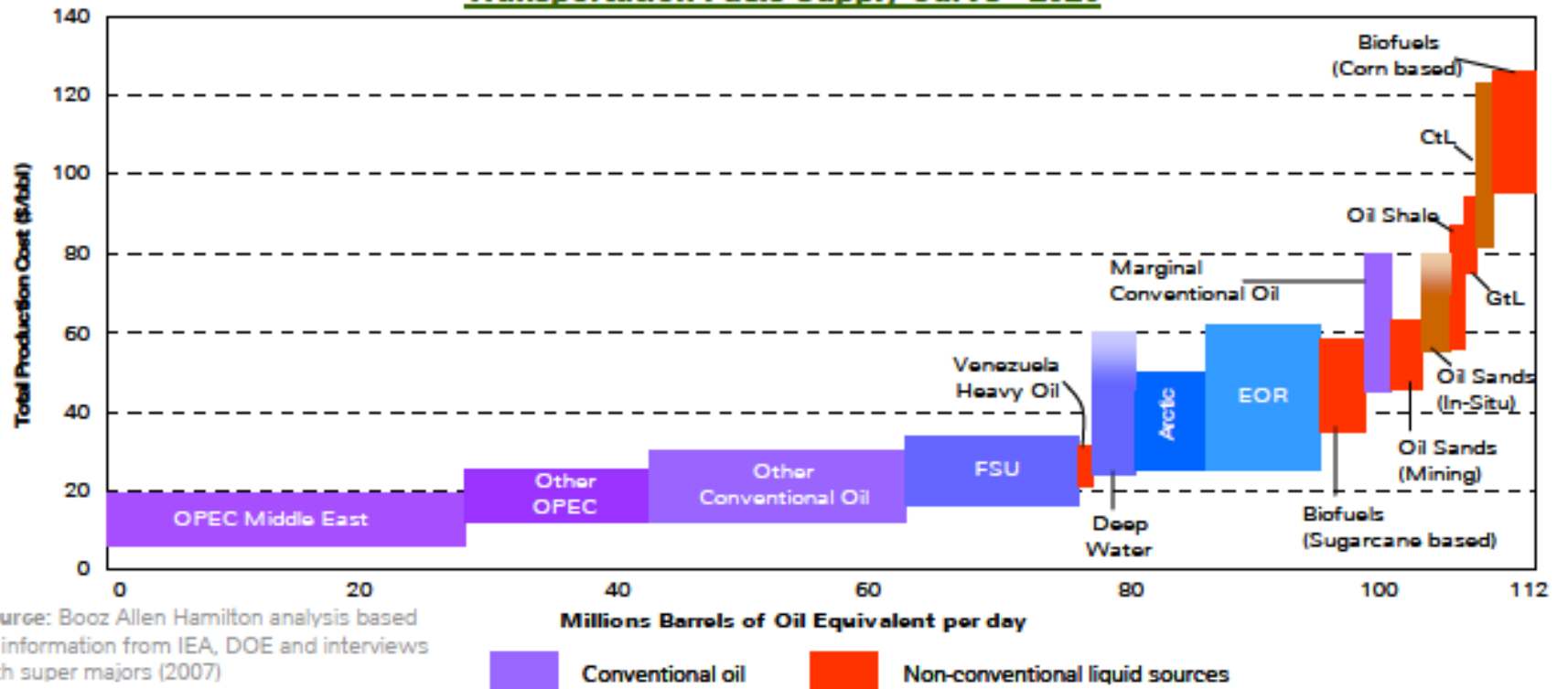


Figure 7. Non-OPEC, non-FSU Oil Production Has Peaked and is Declining (Ref. 17)

