



Sustainability of bioethanol: the vision of CTBE

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Summary of this presentation



- **CTBE and its research programs – Sustainability at CTBE;**
- **Sustainability of biofuels;**
- **Priorities on Sustainability from the point of view of CTBE: GHG emissions, LUC, socio-economic impacts, resources optimization (water);**
- **CTBE's strategy: research to be conducted together with other groups in Brazil and abroad;**
- **Issues to be addressed in this Workshop.**



- **CTBE is a fully dedicated center for Research, Development and Innovation of the production chain of sugarcane for bioethanol. It is a strategic initiative of the Science and Technology Ministry of Brazil.**
- **CTBE's mission is on contributing for ensuring Brazilian leadership in the sustainable production of bioethanol from sugarcane through state-of-the-art research, development, and innovation.**



- **Basic Research:**

- **Photo-biochemical conversion of solar energy by sugar cane.**
- **Sugar cane biomass (bagasse and trash) conversion in ethanol.**
- **Ethanol conversion in mechanical energy.**

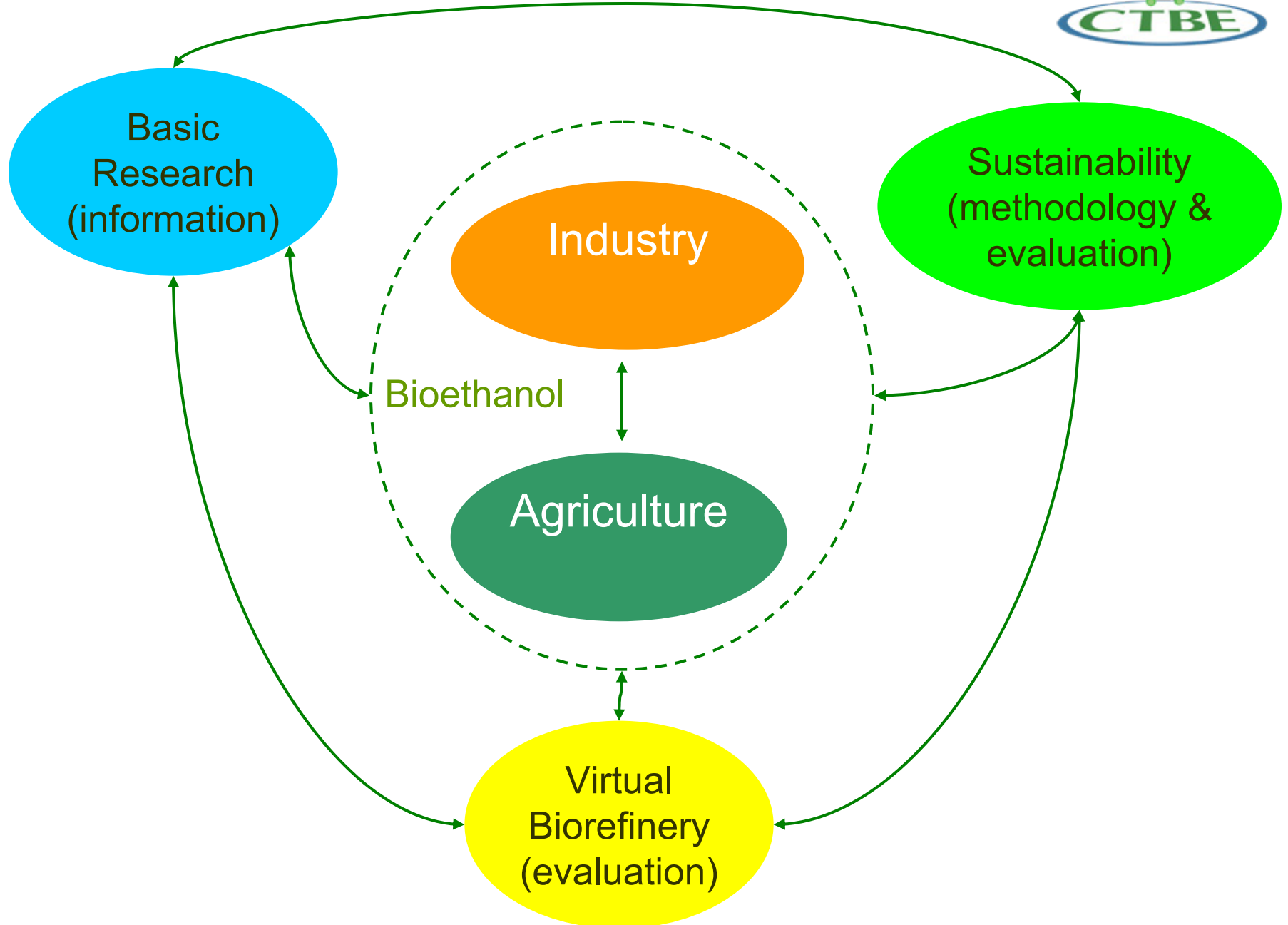
- **Development and Innovation:**

- **Feedstock production: low impact mechanization through a Traffic Controlled Structure.**
- **Cellulosic bioethanol production: Pilot Plant for Processes Development.**

- **Virtual Biorefinery.**

- **Impacts of new technologies on sustainability.**

Sustainability 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.**



- **It makes no sense to foster biofuels production, in large-scale, if one the following aspects is not accomplished:**
 - **environmental contribution at global level needs to be significant (GHG abatement);**
 - **environmental impacts at local/regional level needs to be minimized;**
 - **actual socio-economic benefits should be brought to whom is directly involved with biofuels production.**



