

Physics and Chemistry of Climate Change and
Entrepreneurship
FAPESP - São Paulo, 26 February de 2009

Opportunities in Brazil for
Biological Carbon Sequestration

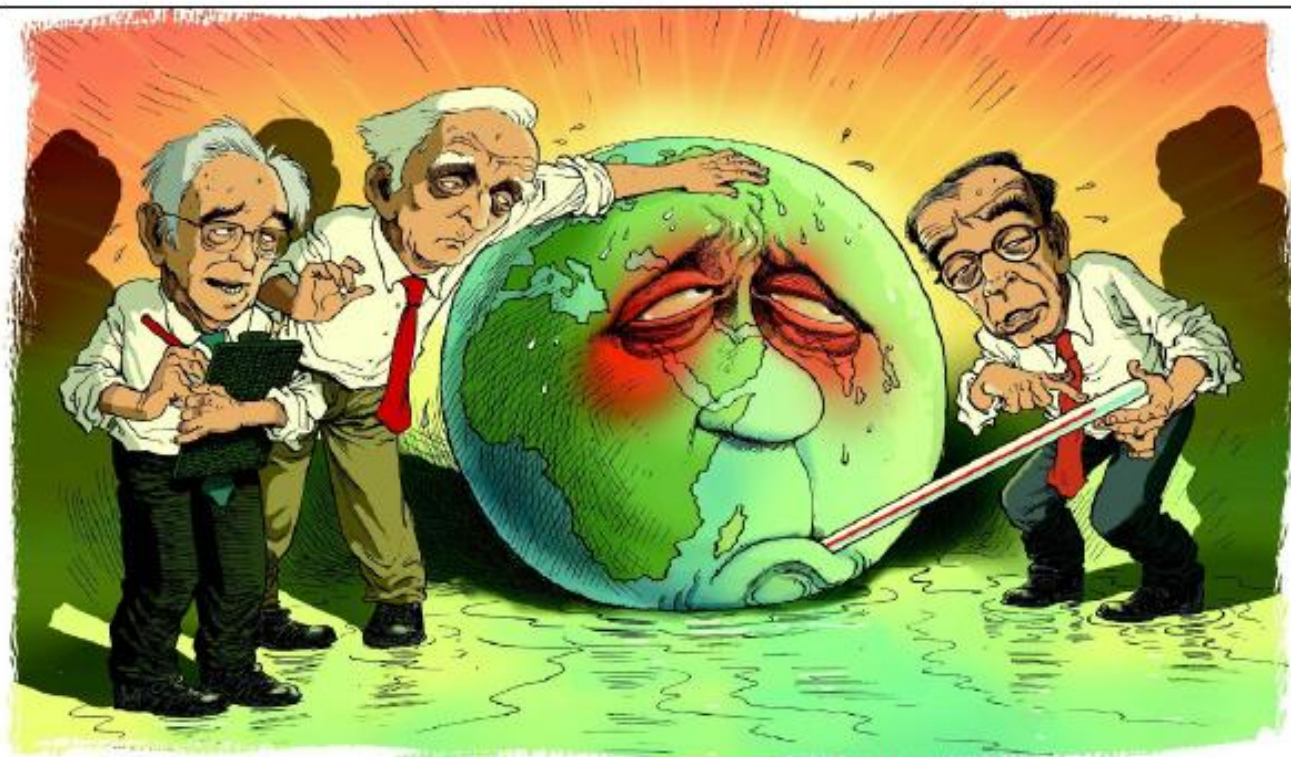
Luiz Gylvan Meira Filho

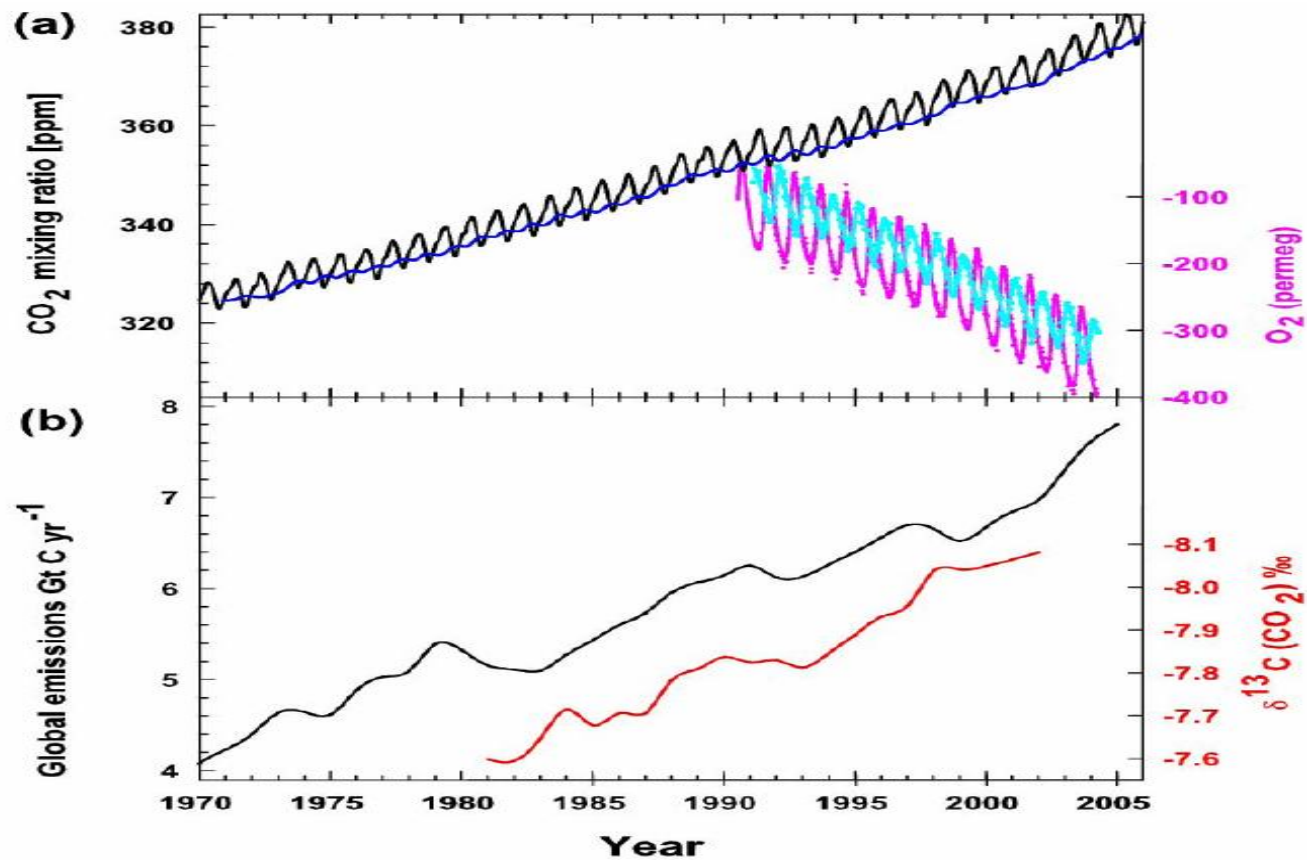
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