

Bioethanol Science and Technology Center



Research Program on Sustainability of Bioethanol

Arnaldo Walter (awalter@fem.unicamp.br)
Manoel Regis L.V. Leal, Joaquim Seabra, Marcelo Cunha

Summary of this presentation



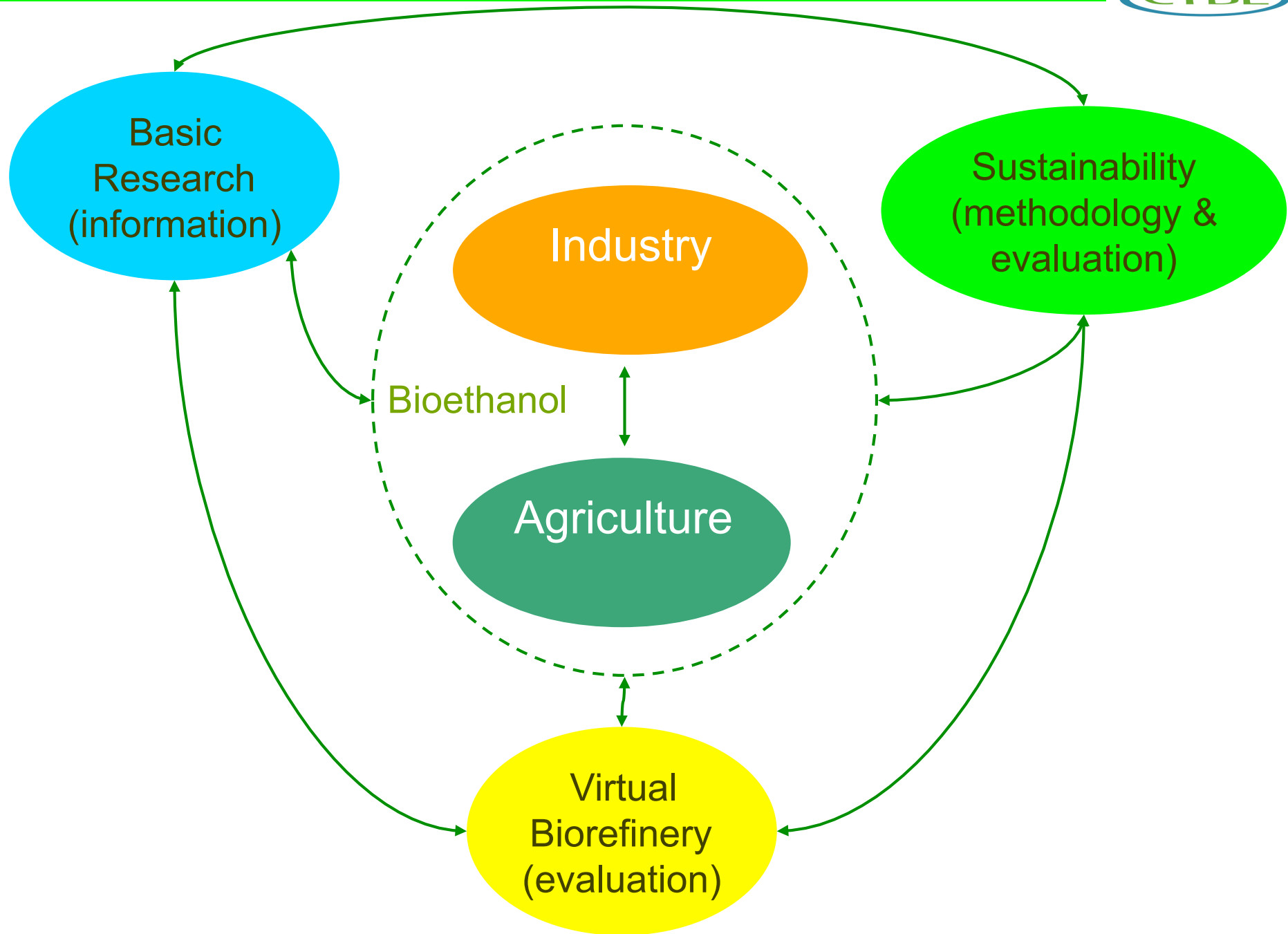
- About CTBE and its research programs.
- Sustainability of biofuels.
- Goals of the Research Program.
- Priorities on sustainability from the point of view of CTBE: GHG emissions, LUC, Carbon stocks and N₂O emissions, socio-economic impacts, resources optimization (water).
- Priority actions and strategy.
- Side activities.
- Dissemination of the results.
- Evaluation process.
- This Workshop.

