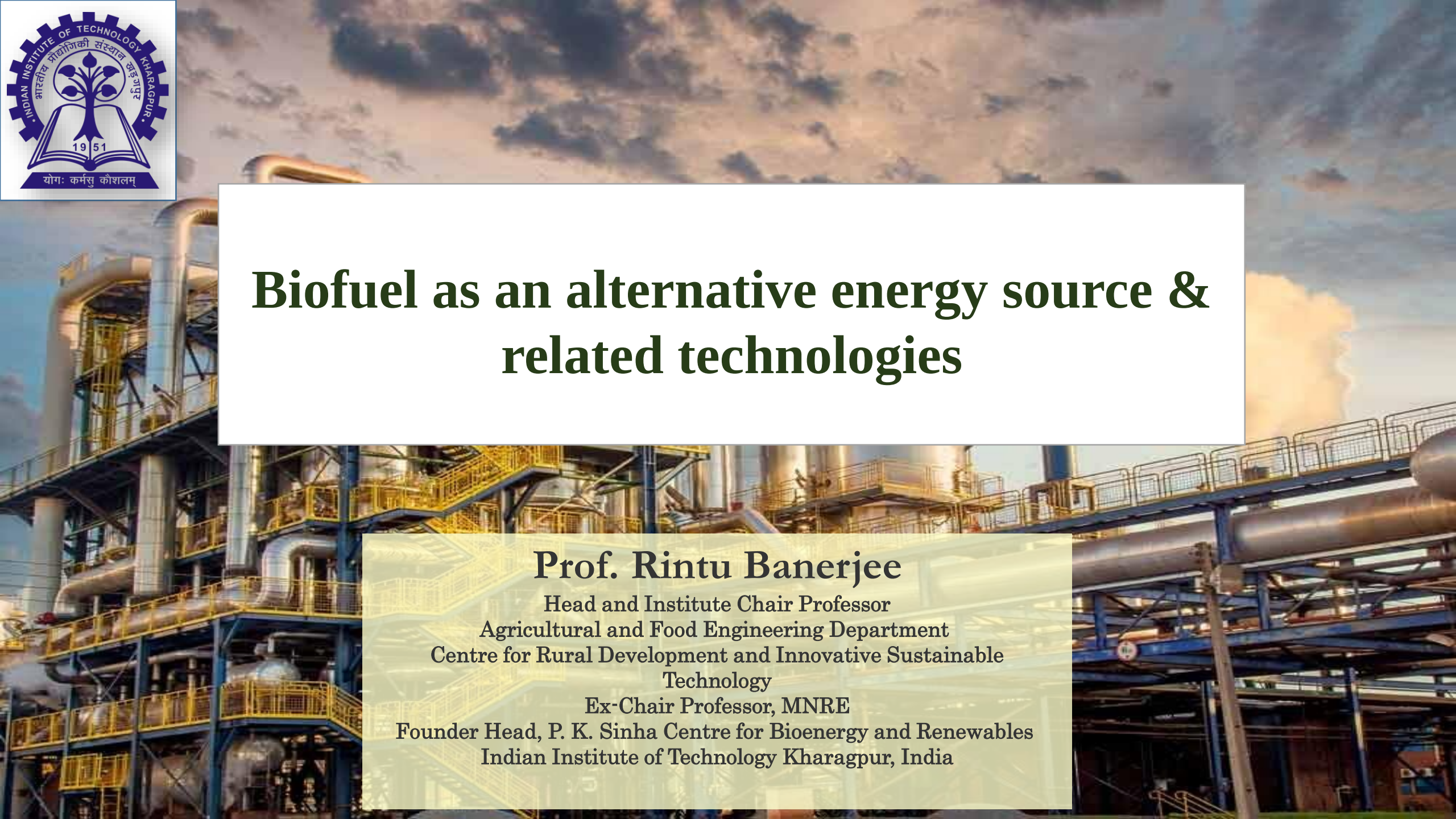
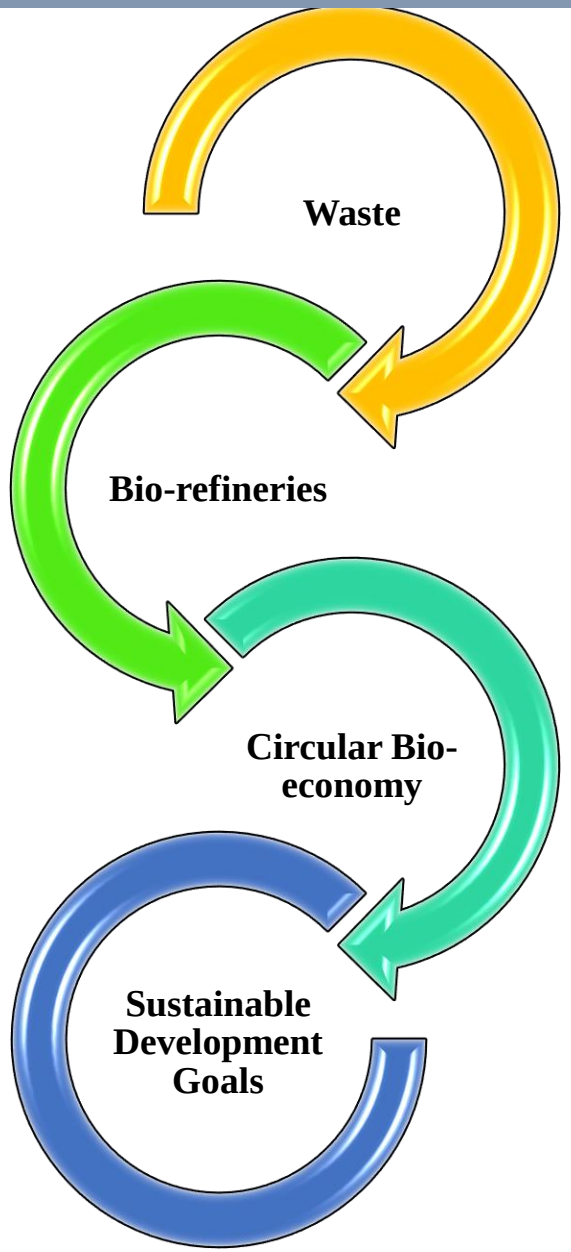