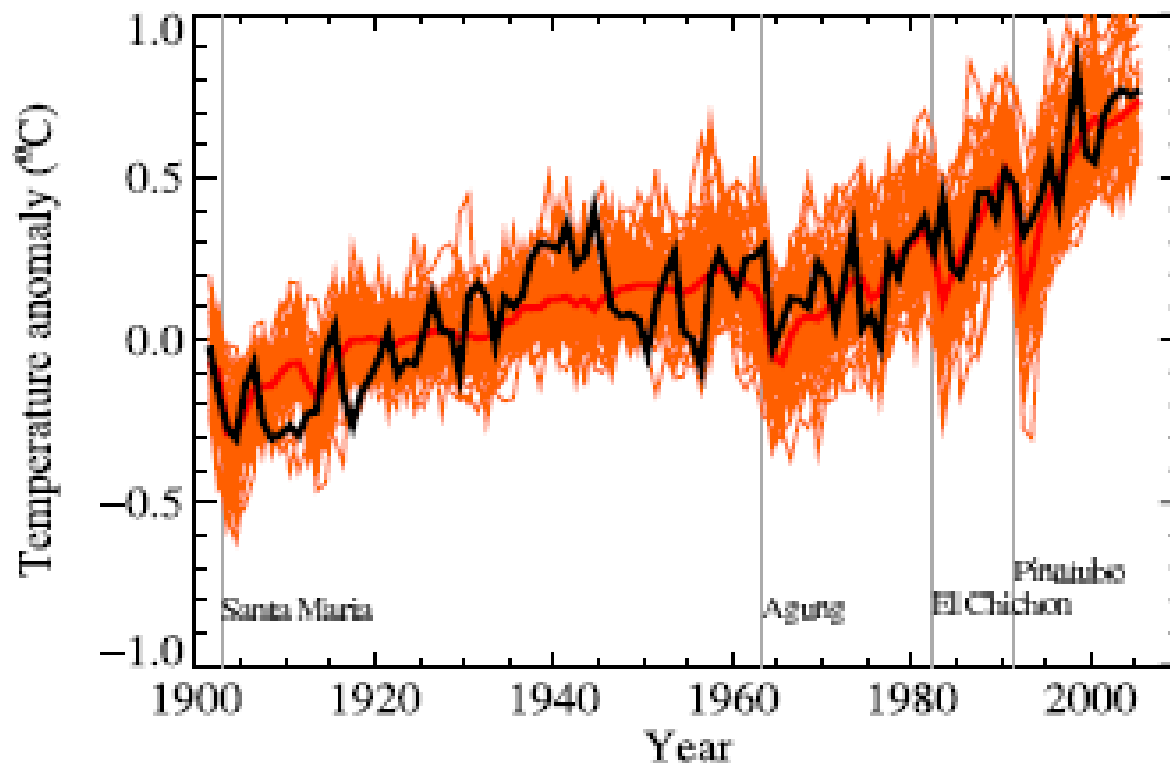
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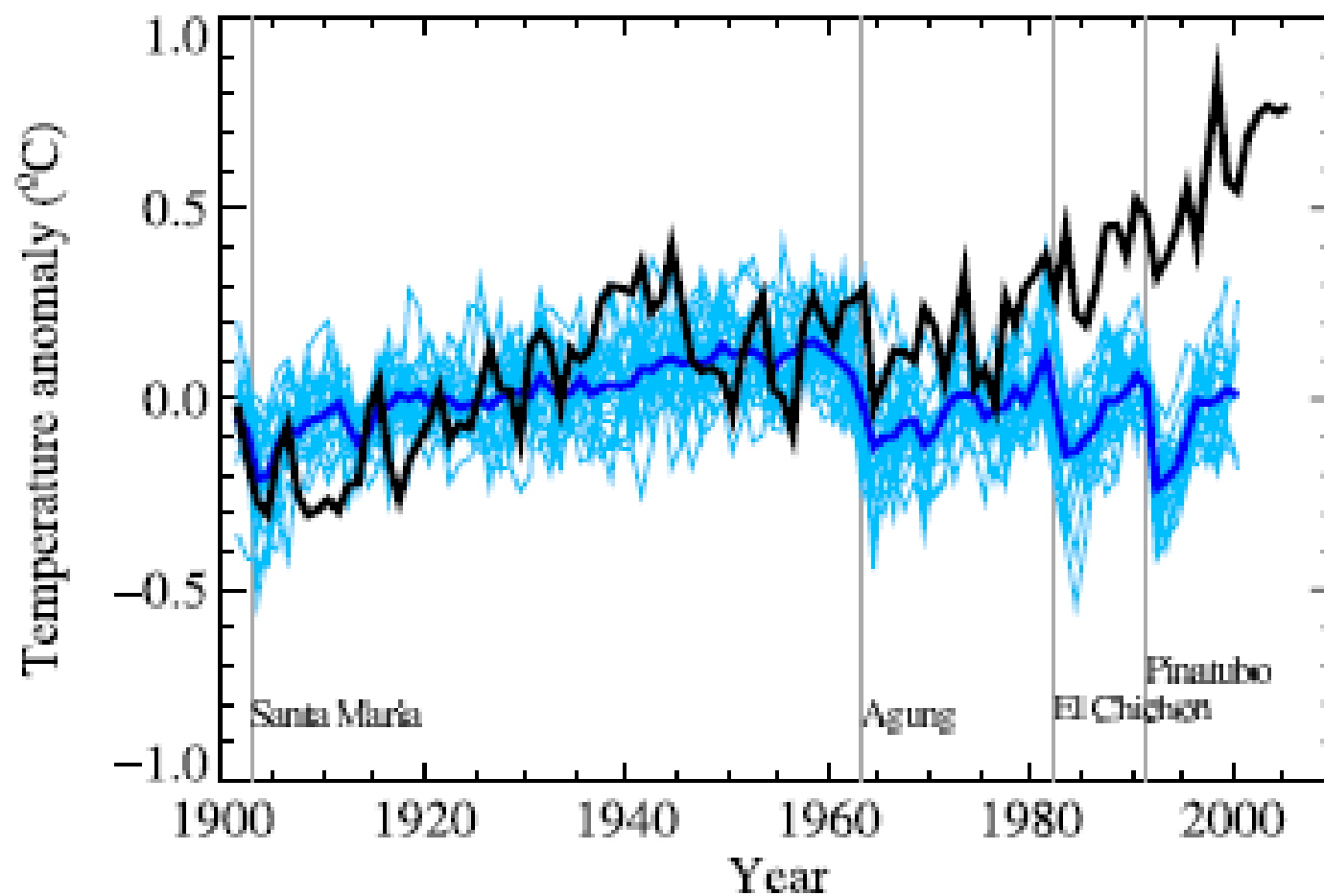
MEETINGS THAT CHANGED THE WORLD **OPINION**

