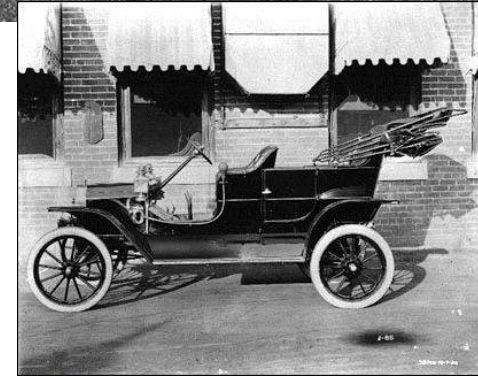


Joint PhD Program on Bioenergy Research The São Paulo Center for Bioenergy



Um pouco do passado e as consequências para o nosso presente



Henry Ford's 1908 Model T ran on 100% ethanol. In 1925, Ford proclaimed ethanol the "fuel of the future." Ethanol distilled from corn was used for illumination in America before the Civil War. It was replaced by kerosene in lamps because it was more expensive and could not be refined in sufficient quantities. (The same was true of "coal oil," which is also currently subsidized, but that must be the subject of another indictment.) Ethanol was displaced by gasoline because it was cheaper and, more plentiful and a far superior fuel

O início da indústria do Petróleo



Em 1903 o Almirante John Fisher realizou a conversão do navio de guerra da Marinha Real Britânica – HMS Hannibal de carvão para óleo derivado de petróleo. O primeiro teste foi uma tragédia, o