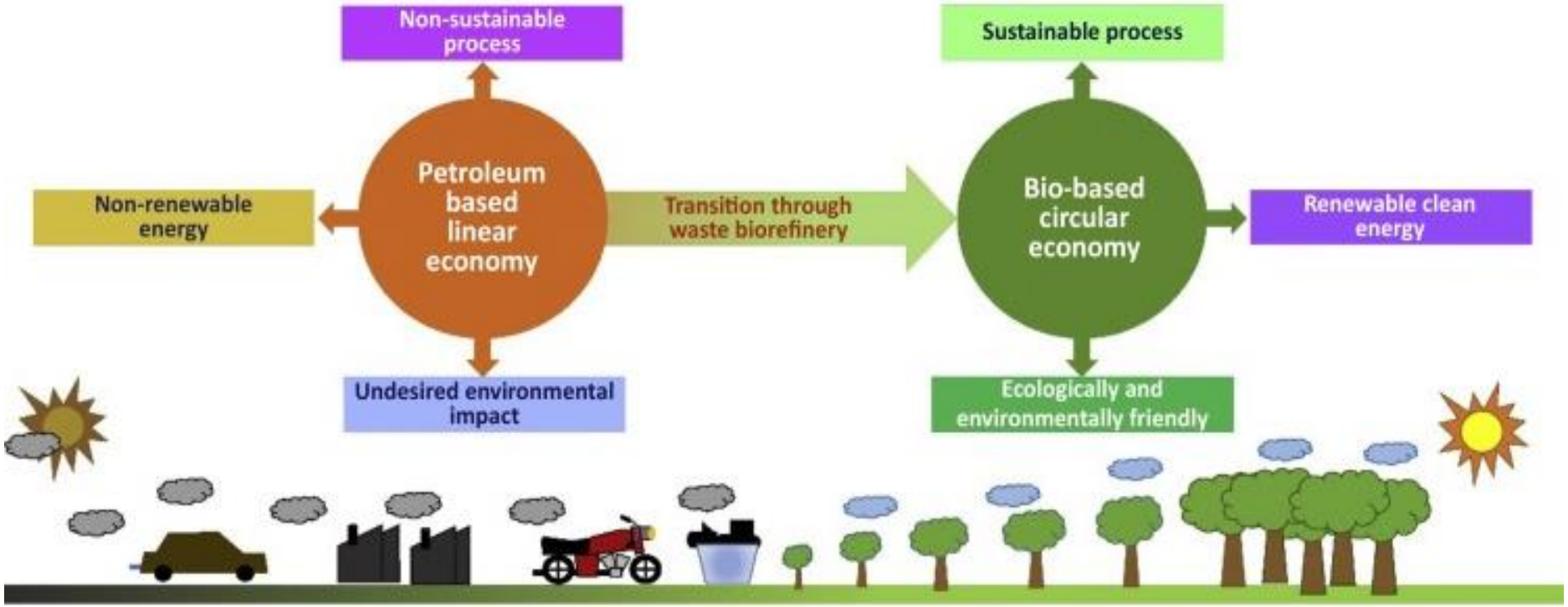
Biofuel as an alternative energy source & related technologies