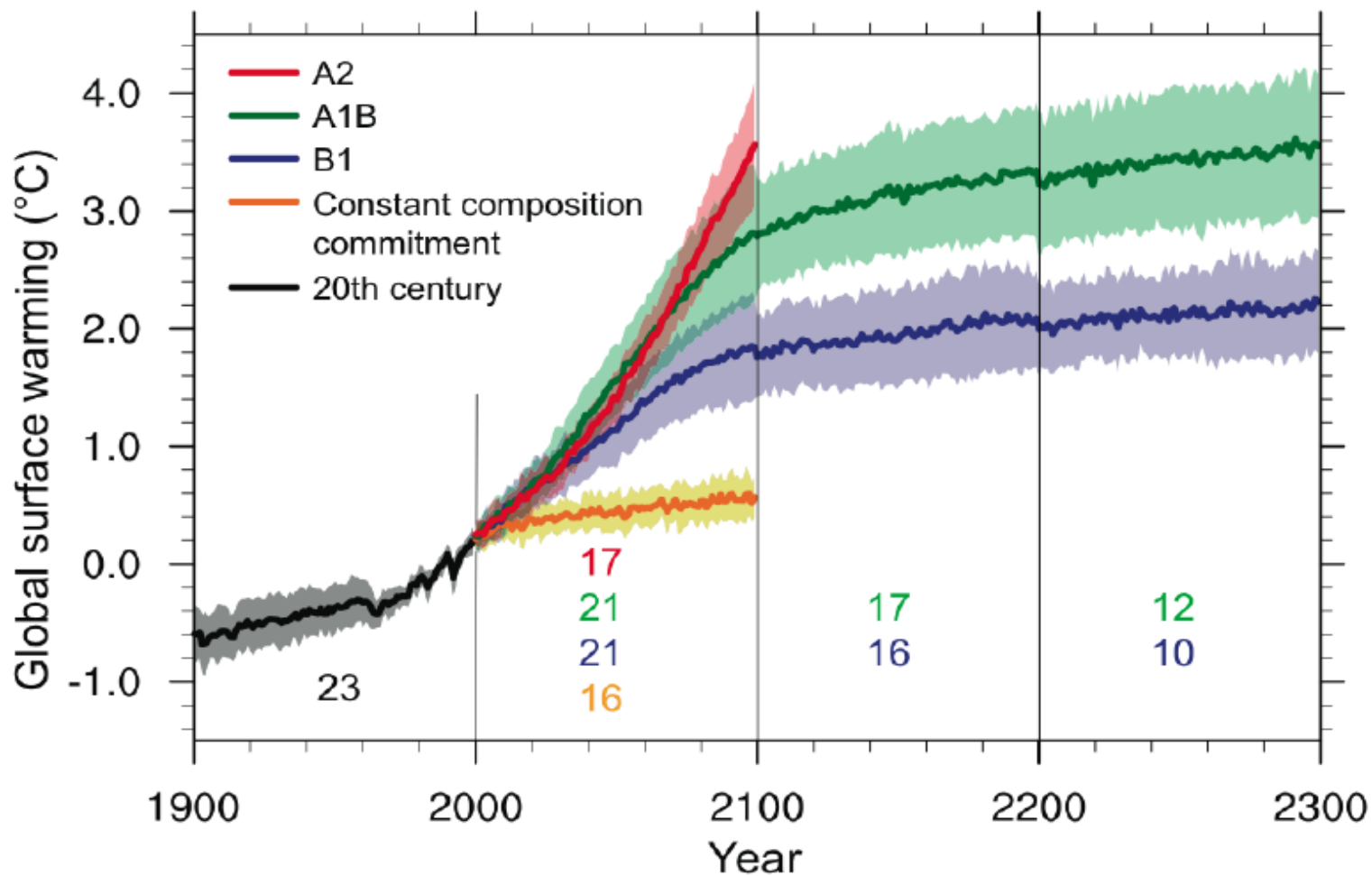
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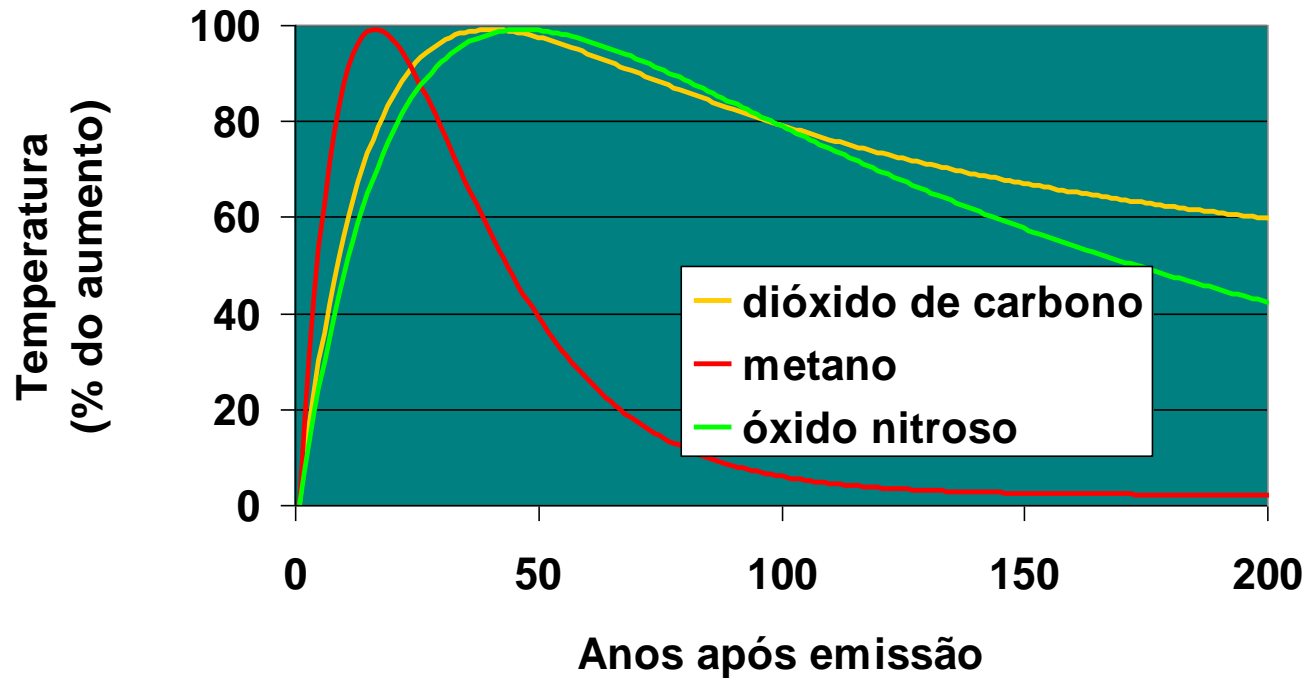