- **Worldwide, the three main issues of concern are: (i) GHG emissions (i.e., the actual contribution of biofuels to the reduction of GHG emissions); (ii) impacts on food supply; (iii) LUC (direct and indirect impacts; with (potential) repercussion on GHG emissions, food supply, biodiversity conservation,).**
- **Brazil doesn't have an agenda on sustainability of biofuels. What should be national priorities?**
- **Anyhow, biofuels production must be sustainable (in a broad sense), because: (i) we live where the production takes place, (ii) because sugarcane industry can be a new paradigm for the agro-energy sector (and also for the agriculture as a whole).**



- It seems clear that in short to mid-term the competitiveness of Brazilian ethanol in the international market can be reinforced with sustainability.
- Theoretically, a more sustainable biofuels (e.g., larger avoided GHG emissions) could get a higher price.



- **Renewable Energy Directive (EU) – approved in December 2008 and recently published. Criteria were defined for biofuels (e.g., minimum avoided emissions of GHG, no-go areas, socio aspects according international rules).**
- **Low Carbon Fuel Standard – California Air Resources Board – released by March 2009: LCFS of 10% reduction for gasoline and fuels substituting for gasoline by 2020 and onwards.**
- **SEKAB – a Swedish trader, together with Brazilian ethanol producers.**
- **Roundtable on Sustainable Biofuels (RSB).**
- **Global Bioenergy Partnership (GBEP).**



- **The main target is on developing new technologies (e.g., low impact mechanization and cellulosic ethanol production) from a sustainability point of view.**
- **The reference is the current way of ethanol production, that can also be improved regarding its economic, socio and environmental aspects.**
- **Regarding the multiple issues that could be prioritized, our (current) focus is on:**
 - **GHG balances;**
 - **LUC;**
 - **socio-economic impacts;**
 - **optimization of water resources.**