Prof. Rintu Banerjee

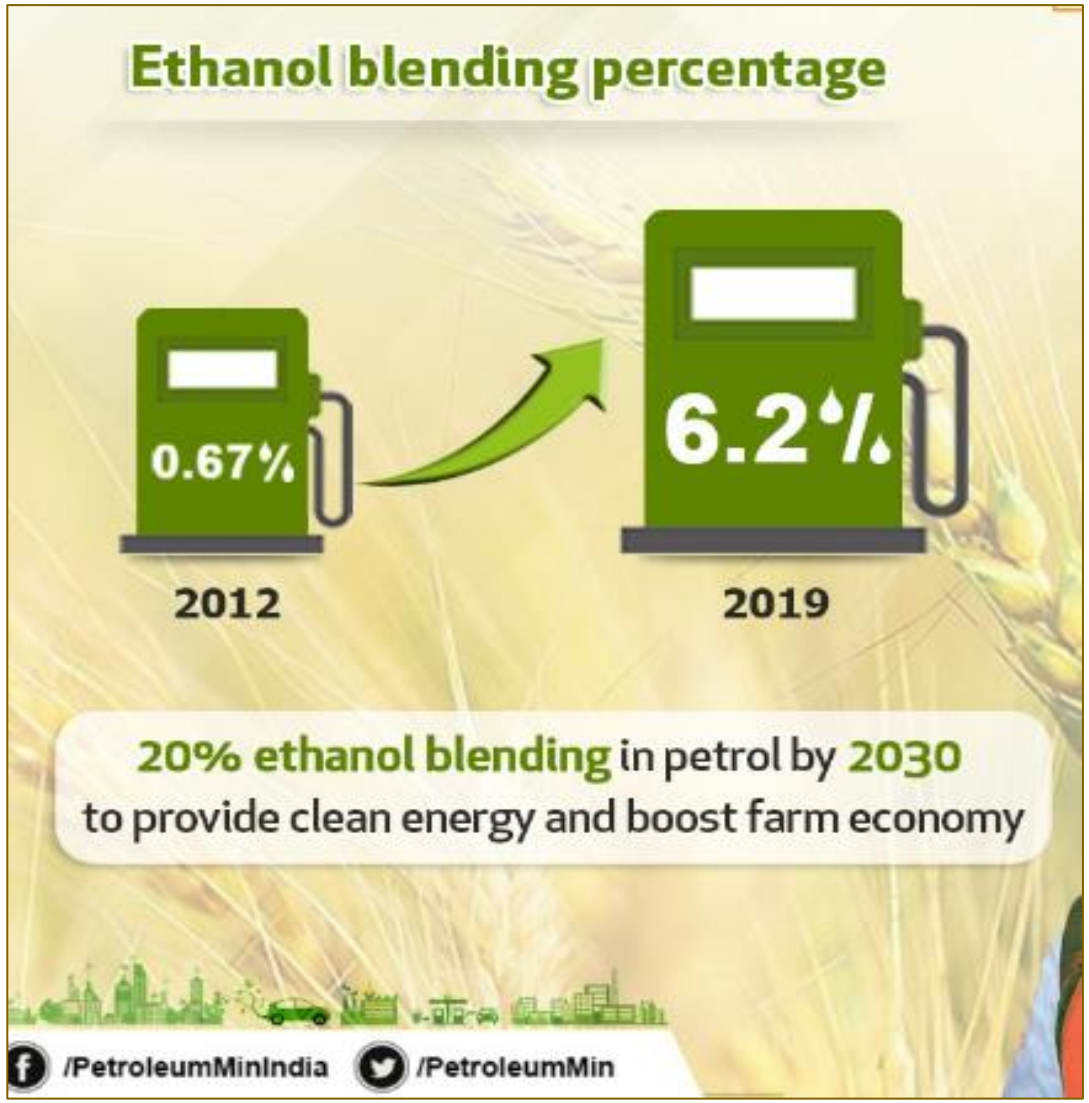
Head and Institute Chair Professor
Agricultural and Food Engineering Department
Centre for Rural Development and Innovative Sustainable Technology
Ex-Chair Professor, MNRE
Founder Head, P. K. Sinha Centre for Bioenergy and Renewables
Indian Institute of Technology Kharagpur, India

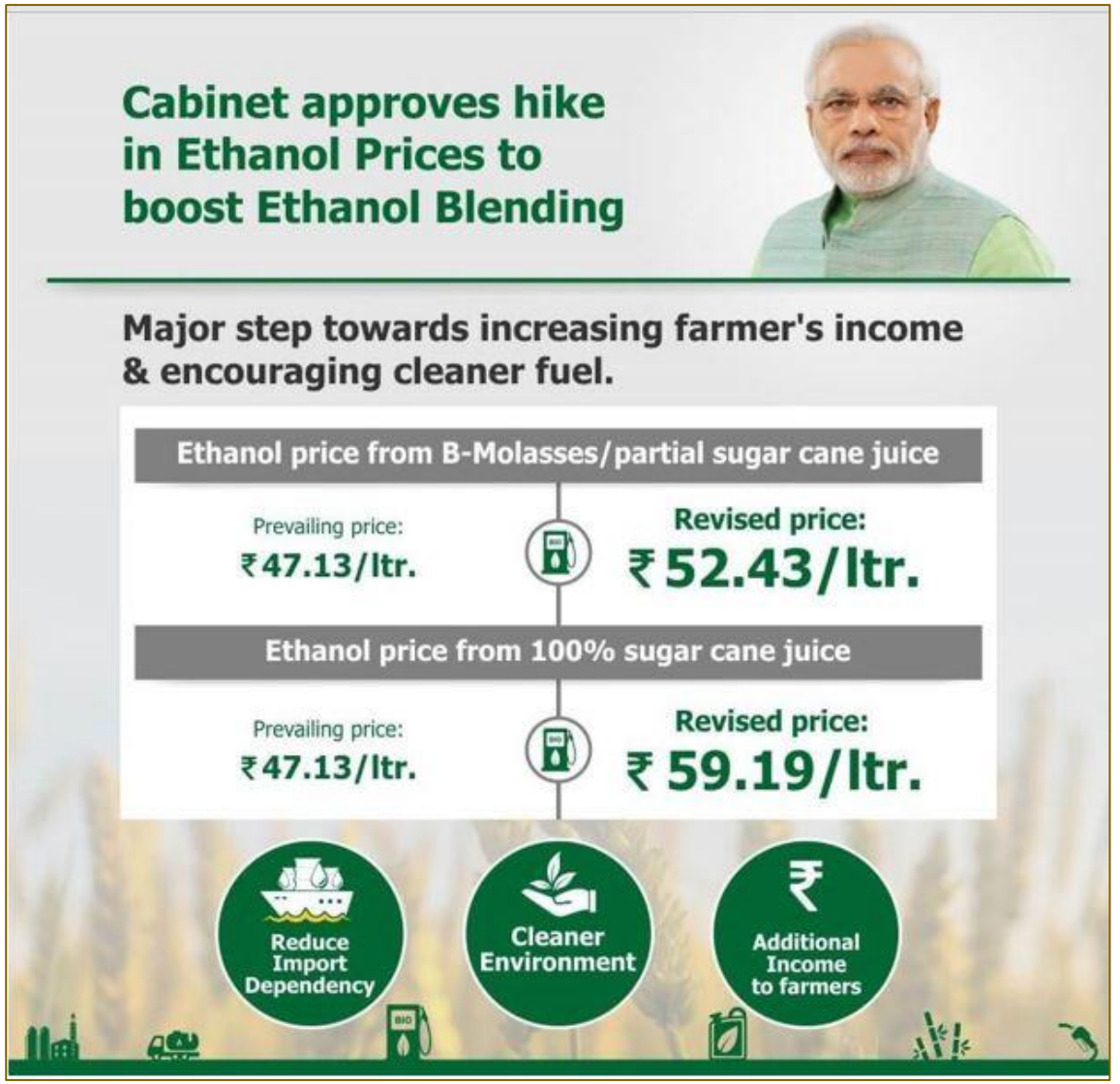
Waste Bio-refinery: A Paradigm Shift For A Sustainable Bio-Economy