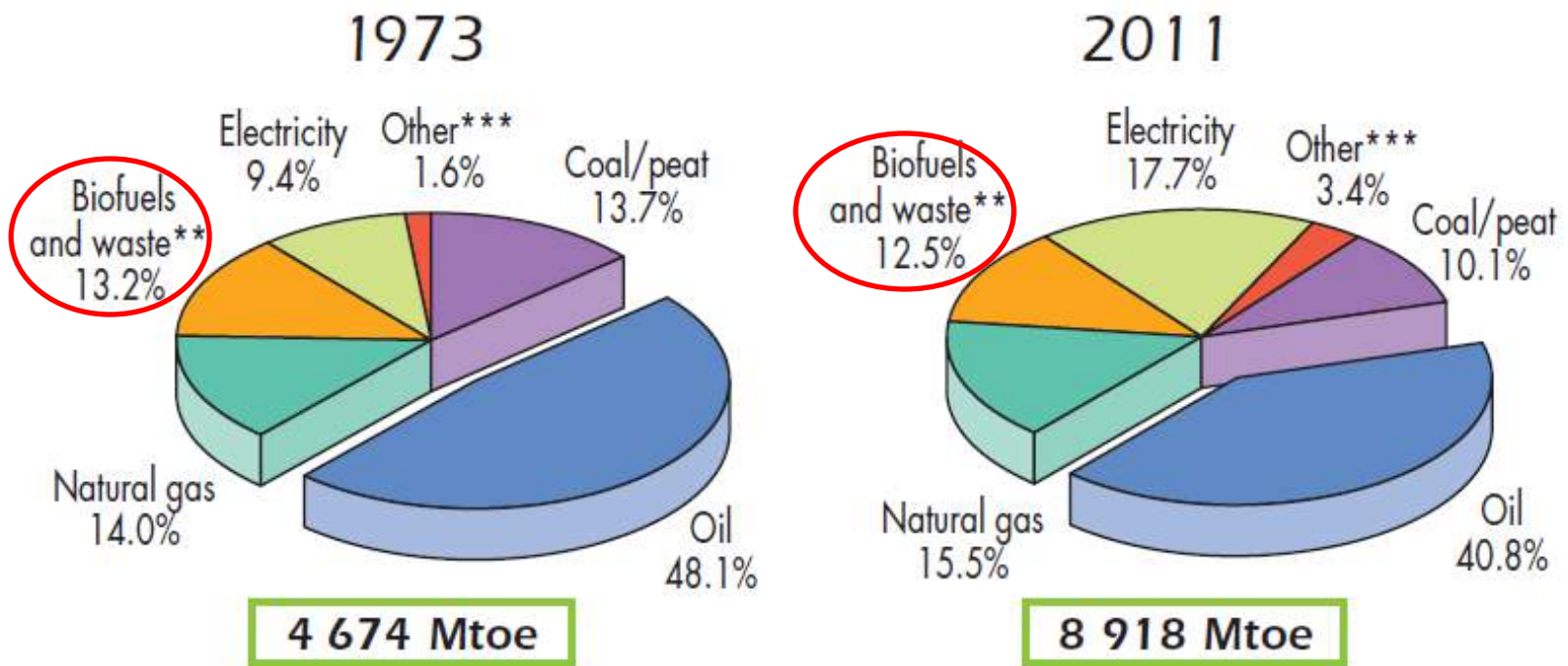


motor pegou fogo e as novas tentativas de conversão de navios de carvão para óleo foram abandonadas. Os testes foram feitos e com o sucesso na melhora das manobras das embarcações, aumento da autonomia, além da possibilidade dos navios serem reabastecidos em alto mar, levaram Churchill a determinar a conversão de todos os navios