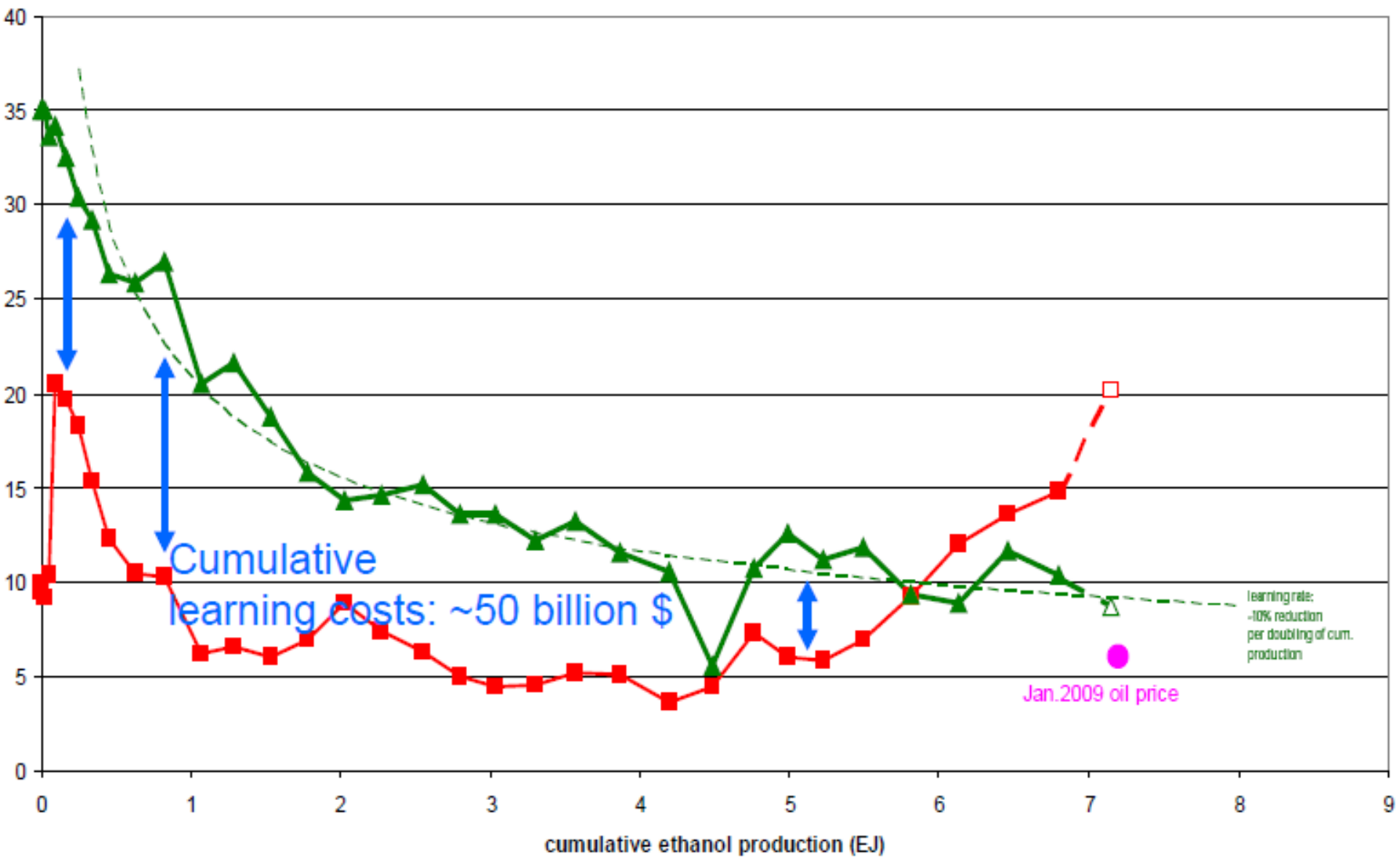




Transportation Fuels Supply Curve - 2020



ethanol (producers Brazil, green) and crude oil (Brent) and gasoline (spot CIF Rotterdam, red) prices (2004\$/GJ)