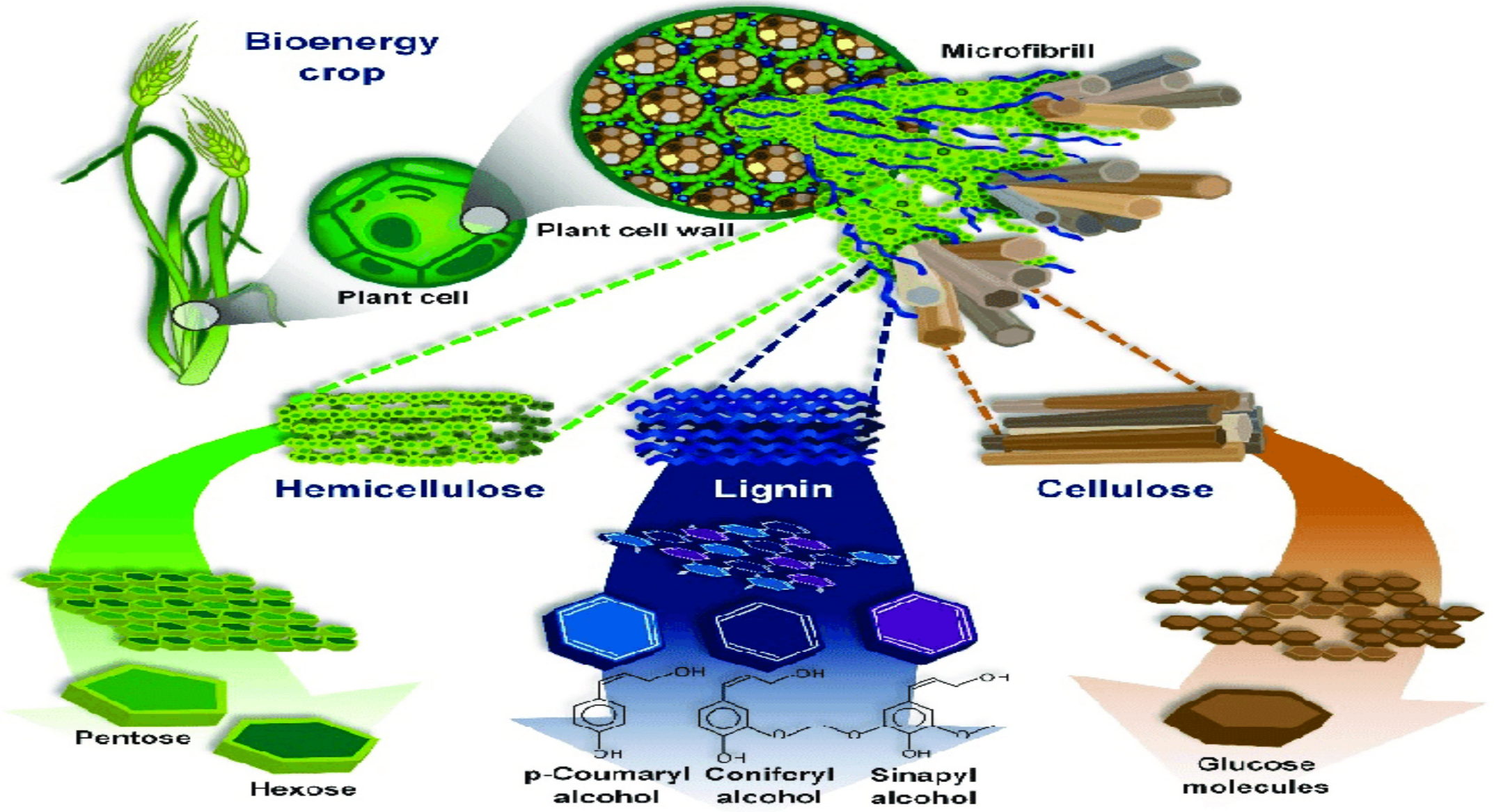


Indian Government's Initiatives Towards Green Energy Using Ethanol





Biochemistry of lignocellulose

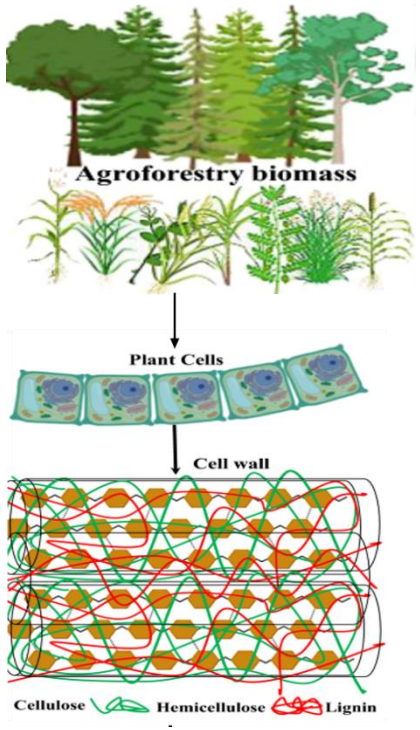


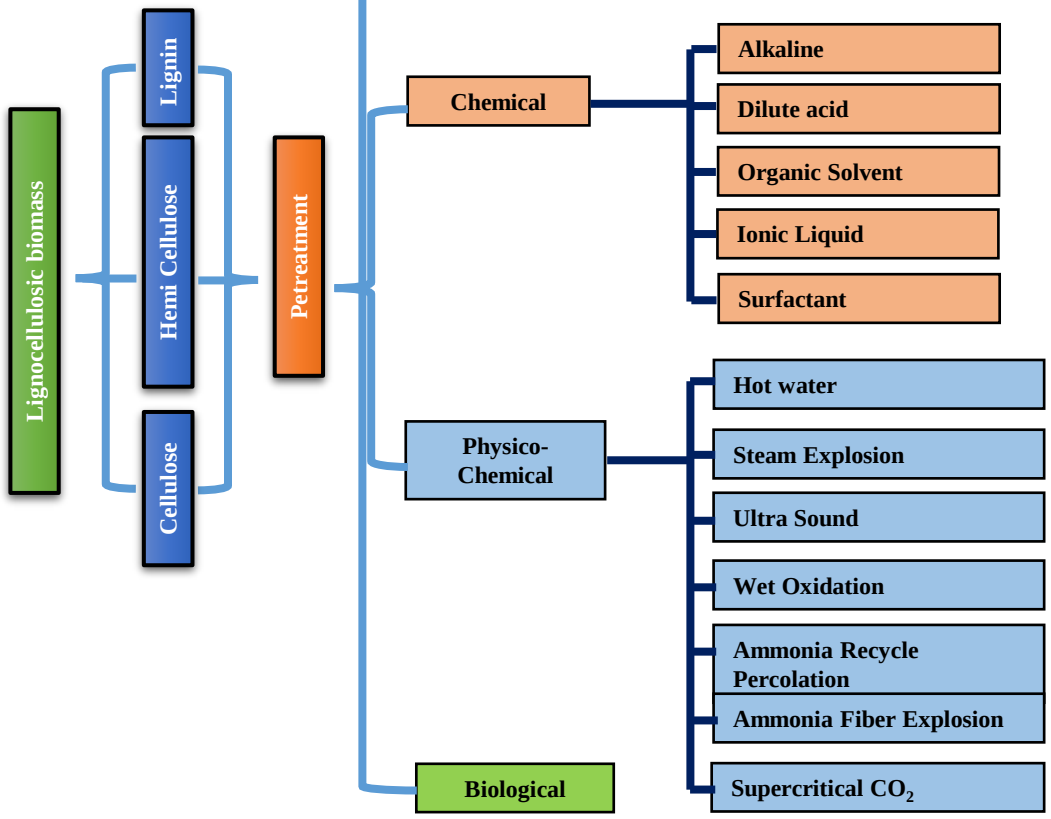
Major Bottlenecks in Lignocellulosic Bioethanol Production

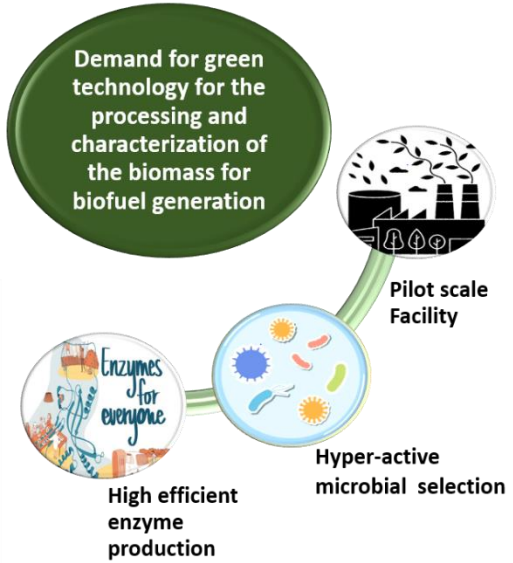
Efficient depolymerization of lignin without the production of furfurals and hydroxymethyl furfurals