Priorities – focus of the research: GHG

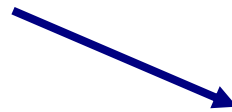


Emissions due to

- * Agriculture
- * Industry
- * Credits
- * Transport
- * End use

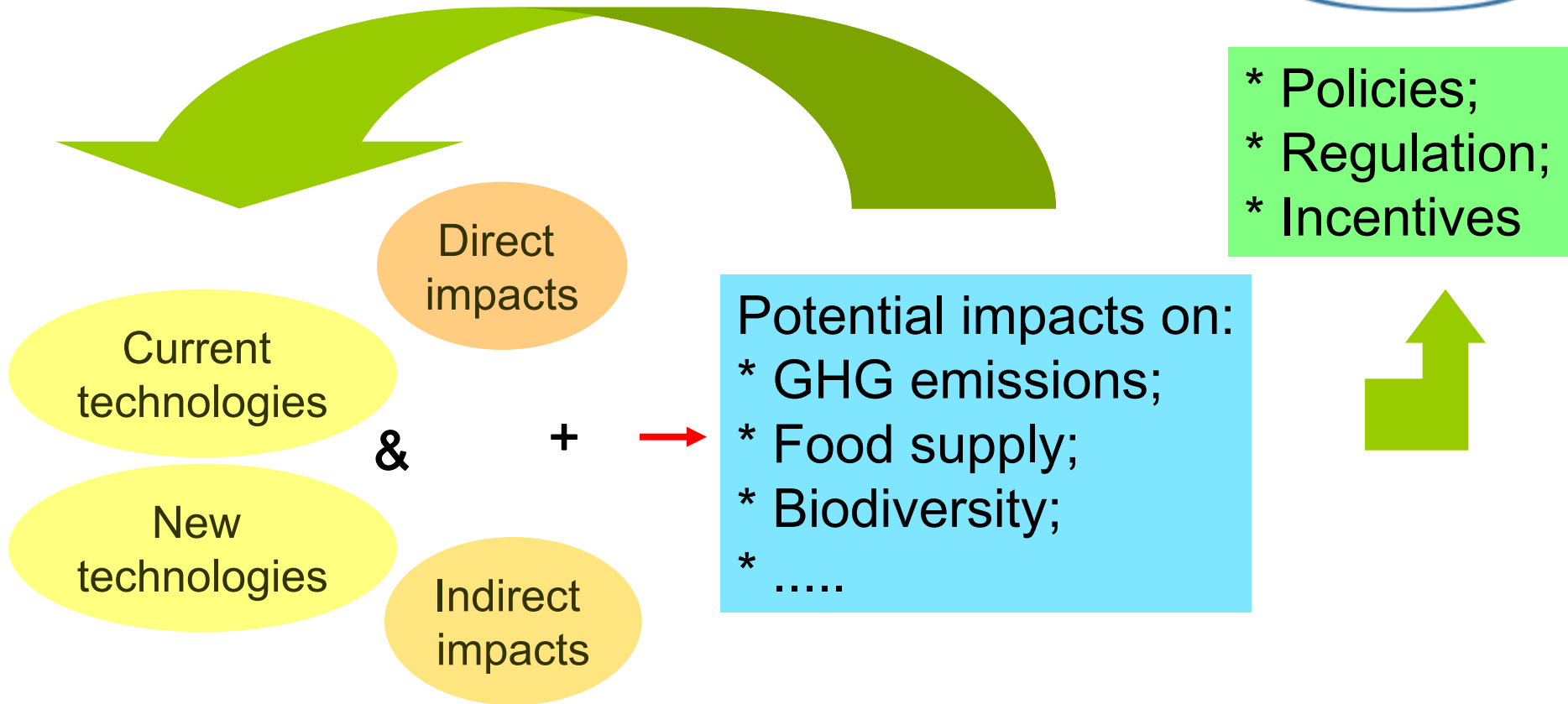


- * Agricultural practices;
- * Mechanization or not;
- * LUC;
- *



Impacts on the GHG emissions
taking into account different
technologies and
scenarios

Priorities – focus of the research: LUC



- * Policies;
- * Regulation;
- * Incentives

Potential impacts on:

- * GHG emissions;
- * Food supply;
- * Biodiversity;
- *

Priorities – focus of the research: Socio-economic



Actual data

Conventional technologies

New technologies

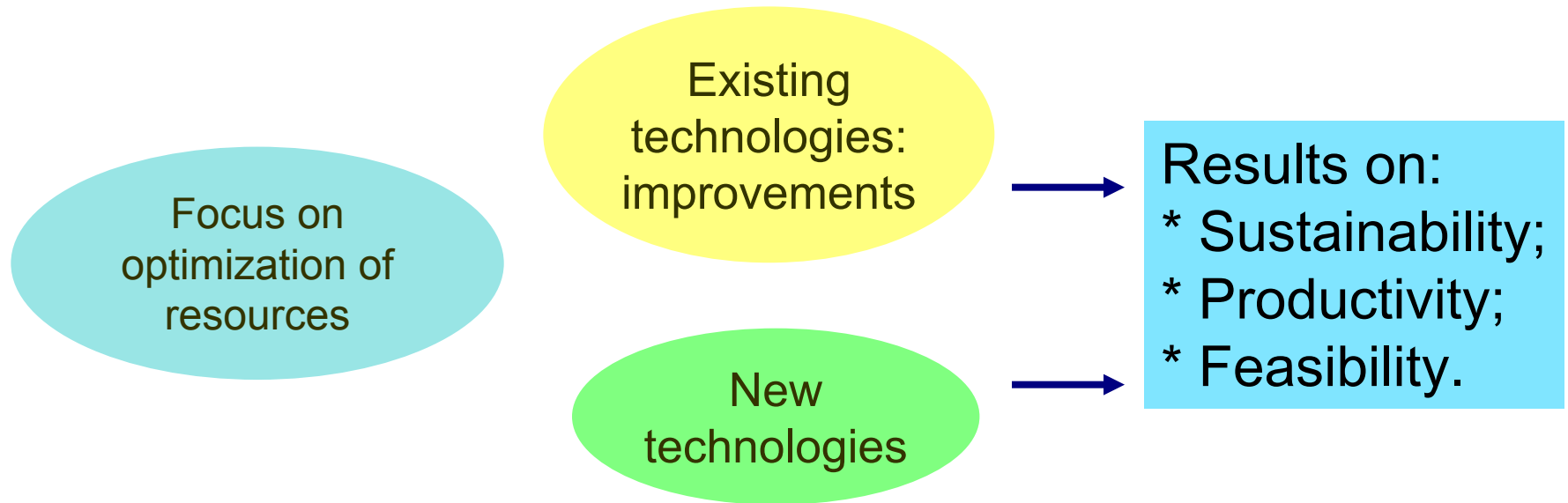
Prospective

Analysis of impacts on:

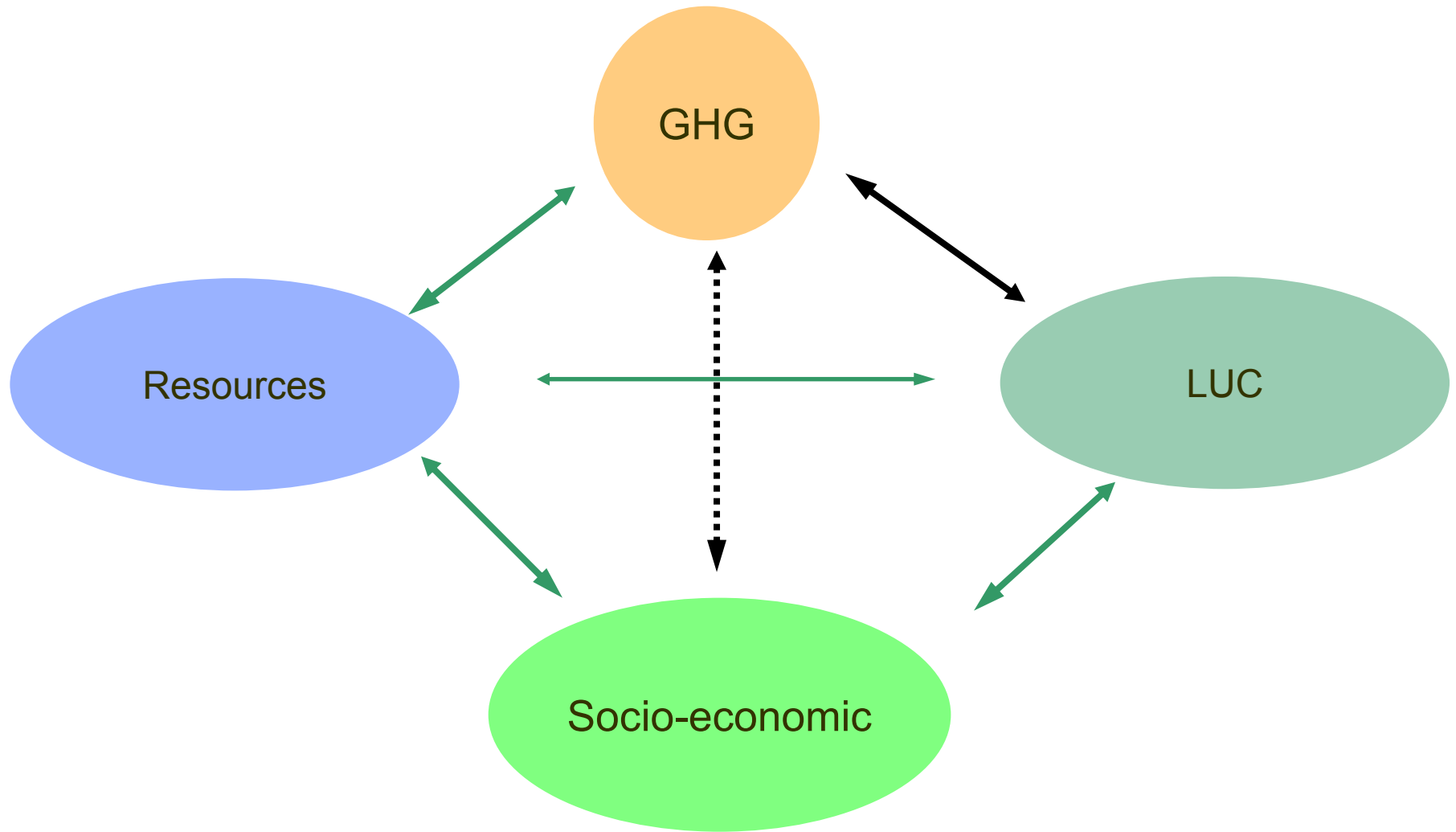
- * Job creation;
- * Economic activity;
- * Income;
- * Wealth distribution;
- * Welfare (e.g., education, health);
- *