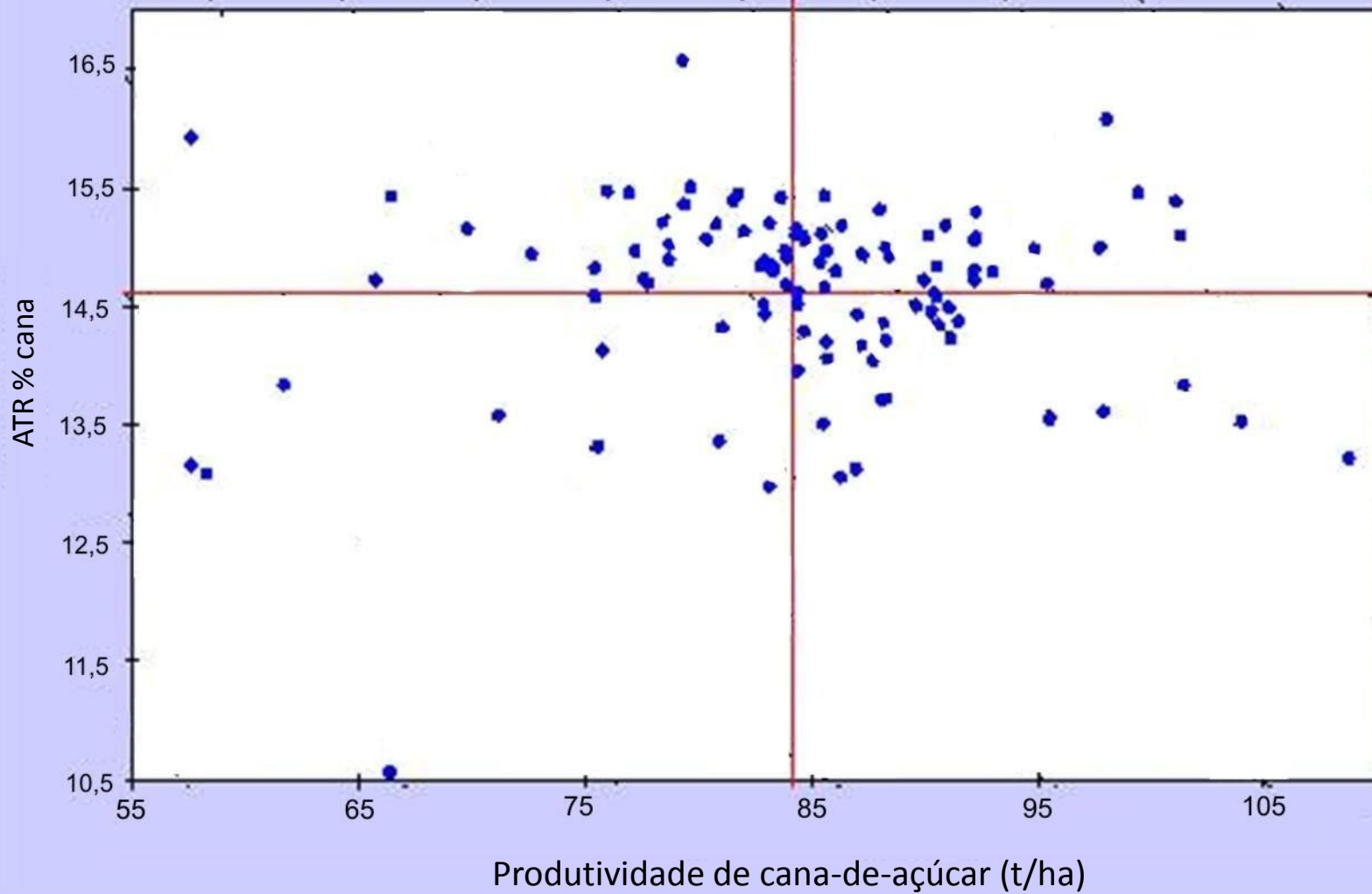


Cumulative learning costs: ~50 billion \$

Jan. 2009 oil price

learning rate: -10% reduction per doubling of cum. production

Desempenho das Usinas de Açúcar (ATR/ha)