About CTBE



- The Bioethanol Science and Technology Center (CTBE) is a national laboratory with focus on innovative and sustainable production of ethanol from sugarcane.
- CTBE invests internally and through strategic partnerships in basic research (science) and technological innovation.
- CTBE has five research programs: (1) Basic Science, (2) Pilot Plant for Process Development (PPDP), (3) Low Impact Mechanization for No-Till Farming of Sugarcane, (4) Sugarcane Virtual Biorefinery, and (5) Sustainability.
- The figure in the next slide is a scheme on how the five research programs have been linked.

Sustainability RP inside CTBE



- Worldwide, the main driving-forces for biofuels are:
 - Improving energy security, that includes diversification of the energy matrix, use of other energy sources than oil, development of indigenous energy sources;
 - Mitigation of GHG emissions and climate change impacts;
 - Improvement of life standards of farmers and agricultors;
 - Supply of energy services;
 - Mitigation of other environmental (potential) impacts.

- Sustainability of biofuels has been one of the focus points of the debate concerned to biofuels.
- Scientific arguments (sometimes not based on scientific evidences) have impacted both the society's behavior and the decisions of politicians.
- It is absolutely necessary to have science-based arguments.
- In the mid- to long-term, the future of the biofuels will depend on their effective sustainability (both in the external and in the domestic markets).

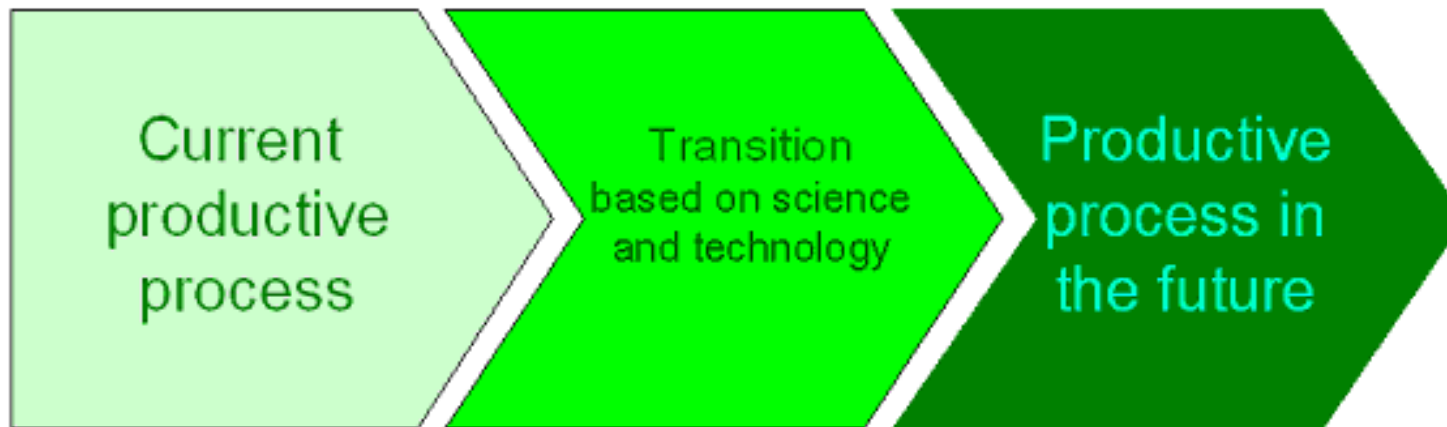


- On short-term, **the aim is evaluating the sustainability of bioethanol production from sugarcane, considering current technology and all changes that can be implemented in the years to come.**
- The mid-term aim is on **evaluating the bioethanol production from a sustainability point of view, taking into account all science and technology innovations that shall be incorporated to the production chain**, and that will be developed by the CTBE in its Research Programs (e.g., low impact mechanization in the agricultural side, ethanol production through hydrolysis of the bagasse, diversification of products, etc.).