- In order to stabilize the atmospheric concentration of carbon dioxide in the atmosphere, at any level, the global emissions will have to be reduced by 60% with respect to their 1990 level.

Máximo efeito sobre o clima ocorre décadas após a emissão

15% do gás carbônico permanece na atmosfera por mais de mil anos



- Carbon dioxide, in the long range, is by far the most important greenhouse gas in a climate change mitigation strategy, because part of the additional atmospheric concentration decays very slowly.

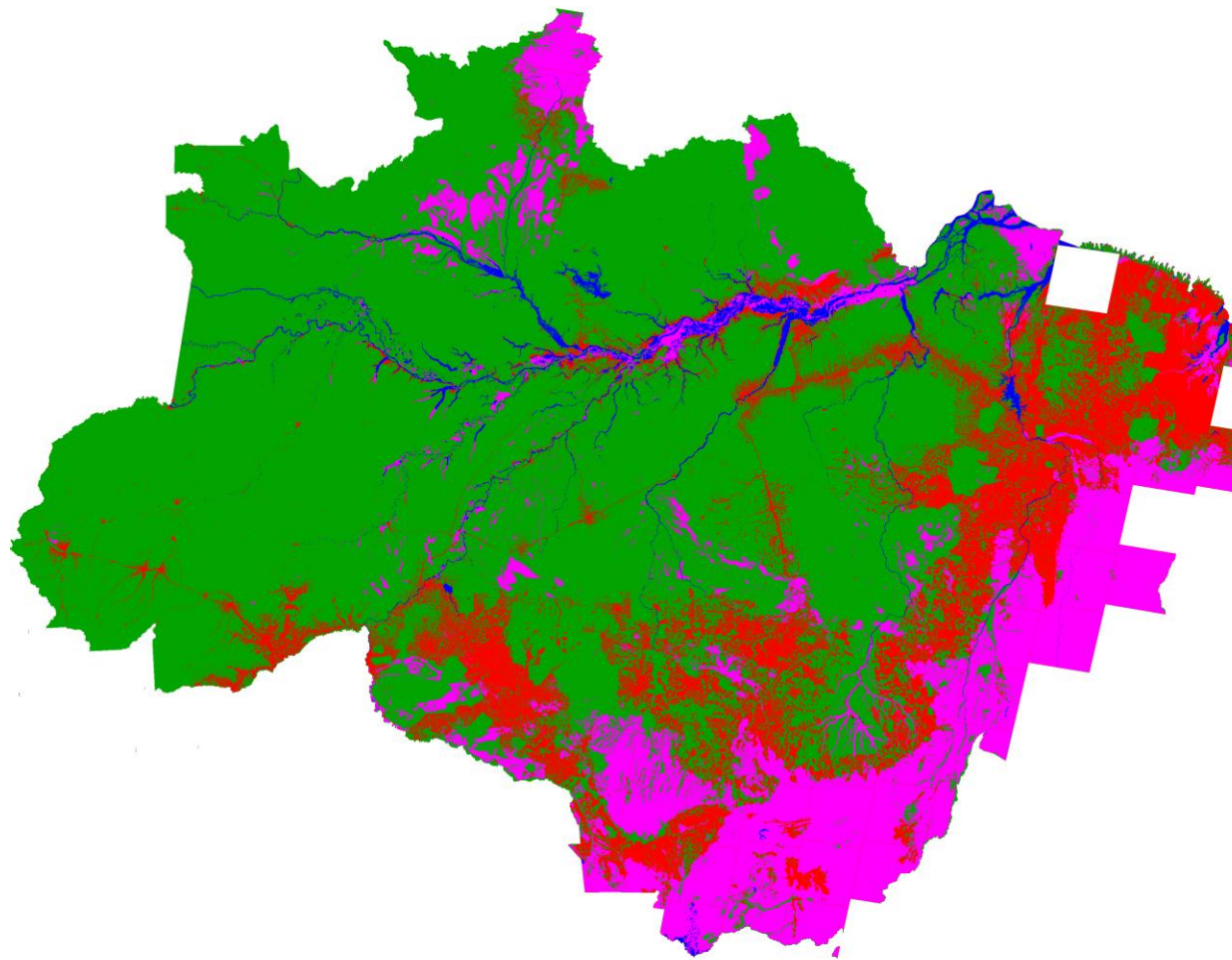
- About 15% of all carbon dioxide of human origin emitted since the beginning of the industrial revolution is still in the atmosphere.