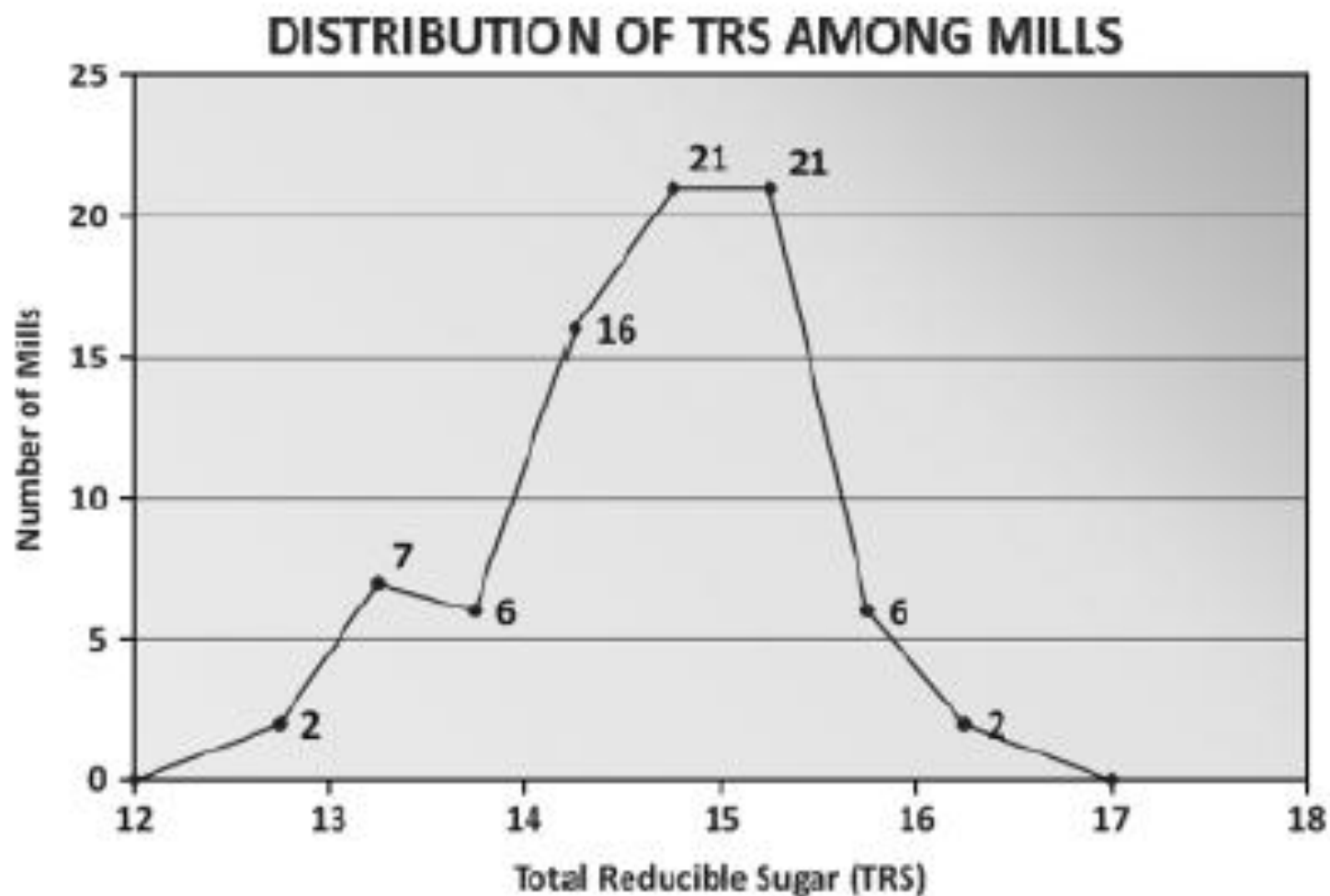
