



# Brazil-EU Workshop: Coordinated Call on Advanced Lignocellulosic Biofuels



Brazilian Bioethanol Science  
and Technology Laboratory



Ministry of  
Science, Technology  
and Innovation

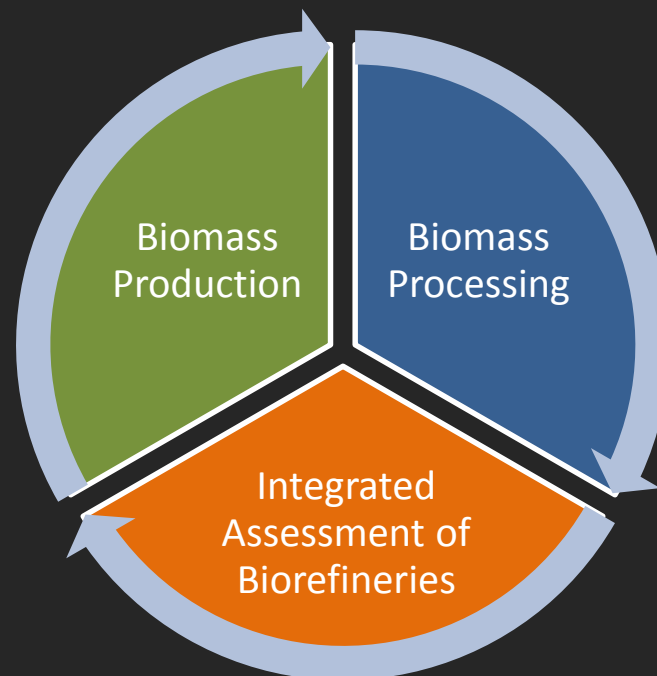


# CNPEM



CTBE is integrated to the National Research Center in Energy and Materials (CNPEM), with other three National Laboratories.

# RESEARCH DIVISIONS



# BIOMASS PRODUCTION



- **Sugarcane low impact mechanization**, reducing traffic and soil compaction;
- **Straw recovery and management** of nutrients and residues;
- **Precision agriculture.**

# BIOMASS PROCESSING



- Fractionation and characterization of biomass and its derivatives;
- Pretreatment, hydrolysis and fermentation of biomass into 2G ethanol;
- Bioprocesses and bioreactors science and engineering;
- Industrial biotechnology for biomass conversion into products;
- Scale expansion process;
- Hydrolases biosynthesis;
- Instrumentation of bioprocesses.



# INTEGRATED ASSESSMENT OF BIOREFINERIES

## VSB

Model  
integration

Sustainability  
impacts



Process simulation  
Mathematical models



- Assessment of new technologies;
- Processes optimization of production chain.