da marinha. Com essa decisão foi criada a empresa Anglo-Persian (atual BP) para a prospecção de petróleo. Assim nasce a indústria petroleira e petroquímica



Distribuição Global das Fontes de Energia

1973 and 2011 fuel shares of total final consumption



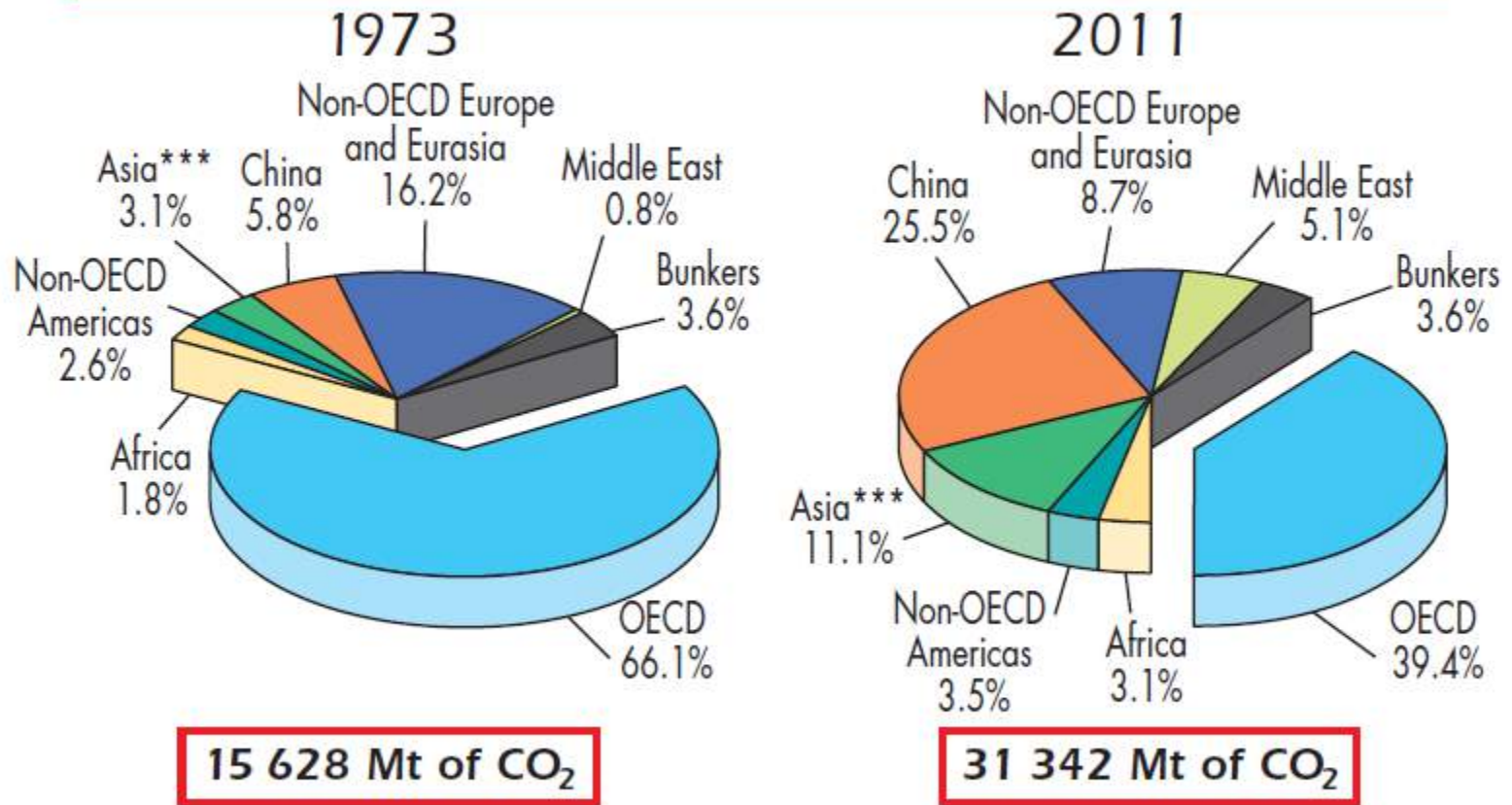
*World includes international aviation and international marine bunkers.