- In addition to reducing fossil emissions of carbon dioxide, it will be necessary to sequester carbon dioxide and store carbon in the terrestrial biosphere, in the oceans and geologically.

- Brazil has gained some experience in the the carbon dioxide sequestration by planting trees (aforestation or reforestation) in areas that did not contain a forest in 1989, both native species and commercial species.

- Aforestation or reforestation with native species in protected areas - CDM Methodology ARAM-0010, developed by AES Tietê.
- CDM project of reforestation of the borders of AES Tietê hydro reservoirs in the state of São Paulo.

- Aforestation or reforestation with single species for commercial purposes - CDM Methodology ARAM-0005, developed by Plantar S/A.
- CDM project of reforestation with eucalyptus for the production of charcoal, a renewable solid biofuel.

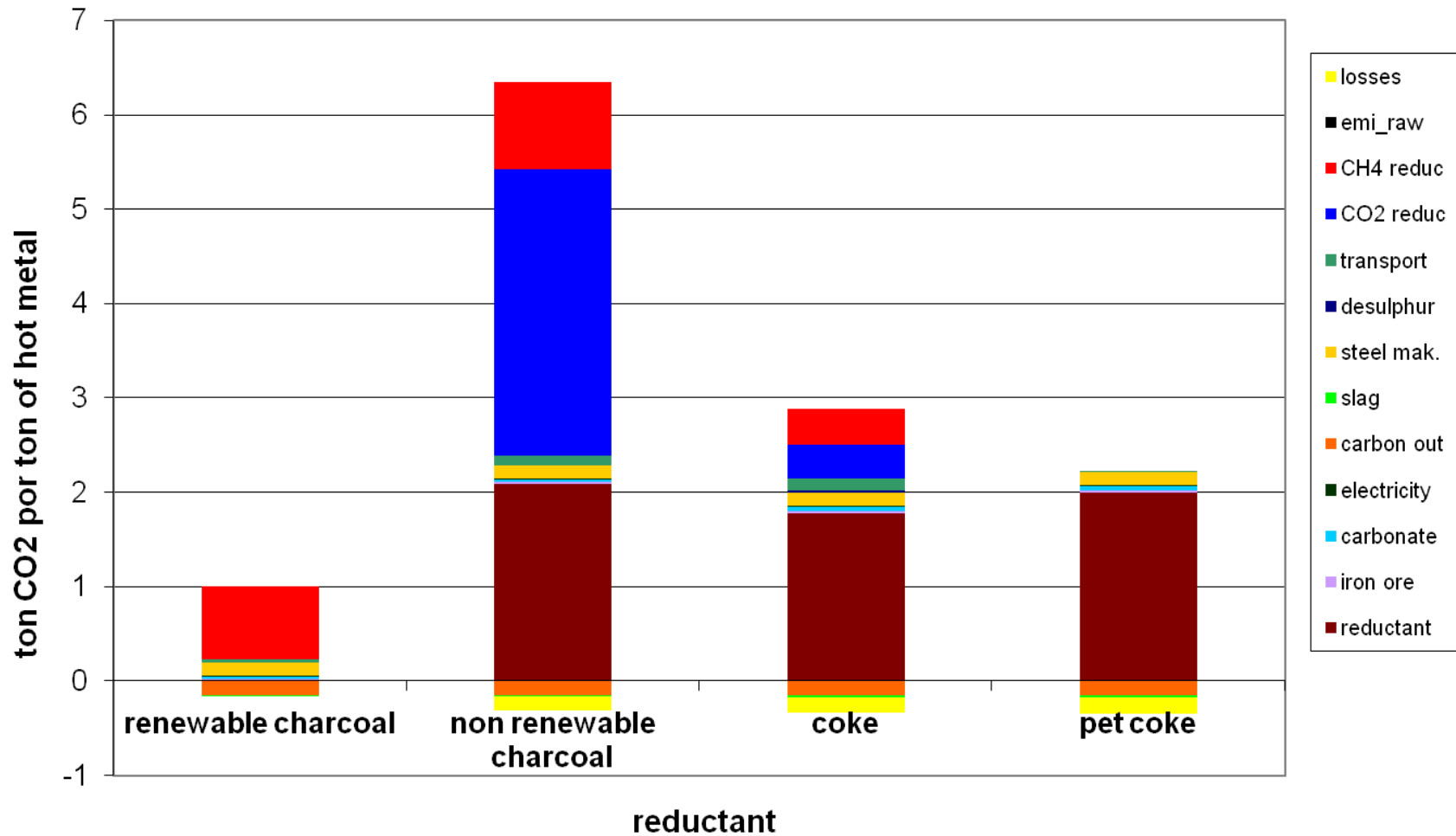


- There is a significant amount of land available for reforestation in the Brazilian Amazonia – could reach one million hectares.
- The recovery of riparian forests and hilltops would produce important side benefits.