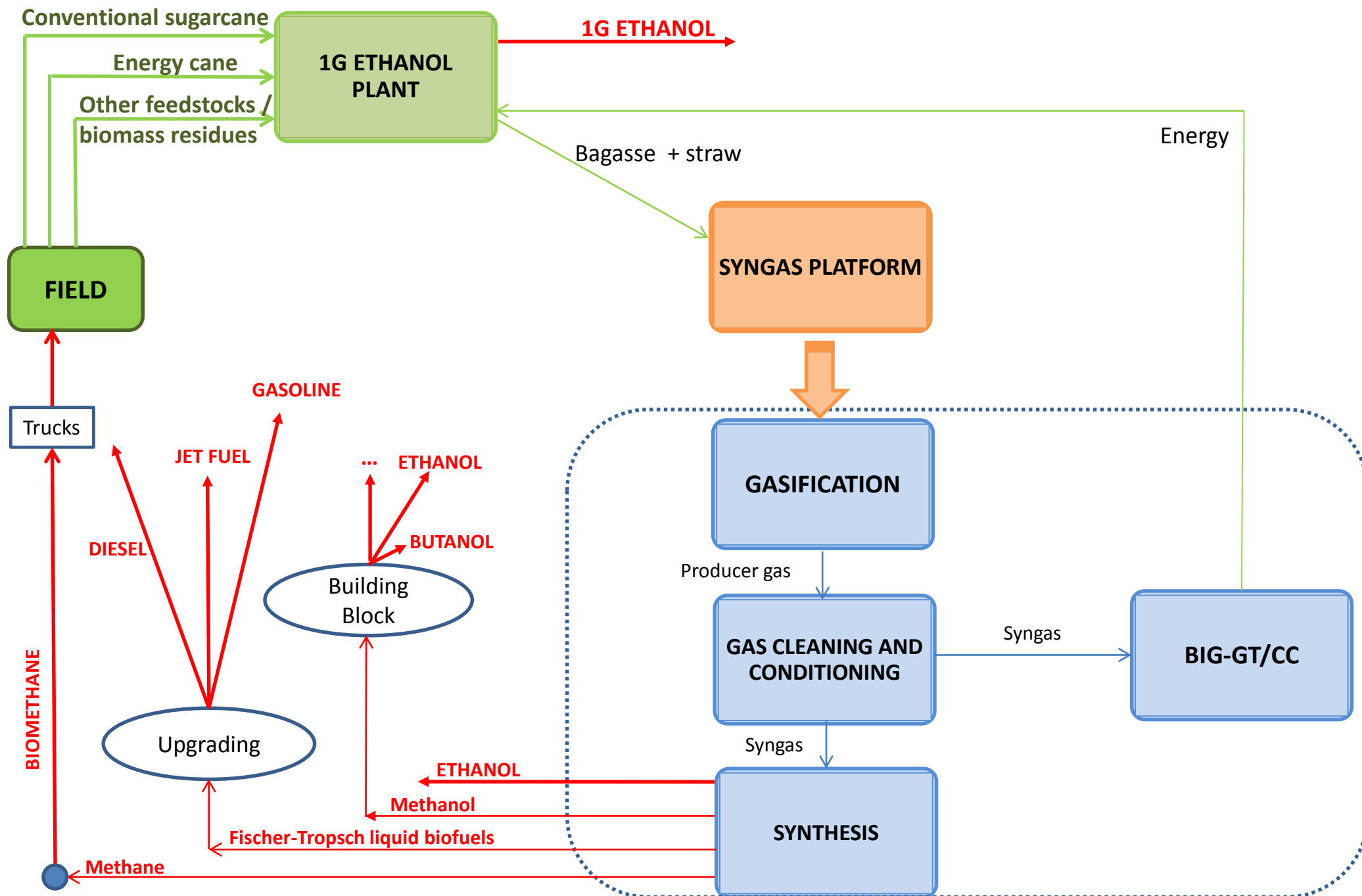




Theme 1: Gasification of bagasse to syngas and advanced liquid fuel production, including biofuels for aviation.

**Theme 2: Applied research to biomass production logistics and applied research for feedstock diversification for advanced biofuels.**

Theme 3: Development of new fermentation and separation technologies for advanced liquid biofuels and applied research to increase the energy efficiency of advanced biofuel processes.





- Conventional cane / Energy cane
- Sustainability
- Food x Energy
- Energy and Material Densification
- Others