**Data prior to 1994 for biofuels and waste final consumption have been estimated.

***Other includes geothermal, solar, wind, heat, etc.

Consequências ambientais do uso de fontes não renováveis

1973 and 2011 regional shares of CO₂ emissions**



*World includes international aviation and international marine bunkers, which are shown together as Bunkers. **Calculated using the IEA's energy balances and the Revised 1996 IPCC Guidelines. CO₂ emissions are from fuel combustion only. ***Asia excludes China.

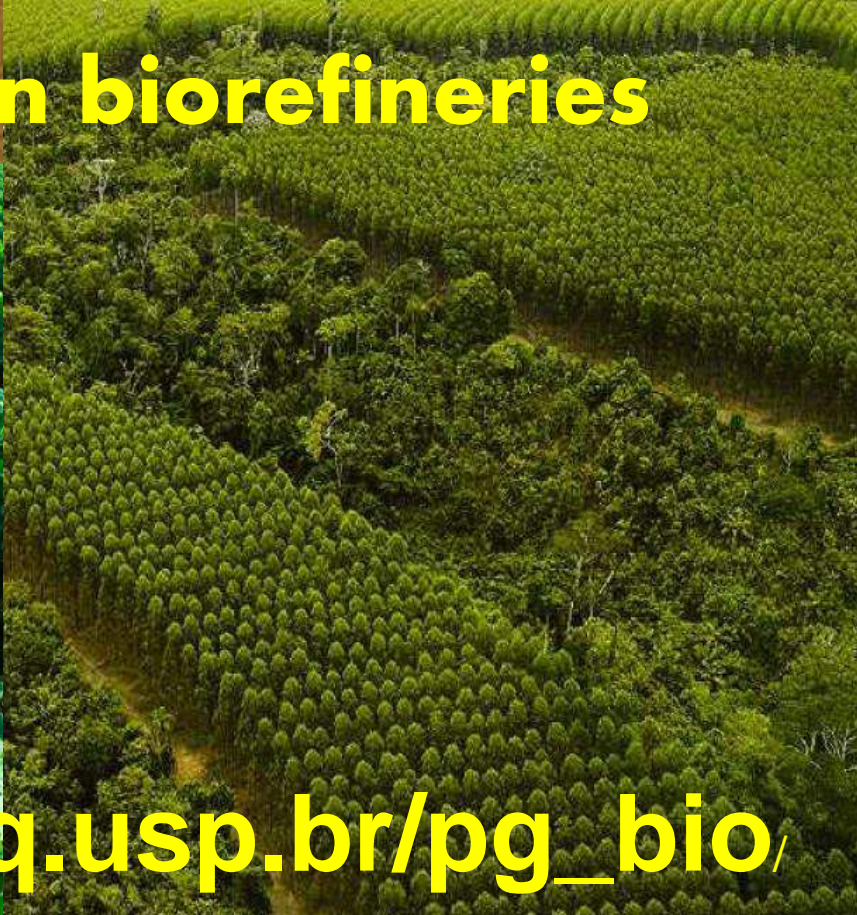


Brazil

A leading country in biorefineries

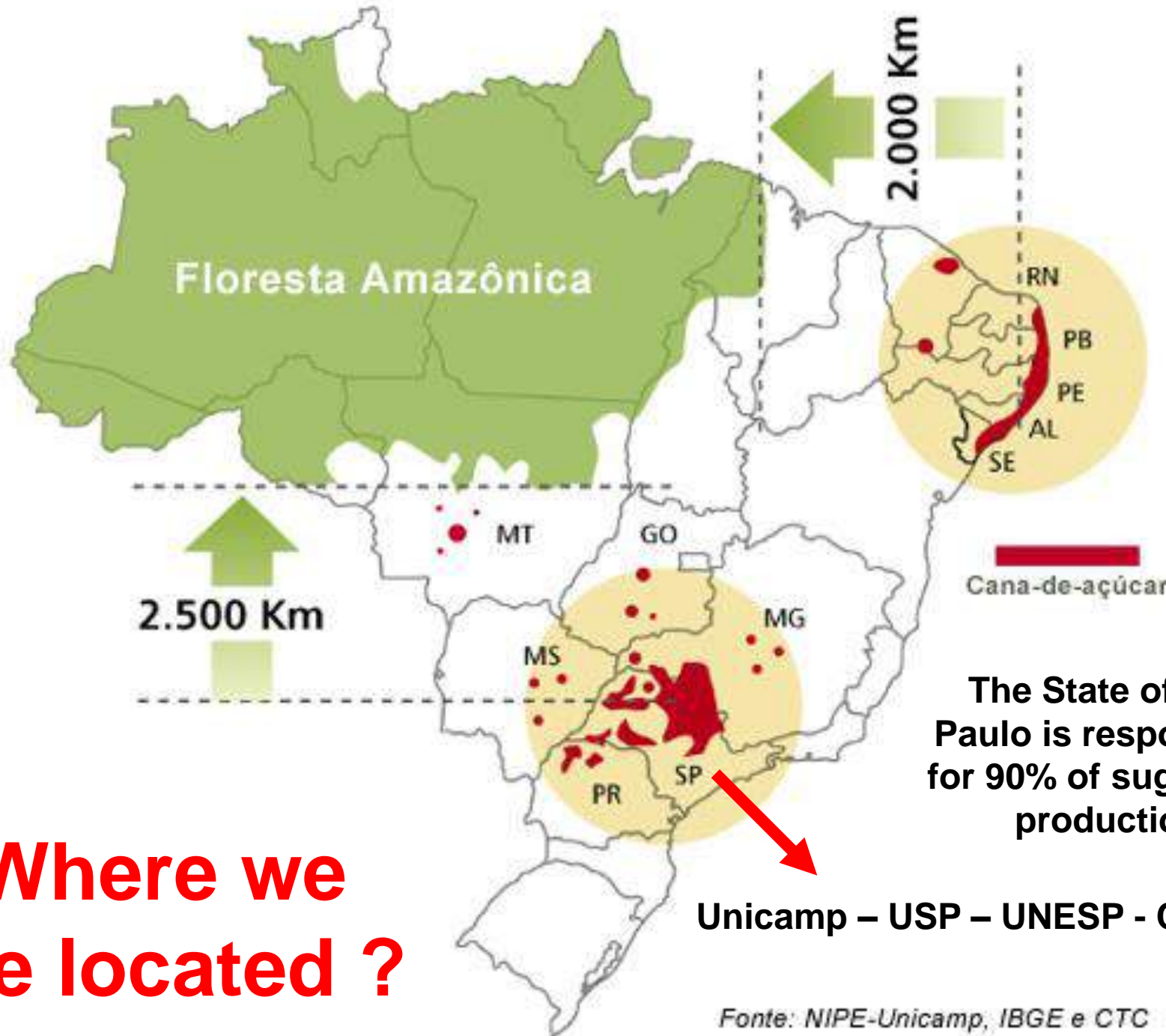


 GranBio



http://genfis40.esalq.usp.br/pg_bio/

**Where we
are located ?**



The State of São Paulo is responsible for 90% of sugarcane production

Unicamp – USP – UNESP - CTBE

Fonte: NIPE-Unicamp, IBGE e CTC

Areas of Research

- ✓ ***Biomass production for Bioenergy***
- ✓ ***Development of new process for biofuels production***
- ✓ ***Biorefineries and Green-chemistry***
- ✓ ***Sustainability Studies, including social, economic and environmental impacts on bioenergy production***
- ✓ ***Engines and Biofuels***