Sustainability of Bioethanol from Sugarcane: its goals



Increase of ethanol production



Enhancement of sustainability



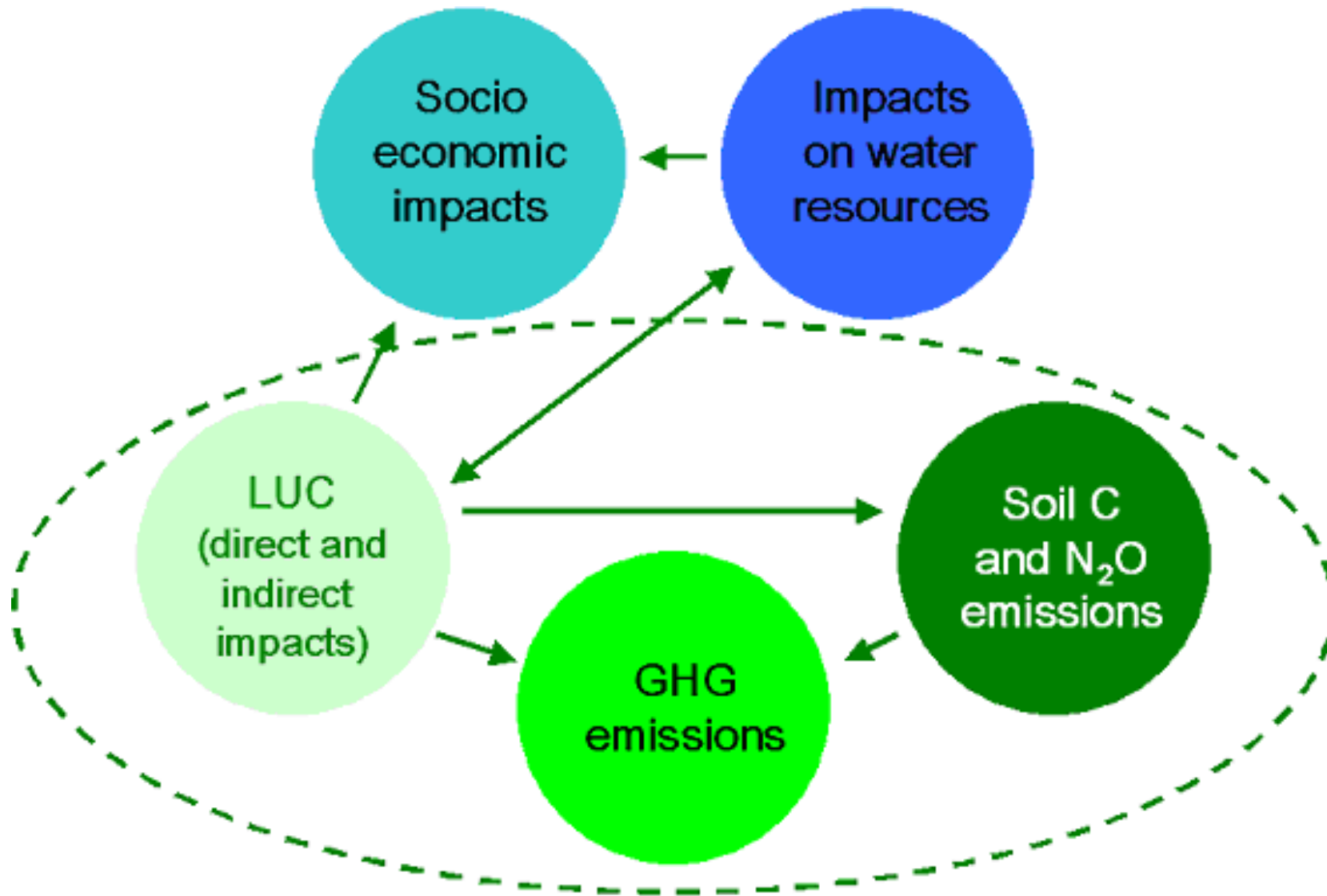
- Larger and more sustainable ethanol production.
- Transition should be based on S&T.