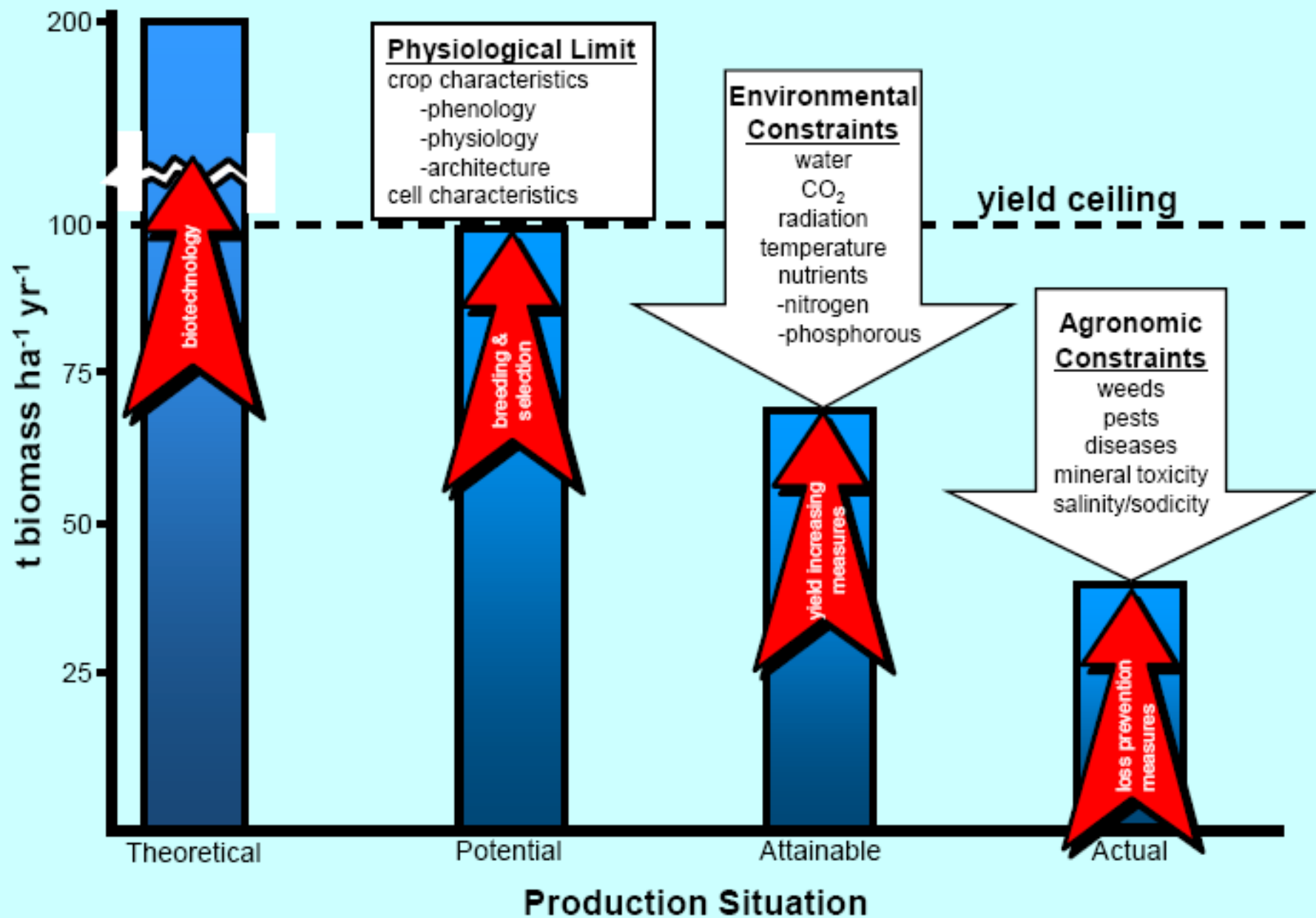