Aims and Scope

- ✓ ***Build an outstanding PhD program on Bioenergy Research of international class***
- ✓ ***Courses are in English and the students will have to spend at least 4 months abroad, either in a University, Research Institute or in the Private Sector***
- ✓ ***Courses are offered in video-conference and can be presented by professors in Brazil, abroad or by researchers and experts from public and private sector***

- ✓ *The program is open to Brazilians and Foreign applicants*
- ✓ *We want to have a strong collaboration with Research Institutes from Brazil and abroad - **DANISH UNIVERSITIES** - and the private sector*
- ✓ *In the first 3 years 150 places will be offered;*

Structure of the PhD Program

- ✓ 43 Supervisors from the 3 universities are already participating***
- ✓ 27 New Research Scientists are being hired***
- ✓ Courses are offered simultaneously for the 3 universities and are recorded***
- ✓ 9 Research Centers from the 3 Universities are already involved***

- ✓ ***The National Laboratory for Science and Technology of Bioethanol (CTBE/CNPEM) is involved with co-supervision of it`s leading scientists and scholarships***
- ✓ ***Foreign students can have scholarships from Brazil (CAPES-CNPq or FAPESP)***

Brazilian-Danish Collaboration on Biorefineries



BRAZILIAN-DANISH WORKSHOP ON BIOREFINERIES
Integrated Biorefineries for
Energy and Chemical Production

Copenhagen, 22-23. September, 2014

Collaboration on biorefineries –why?

- Biomass is a strategic resource
- Brazil has large agricultural sector, large bioethanol industry, growing research infrastructure, large natural resources
- Denmark has a large agricultural sector, large biotech industry, long tradition for agricultural research

Activities

- Workshops
- December 2013 CTBE - Campinas (108 participants)
- September 2014 Copenhagen (82 participants)
- PhD courses
- Guest teachers
- Guest teachers –video link
- PhD student exchange (2-way)
- Short term visits

Participants

Denmark

- University of Copenhagen
- Technical University of Denmark
- Aarhus University
- Aalborg University
- Novozymes
- DONG
- Haldor Topsoe
- BioGasol + more

Brazil

- USP
- CTBE
- UNICAMP
- UNESP
- We want to include Brazilian companies in the program: Granbio, Raizen, CTC, Petrobras, Brasken, Dow Brazil, Abengoa, Odebrechte

Principles for continuing collaboration

- Develop technologies and biomass supply for 3rd generation biorefineries – integrated production of fuels and chemicals
- Cross disciplinary effort from field to factory, fermentor and reactor.
- Identify and use synergies between, technologies, and infrastructures (research, industry and agriculture)
- Develop common project ideas
- Graduate education of MSc and PhD
- Build a long lasting and strong collaboration through exchange of PhD's and researchers and sharing of resources

Collaboration -lessons learned

- Denmark and Brazil have a good mix of academic research and industry in need of knowledge and innovation
- Sandwich PhD programs are attractive to the PhD students
- Mobility (funding) is key
- A cross disciplinary approach is optimal (from nano-meter to square-kilometer)
- Industries are interested, but hard to commit to a strategic research agenda
- Biorefineries are a fertile area for joint research, but funding is hard to get for common projects

Next step(s)

- Continue exchange of students and researchers
- Build on existing programs, projects and activities
- Look for industry support/collaboration
- Support a joint EU-BR call for H2020
- Develop joint PhD courses
- Continue BR-DK Biorefinery workshops
- Support specific BR-DK program

BR-DK Copenhagen workshop 2014