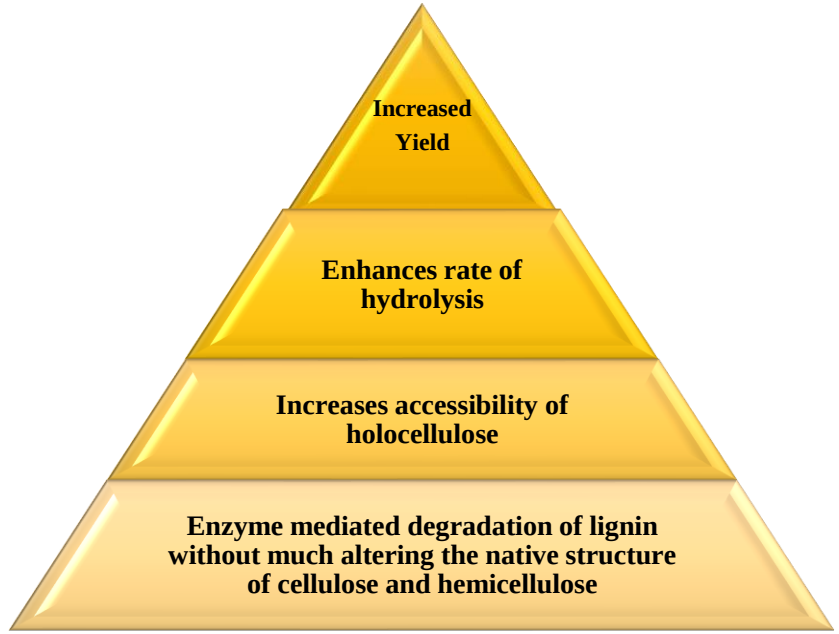
Simultaneous utilization of Pentose and Hexose sugars

Need for enzyme production facility: A step to meet 20% ethanol blending program of India by 2025

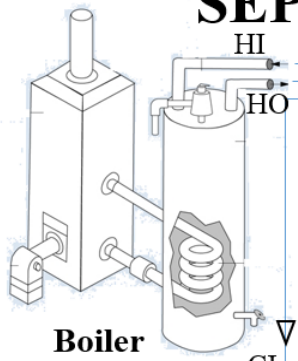




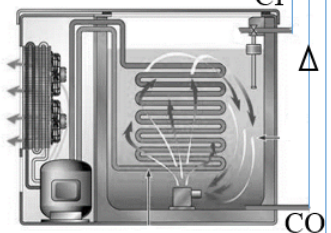




SEPARATE PRETREATMENT, SACCHARIFICATION & FERMENTATION



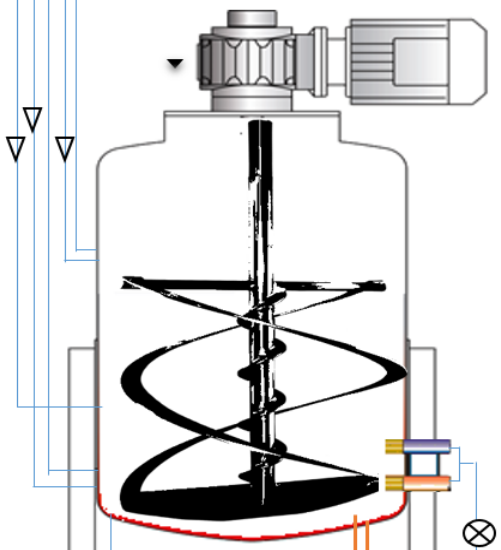
Boiler



Chiller

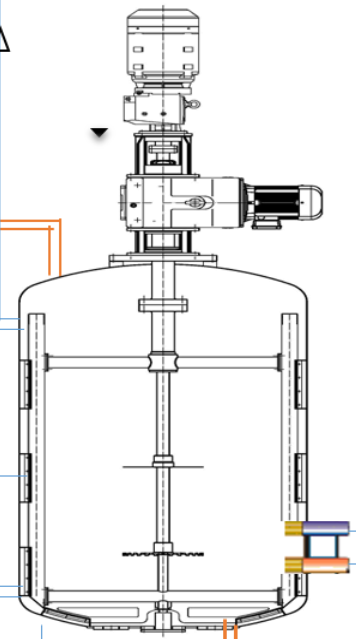
Tap water

HI = Hot water In
HO = Hot water out
CI = Chilled water In
CO = Chilled water out
TW = Tap water