Actions

Priorities – focus of the research: resources (H₂O)



Priorities – interactions between sub-programs



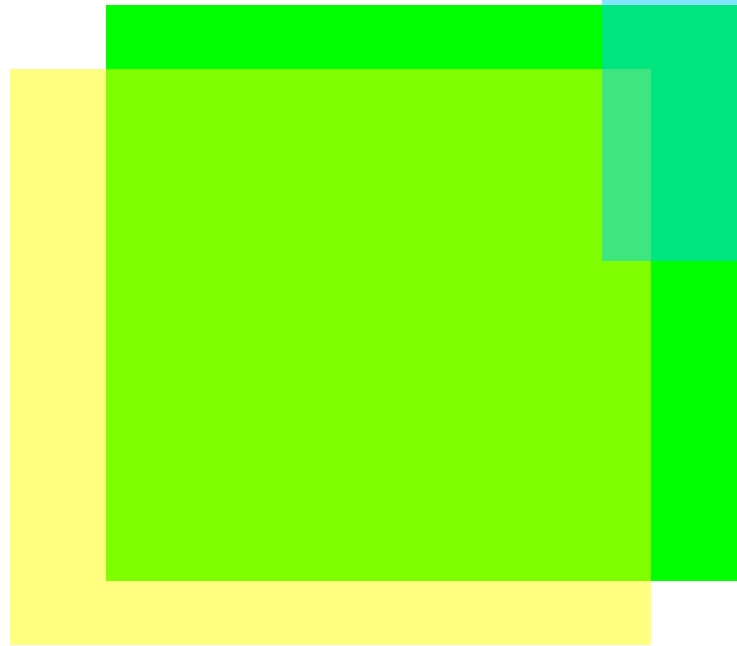


- **CTBE should act as a national lab (e.g., Pilot Plant for Processes Development) and, as much as possible, regarding Sustainability.**
- **CTBE's programs will demand partnership with other institutions, mainly on a interdisciplinary theme such as Sustainability.**
- **CTBE will foment and attract the scientific community to help in the creation of high level research, development and innovation on the sugar cane production chain of bioethanol.**