Sustainability RP: its priorities

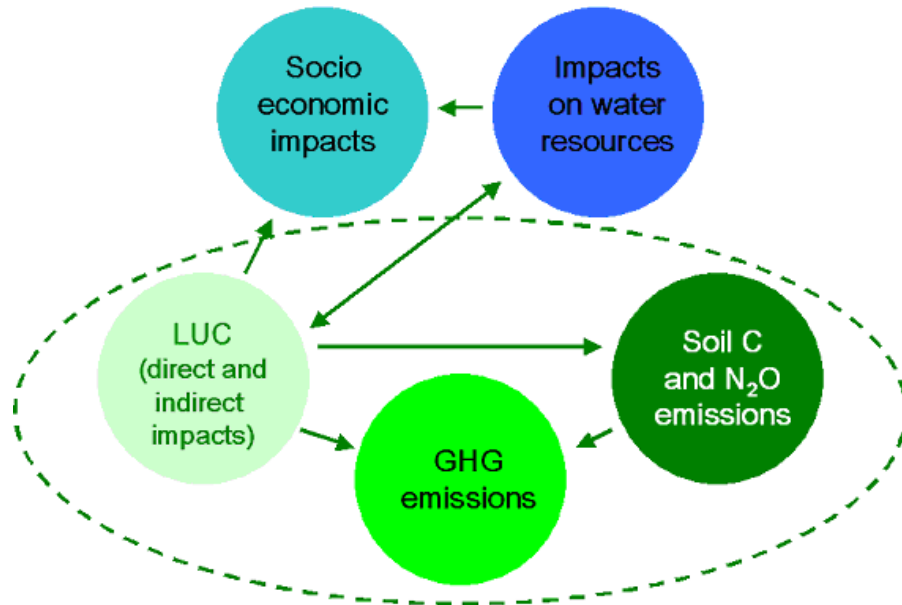


- Three priority aspects were defined by CTBE taking into account both the national and the international agenda
- They are: energy balance and balance on greenhouse gas emissions; socio-economic impacts; and impacts on the availability and on the quality of water resources.
- Strategy: (1) based on priorities, (2) on capacity skills, (3) on the necessity to reach solid results in short-term.
- This choice does not mean that other aspects of biofuels sustainability were considered irrelevant; other priorities should be defined along the coming years.

Sustainability RP: five research programs



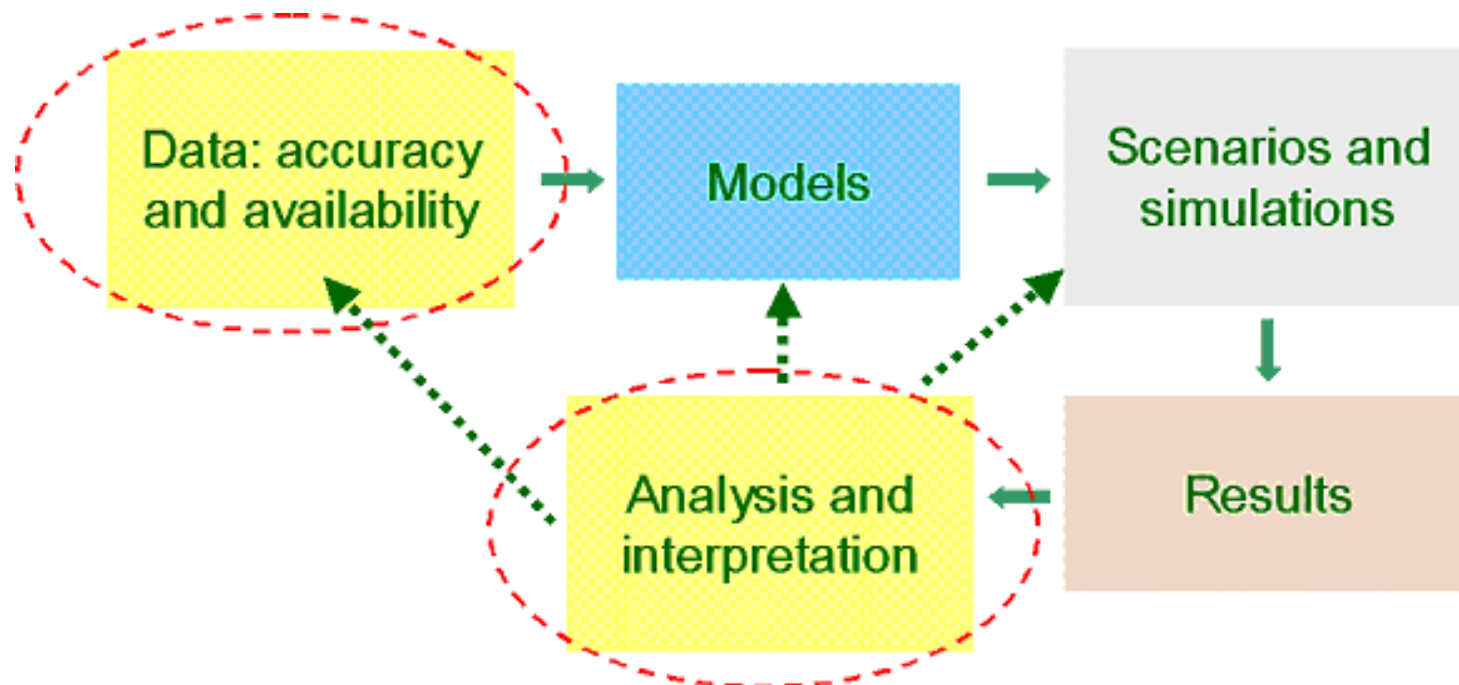
Sustainability RP: five research programs