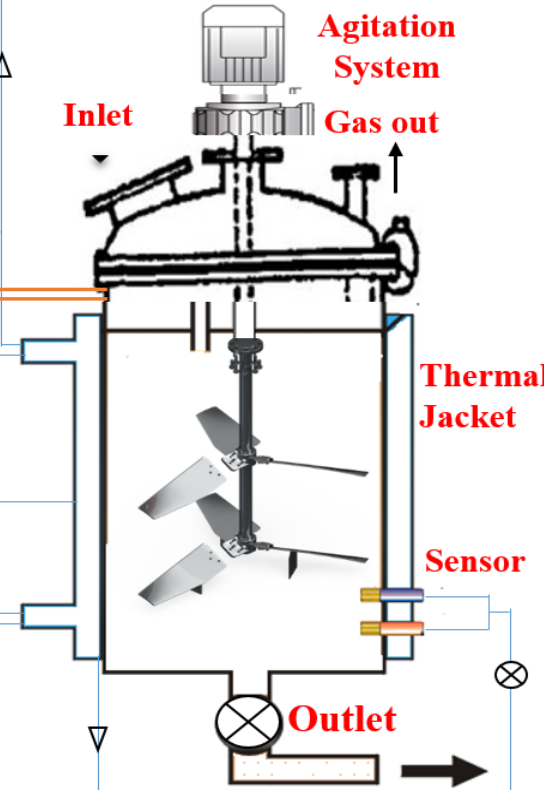
TANK 1

Pretreated liquid



TANK 2

Sachharified liquid



Drainage pipe

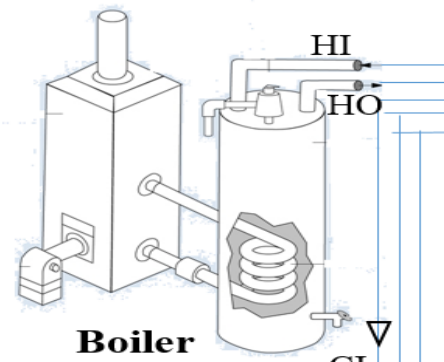
TANK 3

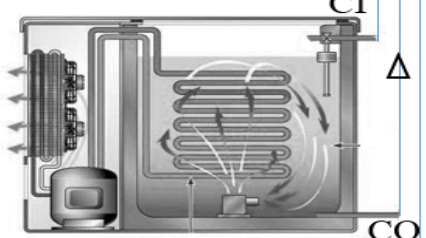
TANK 1	PRETREATMENT
TANK 2	SACCHARIFICATION
TANK 3	FERMENTATION

Control panel

	Temperature	pH	DO	Agitation
TANK 1	⬭	⬭	⬭	⬭
TANK 2	⬭	⬭	⬭	⬭
TANK 3	⬭	⬭	⬭	⬭

CONSOLIDATED BIOPROCESSING





Tap water

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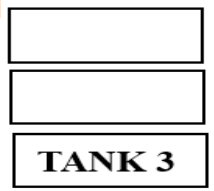
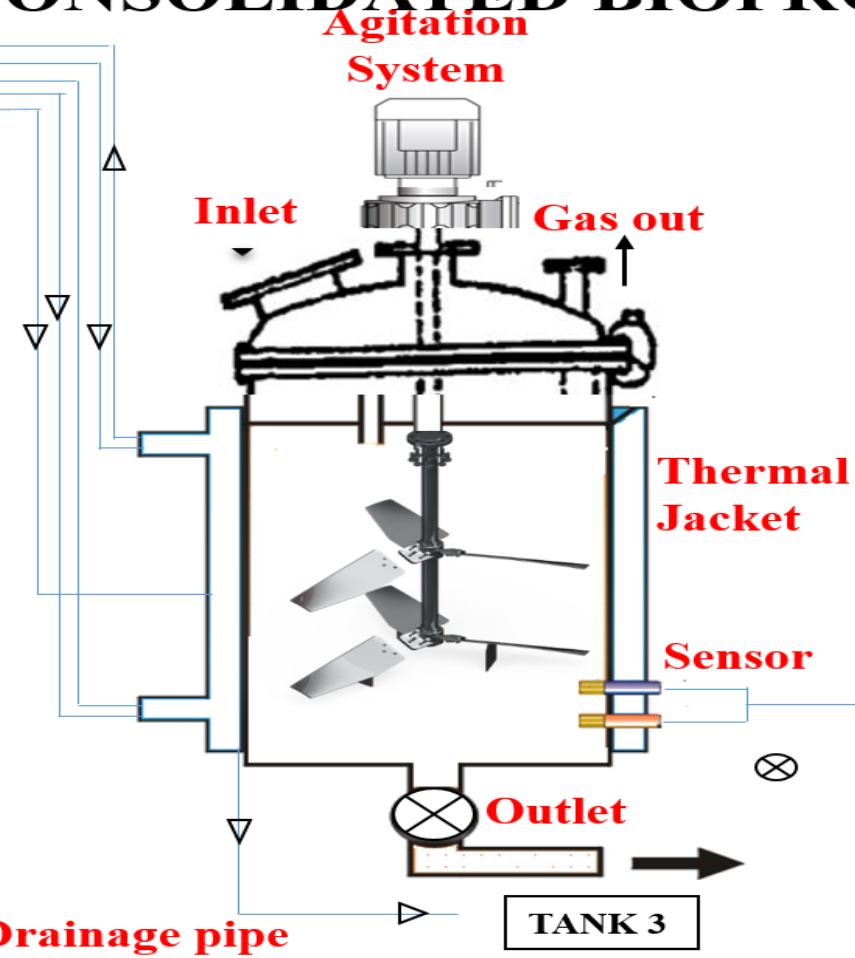
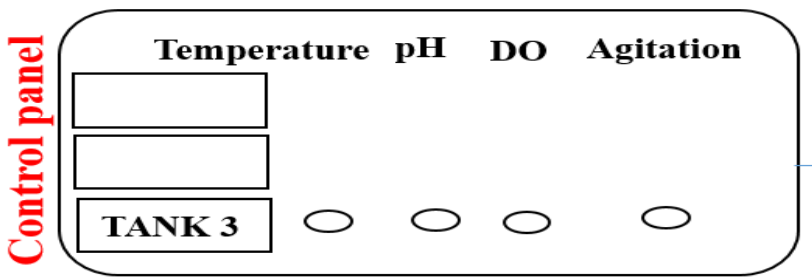