Figure 2. Distribution of TRS among mills (Authors' elaboration based on CTC¹⁶).



PERSPECTIVES FOR THE REPLICATION OF BRAZILIAN ETHANOL PROGRAM IN OTHER DEVELOPING COUNTRIES

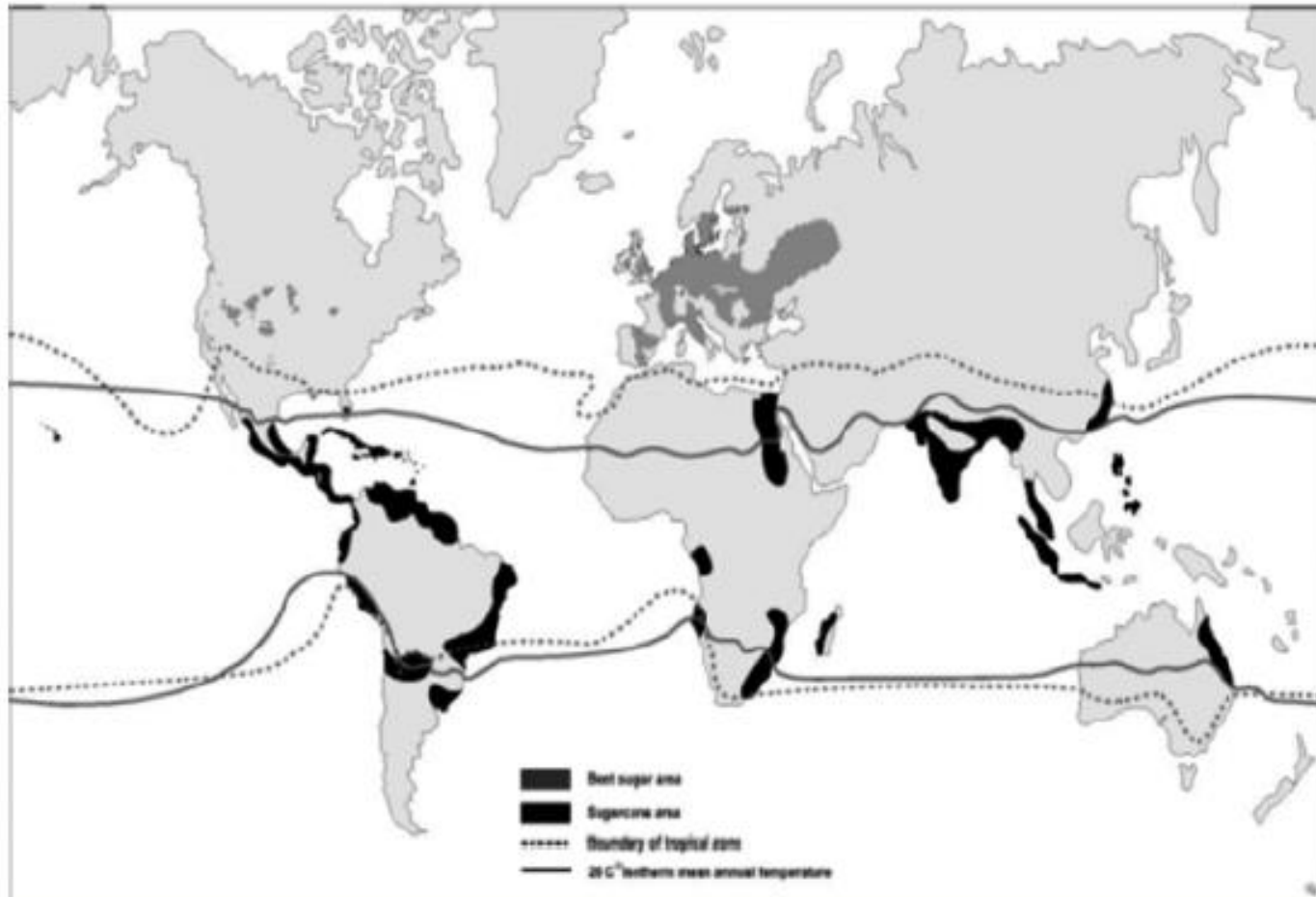
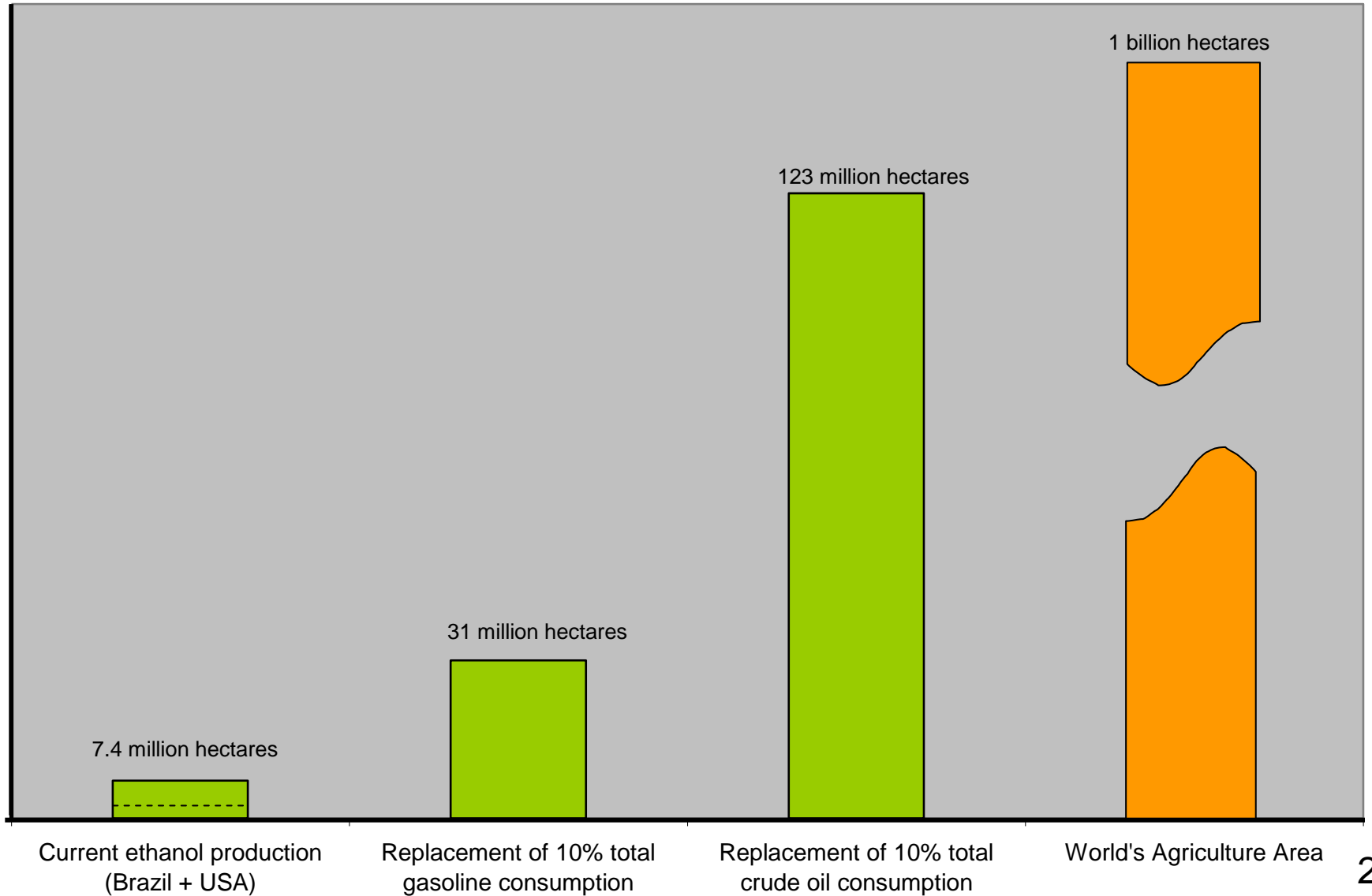


Figure 4. Perspectives for the replication of Brazilian ethanol program in other developing countries.²¹

Land Use to Ethanol



Present production and potential demand for ethanol

Country/region	Present gasoline consumption (billion liters per year) 2007	Present ethanol production (billion liters per year) 2008	Potential demand resulting from present mandates up to 2020/22 per year
US	530	34	136
European Union	148	2.3	8.51
China	54	1.9	5.4
Japan	60	0.1	1.8
Canada	39	0.9	1.95
United Kingdom	26	0.03	1.3
Australia	20	0.075	2.0
Brazil	25.2	27	19.6
South Africa	11.3	0.12	0.9
India	13.6	0.3	0.68
Thailand	7.2	0.3	0.7
Argentina	5.0	0.2	0.25
The Philippines	5.1	0.08	0.26
Total	943.2	67.3	178.7