## Conventional cane

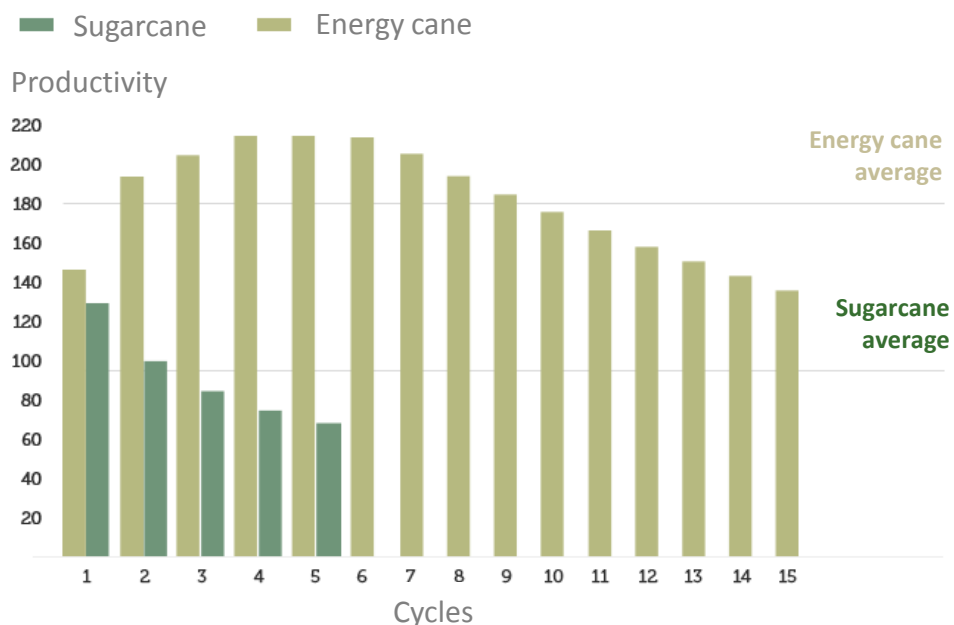
- Widespread use
- Higher sugar content
- 1G ethanol feedstock

## Energy cane

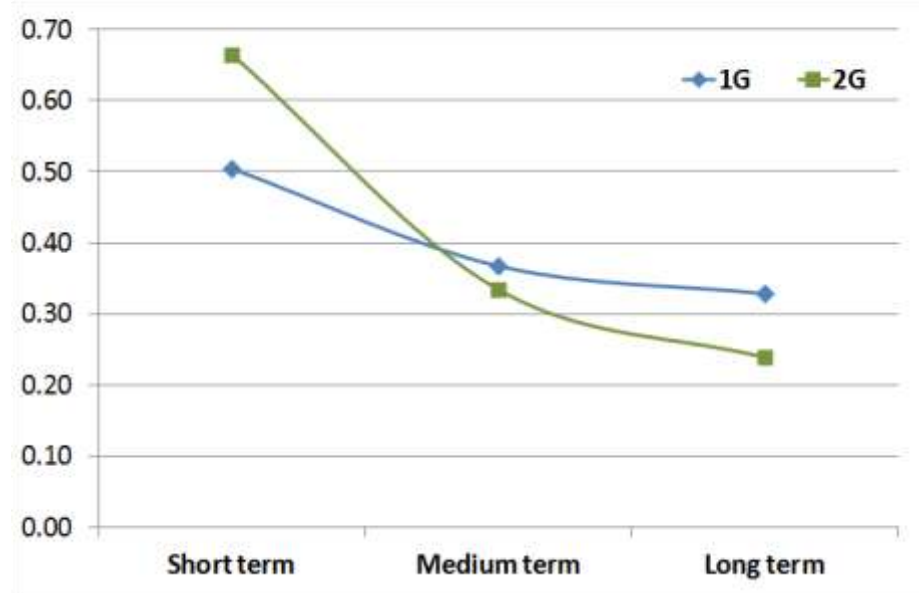
- Higher fiber content
- Lower sugar content
- Higher productivity (?)
- Off-season (???)
- Higher potential (electricity/2G ethanol)