- In the pulp and paper industry, the short rotation period of eucalyptus and pinus in Brazil opens the perspective for important amounts of biological sequestration by planting in non-forest land.

- Aforestation or reforestation to produce energy, in addition to the sequestration of carbon dioxide, results in the additional benefit of displacing fossil emissions or the even higher emissions from the non-renewable use of biomass.

specific emissions of carbon dioxide equivalent per ton of hot metal

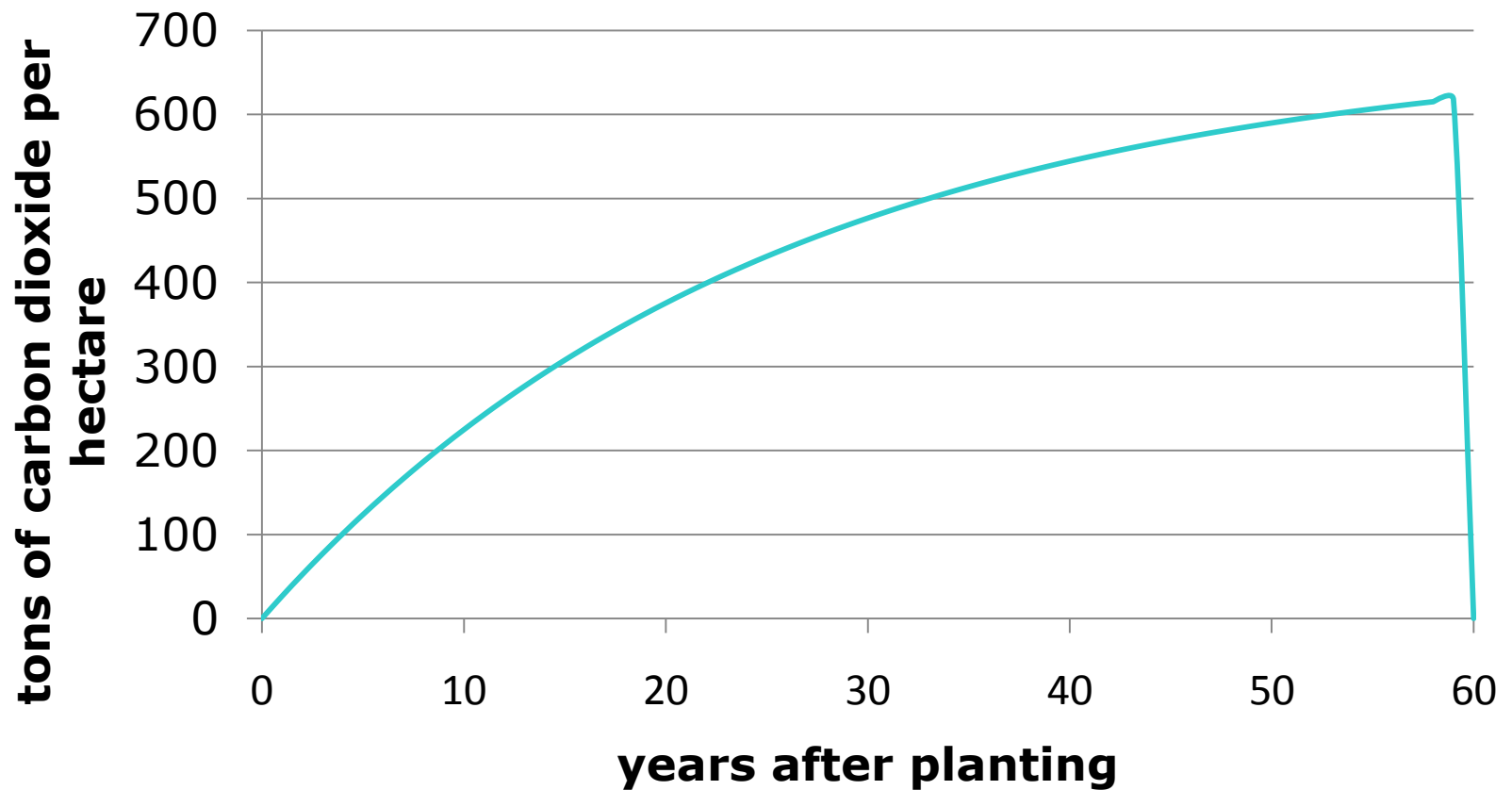


- There is a potential to produce one third of all iron and steel in Brazil with solid renewable biofuels.
- In combination with carbon dioxide capture and geological storage, it would result in negative emissions.