- The Research Program on Sustainability of Bioethanol is organized based on five research projects that will be conducted simultaneously.

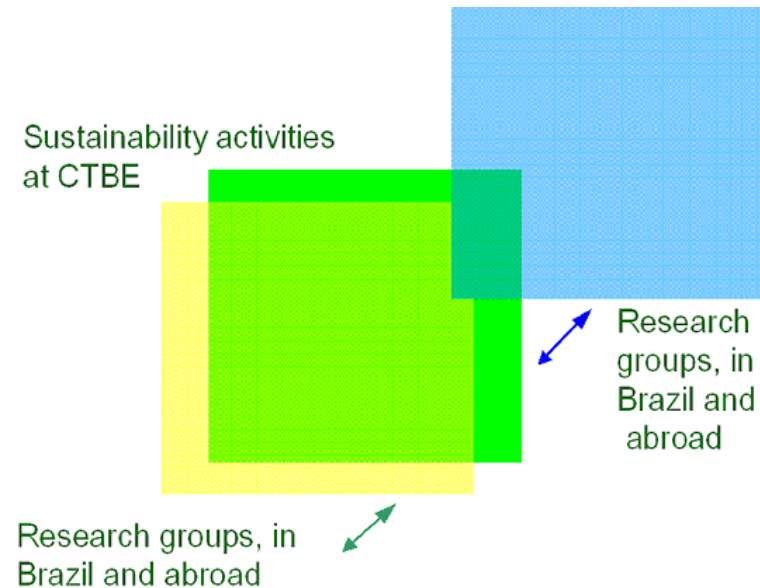
- Energy and greenhouse gas (GHG) emission balances;
- Land use change (LUC);
- Soil carbon stock changes and emissions of nitrous oxide;
- Socio-economic impacts;
- Water use and its impacts on water resources.

Sustainability RP: priority actions



- In short term the development of models will not be a priority.
- Data should reflect as much as possible Brazilian conditions of sugarcane and ethanol production, and, in this sense, considerable efforts would be put on data gathering (e.g., regarding soil carbon stocks, N₂O emissions, socio-economic aspects, etc.).
- Another priority should be on better understanding the results of modeling process.