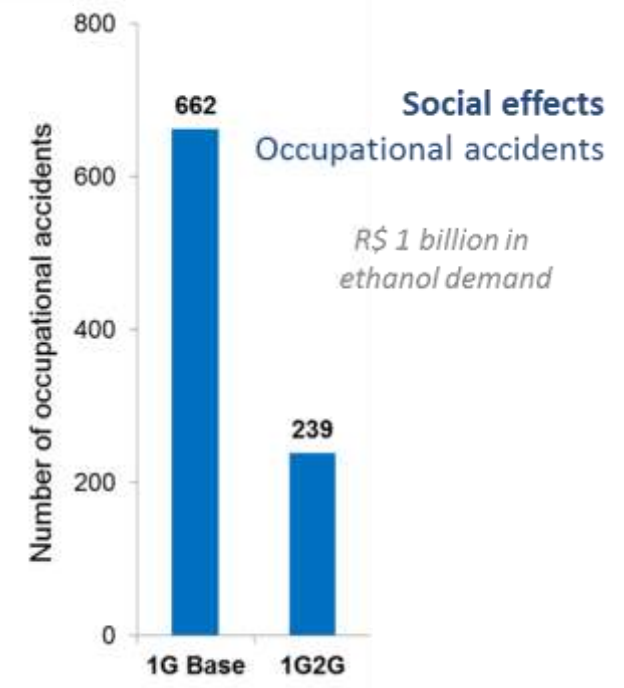
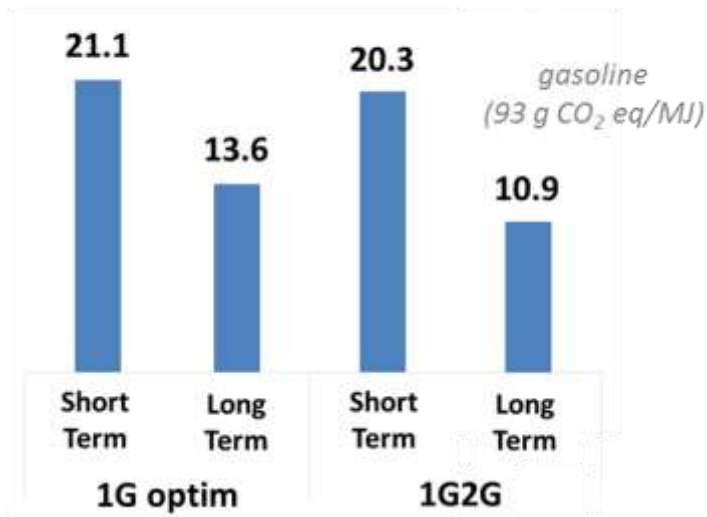
### More cycles, more productivity

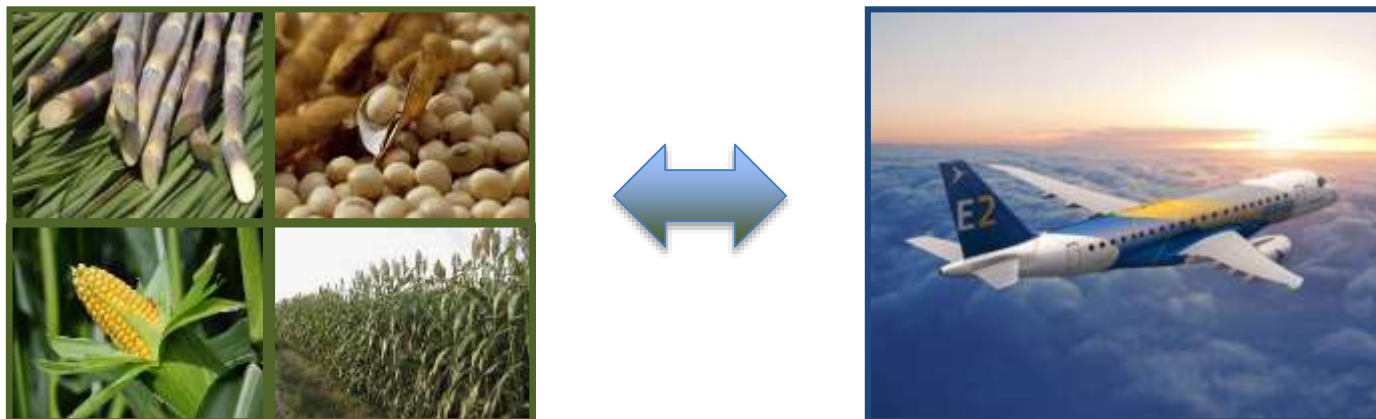


Ethanol production cost (US\$/L)