CONSOLIDATED BIOPROCESSING





Lignocellulosics Selected for Study at IIT Kharagpur for Bioethanol Production

Ricinus communis

Lantana camara

Kans Grass

Bambusa bambos

Rice straw

Sugarcane Baggase

Pineapple leaf waste

Wheat straw

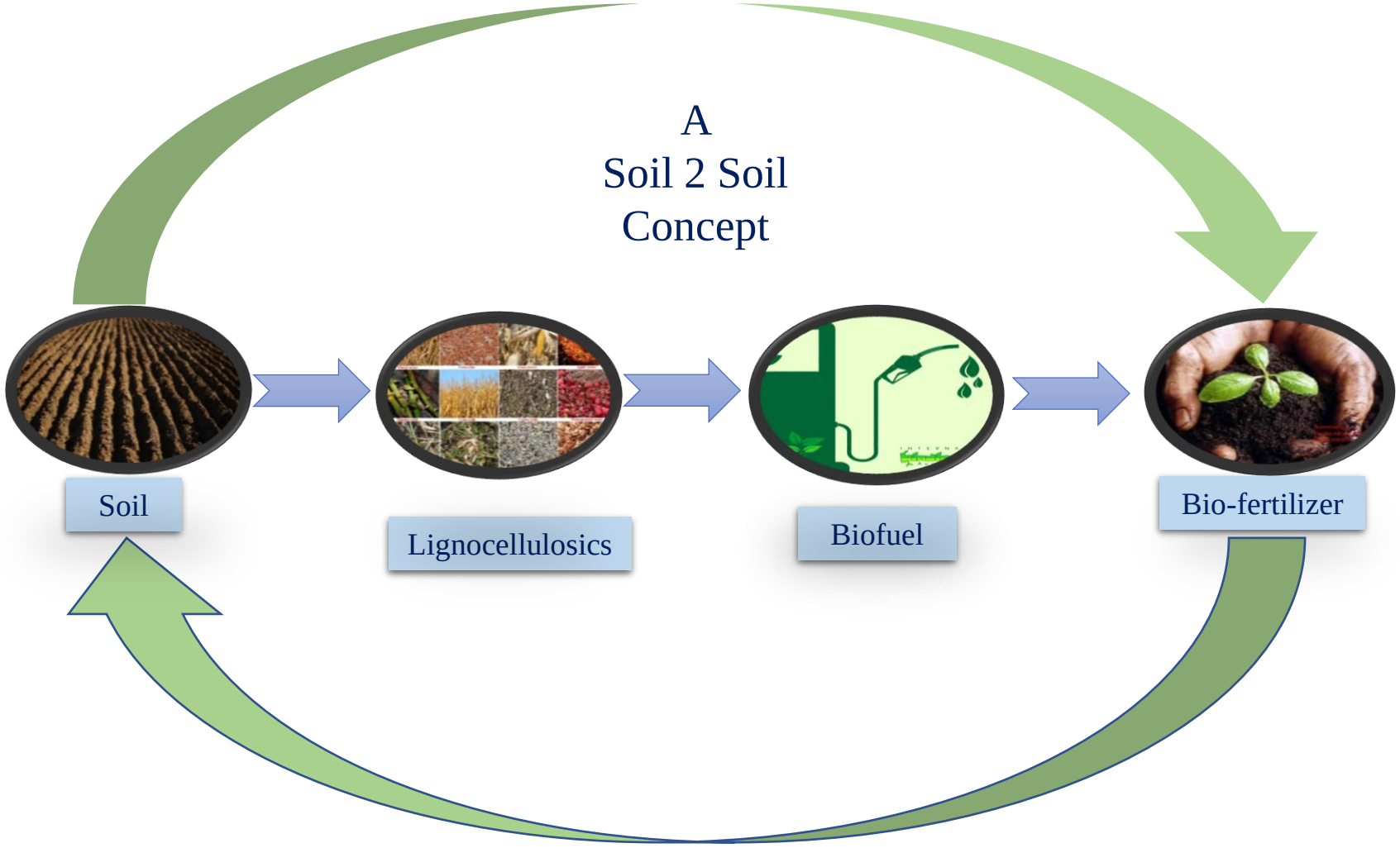
Cotton stalk

Banana plant

Sweet Sorghum

Pilot-scale 2G-Ethanol production using sugarcane bagasse

Soil to Soil Concept



USP of the developed Technology

- Enzyme based delignification and saccharification
- No use of chemicals/physico-chemical processes
- Reaction takes place at mild environmental conditions
- Water requirement is less compared to the other methods
- Eco-friendly and green technology
- Raw materials: Lignocellulosic biomass which includes rice straw, non-edible biomasses produced under contract farming

Versatile accomplishment of the novel technology

EXCLI J. 2011; 10: 85–96.
Published online 2011 May 27.
PMCID: PMC5109006
PMID: 27857667

Production of ethanol from lignocellulosics: an enzymatic venture

Arindam Kuila,[1] Mainak Mukhopadhyay,[1] D.K. Tuli,[2] and Rintu Banerjee*,[1]

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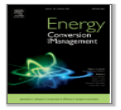
Volume 157, 1 February 2018, Pages 364-371



An eco-friendly process integration for second generation bioethanol production from laccase delignified Kans grass

Rajiv Chandra Rajak [a], Rintu Banerjee [b]

ELSEVIER
Waste Management
Volume 49, March 2016, Pages 320-325

Integrated bioethanol and biomanure production from potato waste

Anjani Devi Chintagunta [a], Samuel Jacob [b], Rintu Banerjee [b]

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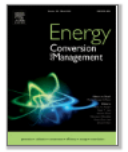
Volume 207, 1 March 2020, 112504



An innovative approach of mixed enzymatic venture for 2G ethanol production from lignocellulosic feedstock

Rajiv Chandra Rajak [a], Rintu Banerjee [b]

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Prototype exhibition at TechEx 2019

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NEWS

IIT KGP team develops a new technology to manufacture biofuel

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IIT - Kharagpur develops technology to make pollution-free biofuel

IANS | Kolkata
May 31, 2017 Last Updated at 17:42 IST

Future of fuel lies in going unconventional:

Better, Sustainable and Green

Thank you…