Sustainability RP: strategy

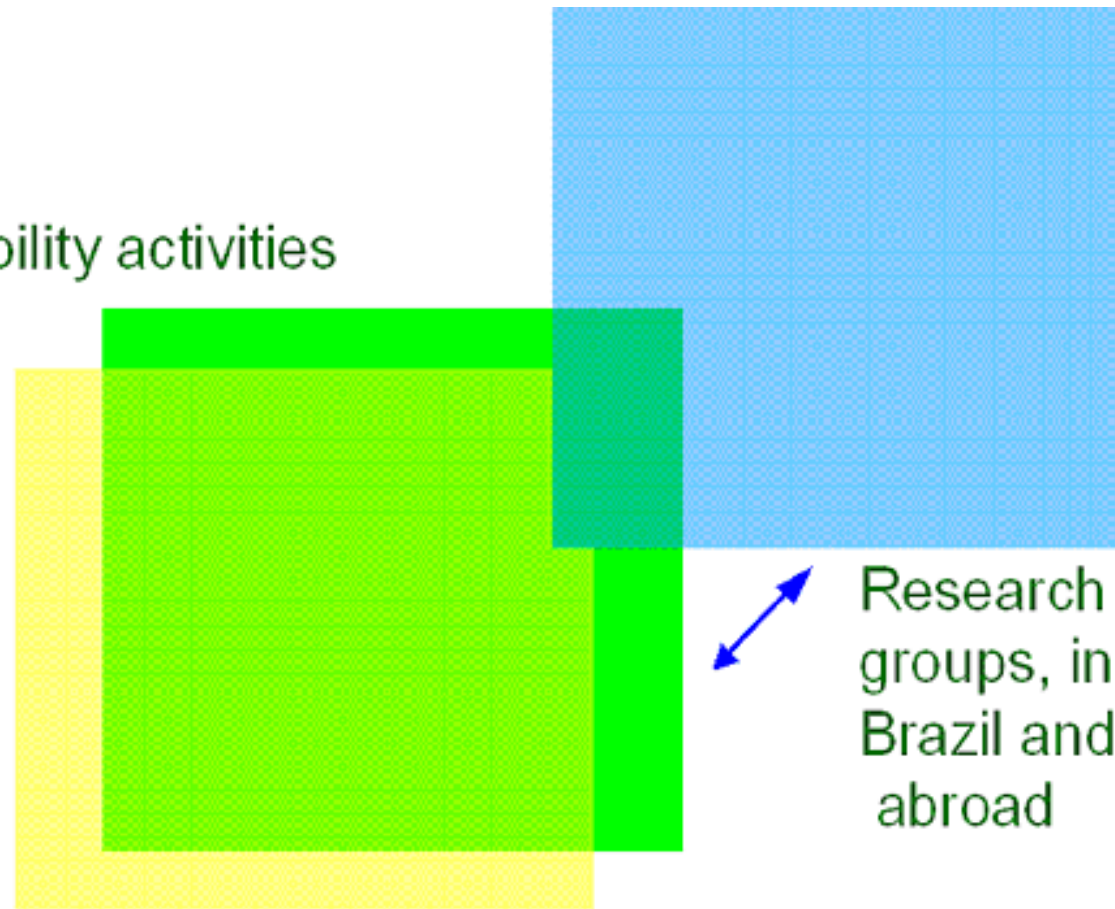


- CTBE intends to set partnerships either with national or with international research groups.
- Partnerships aim at catalyzing the research process and making more effective the use of resources, but CTBE also intends to efficiently disseminate information.
- Depending on the case, research activities would be developed internally at the CTBE in a small or in a large extent.

Sustainability RP: strategy



Sustainability activities
at CTBE



Research
groups, in
Brazil and
abroad

Research groups, in
Brazil and abroad



- **Data basis:** one of the aims of the Research Program is dissemination of information. As far as possible, all information obtained will be public available in order to disseminate the knowledge and foster the discussions with other research groups.
- **Definition of scenarios:** some of the research activities will be developed taken into account a given economic context. In order to have a comprehensive and coherent set of hypothesis (and, as consequence, a coherent and comparable set of results), solid reference scenarios need to be defined.
- **Overview reports:** some overview reports would be necessary in order to guide the research activities and the analysis that will be done. Experts could be hired for specific studies (e.g., about competitors of ethanol as alternative fuel, alternatives of sugarcane as raw material, new technologies, new tendencies on energy- and climate-policies).

- Results would be primarily published in English, in high-level peer-reviewed journals. Complementarily, information could be disseminate through papers (to be presented in conferences), reports, speeches, the Program website, newsletter, etc.
- This aspect should be explicitly considered along the annual evaluation processes, taking into account the number and the quality of the papers, the impact of the journals, and the frequency of publications.

Evaluation of results



- The Research Program will be annually evaluated by peer-reviewers (three, as a proposal). At least one of these three peer-reviewers must be from abroad. Ideally, at least a partial evaluation should be presented during the annual Workshop, that is mentioned below.
- A Workshop would occur annually at CTBE's facilities, in Campinas. During this Workshop, the research results achieved along the year will be presented and discussed.

This workshop



- The Workshop itself will occur in two days.
- The research activities will be presented and discussed in five consecutive sessions, each one devoted to the previously described research subjects.
- In each session, after the presentations, there will be time for discussions.
- The proposal regarding the project “Impacts on water resources” is a more preliminary stage; more details will be presented Thursday afternoon.
- The Research Proposal will be evaluated in more details Friday morning, in a meeting between the peer-reviewers and CTBE’s staff.



Thanks for your attention!!
Questions?