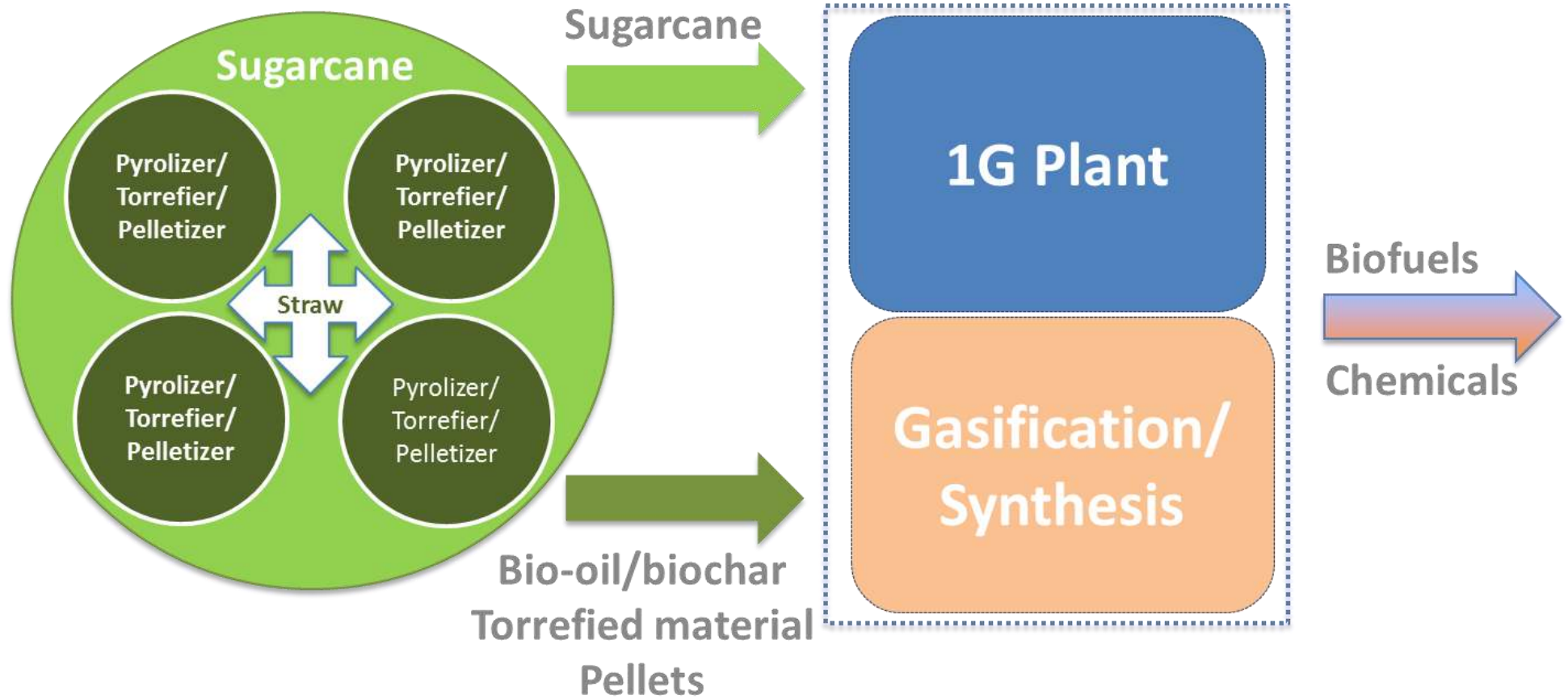


Ethanol production impacts (g CO<sub>2</sub> eq/MJ)  
Energy allocation





- Biofuel policy – positive sustainability impacts
  - Land availability
  - Energy crops
  - Livestock – Energy crops integration
  - Straw recovery
  - Efficient mechanization
  - Optimization of biorefineries
- Others



## ➤ Research Institutions

- Brazilian Synchrotron Light Laboratory (LNLS)/CNPq
- Brazilian Nanotechnology National Laboratory (LNNANO)/CNPq
- University of Campinas (UNICAMP)
- University of São Paulo (USP)
- Institute for Technological Research (IPT)
- University of Brasília (UNB)
- Federal University of Itajubá (UNIFEI)
- Federal University of Uberlândia (UFU)

## ➤ Industrial Partners



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# THANK YOU

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