Interaction with other research groups



Sustainability activities
at CTBE



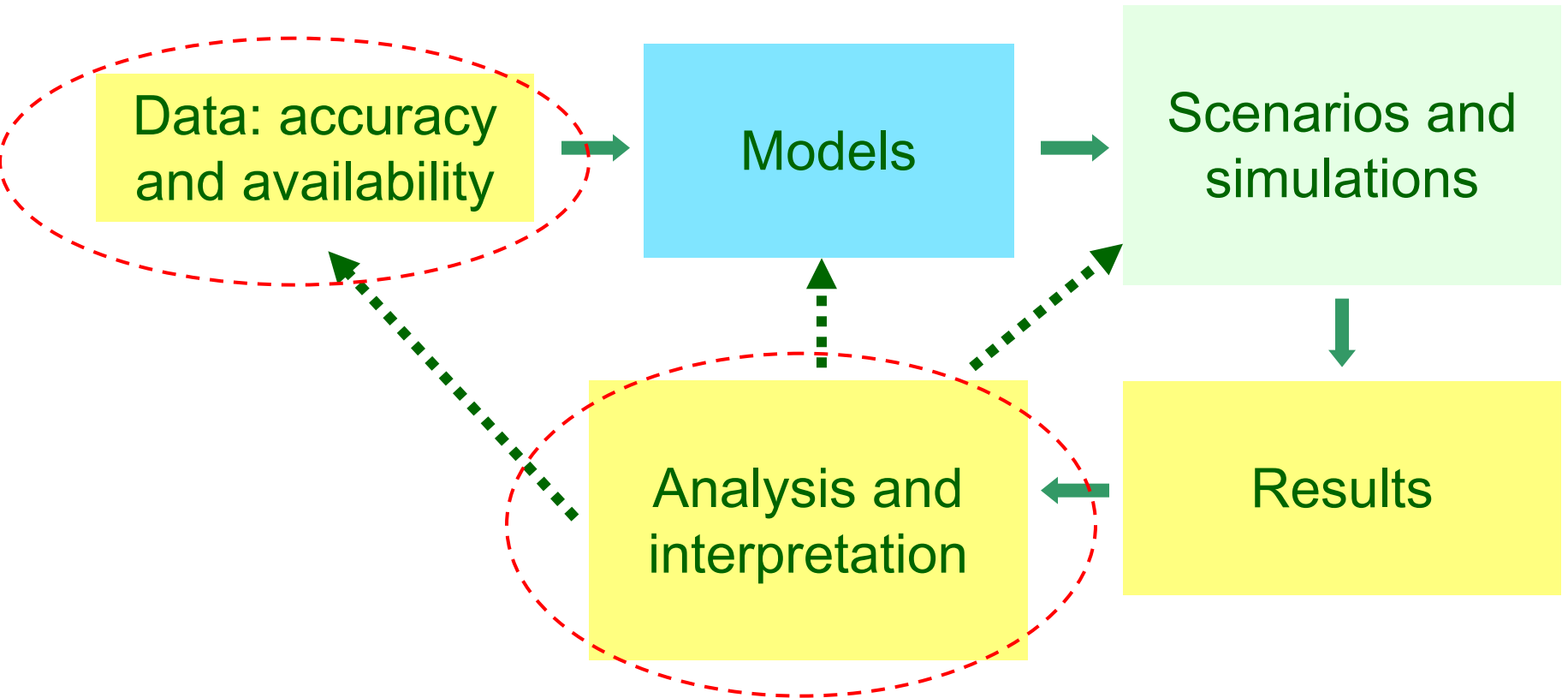
Research
groups, in
Brazil and
abroad



Research groups, in
Brazil and abroad



Activities on Sustainability





- **What are the different visions regarding sustainability of biofuels?**
- **What are the priorities regarding sustainability of biofuels from Brazil's point of view?**
- **What is already going-on (the initiatives ...)?**
- **What is the state-of-art regarding specific issues (GHG balances, LUC and their impacts on GHG emissions, socio-economic impacts, impacts on water supply)?**
- **Who has the knowledge in Brazil and abroad?**
- **What about data availability and data quality?**
- **How to join efforts?**



- **In a second Workshop, in the second semester, a Research Program on Sustainability will be presented. This Program will be evaluated by peer-reviewers.**
- **Before that, the Program will be discussed with potential partners, in Brazil and abroad.**
- **At this moment, we are presenting our "vision", priorities from our point of view, and a proposal for acting.**
- **We are looking forward for suggestions, and we are prepared for criticisms!**



Thanks for attending!
Thanks for your attention!!
Questions?