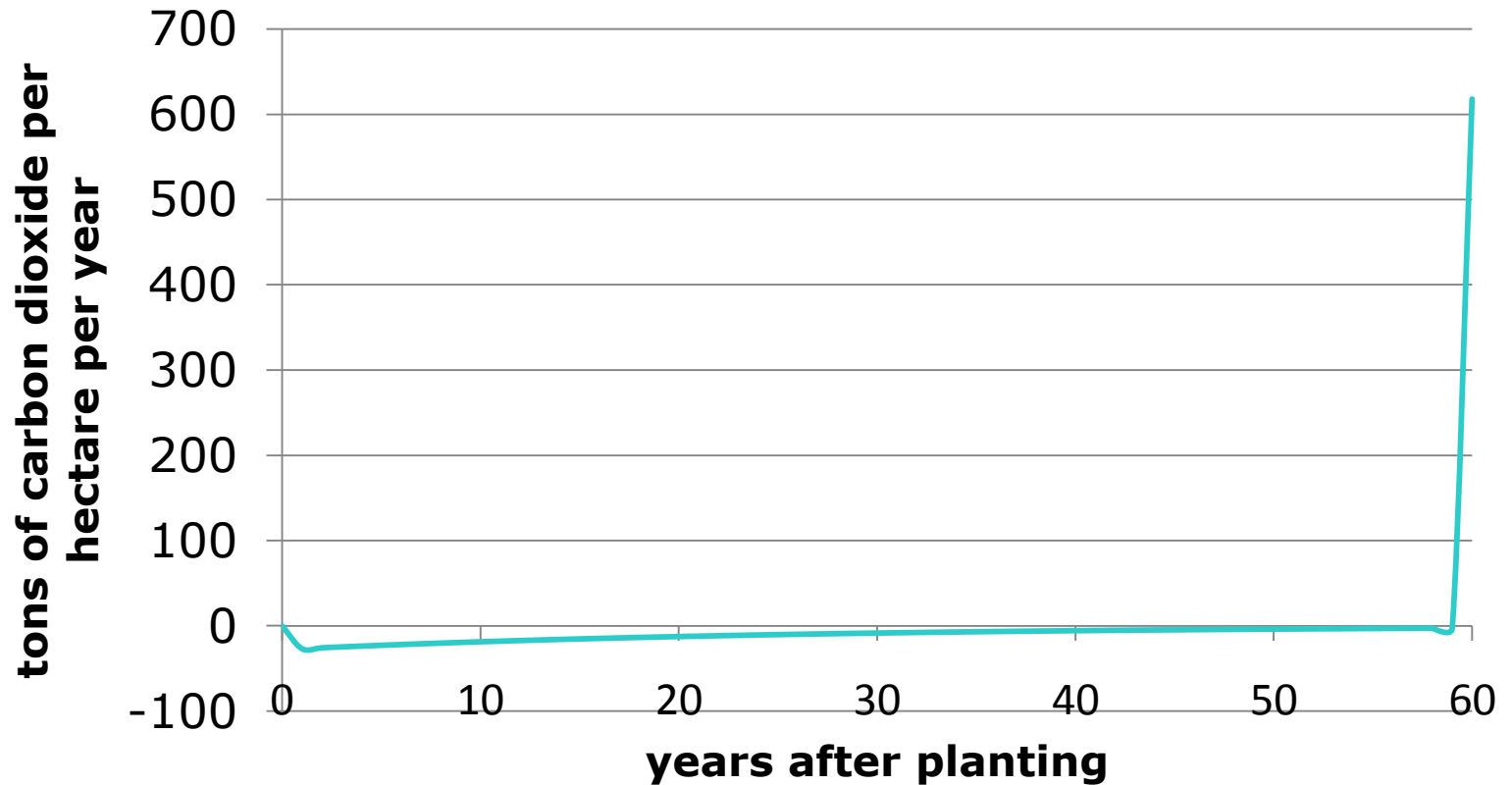
- The cost of aforestation or reforestation is high - a subsidy is thus required.
- The sale of carbon credits under the Kyoto Protocol CDM is not sufficient to make aforestation or reforestation economically viable.

- At present, the price of carbon credits for biological carbon dioxide sequestration and carbon storage is well below the price for ordinary CDM credits, because the rules consider that afforestation or reforestation credits are temporary.

Cumulative removal from A/R with native species



Emissions reduction (negative) and emissions (positive) for A/R with native species



- The assumption behind the present rules, that all carbon is released at the end of the project period, is not plausible or credible, for certain circumstances, such as protected areas or sustained commercial forestry.

- When the present rules are revised, the price of aforestation or reforestation carbon credits is likely to approach that of ordinary carbon credits
- This would represent a sufficient incentive for biological sequestration.

- There is an urgent need for larger scale studies of the fate of carbon in ocean iron fertilization in the Atlantic Ocean.
- The potential storage is likely to be for several centuries.

- Thank you
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