



# Bioenergy & Biotechnology for Future Fuels

BIODIESEL BIOMETHANE BIOLPG SYNTHETIC FUELS TOWARDS NET ZERO



# BIOENERGY

- ▶ **Derived from recently living organic materials known as biomass**
- ▶ Main waste feedstocks are wood waste, agri waste, municipal solid waste and manufacturing waste
- ▶ Thermal conversion using torrefication, pyrolysis & gasification
- ▶ Surface power density is issue

# BIOTECHNOLOGY

- ▶ **uses living cells to develop or manipulate products for specific purposes**
- ▶ Lipase, methanobacteria, yeast, e.coli etc are used to achieve the biofuels
- ▶ Industrial Fermentation, esterification, anaerobic digestion
- ▶ Initial capital in R&D, tech development at scale



# Biodiesel

- ▶ Transesterification and Esterification
- ▶ UCO, Palm stearin, Tallow, Virgin oils in transesterification
- ▶ Acid oils, DFA's, POME, chicken oil etc. via esterification (higher ffa)
- ▶ Sustainable Aviation Fuel effect and byproduct disruption
- ▶ 90% of plants in india operate on palm stearin and tallow(per recent tender)
- ▶ Price of end product against feed
- ▶ Biodiesel as FAME and expanding scope



# Biomethane

- ▶ Upgrading biogas and Thermal gasification
- ▶ Crop residue, animal manure, organic fraction-MSW, wastewater sludge
- ▶ Crops produced for sole purpose of energy generation as feed
- ▶ Asia's largest bio cng plant recently inaugurated in indore
- ▶ SATAT scheme from MOPNG encourages cbg
- ▶ EOI from OMC's for long term procurement at fixed price
- ▶ Sustainable alternative towards NET Zero

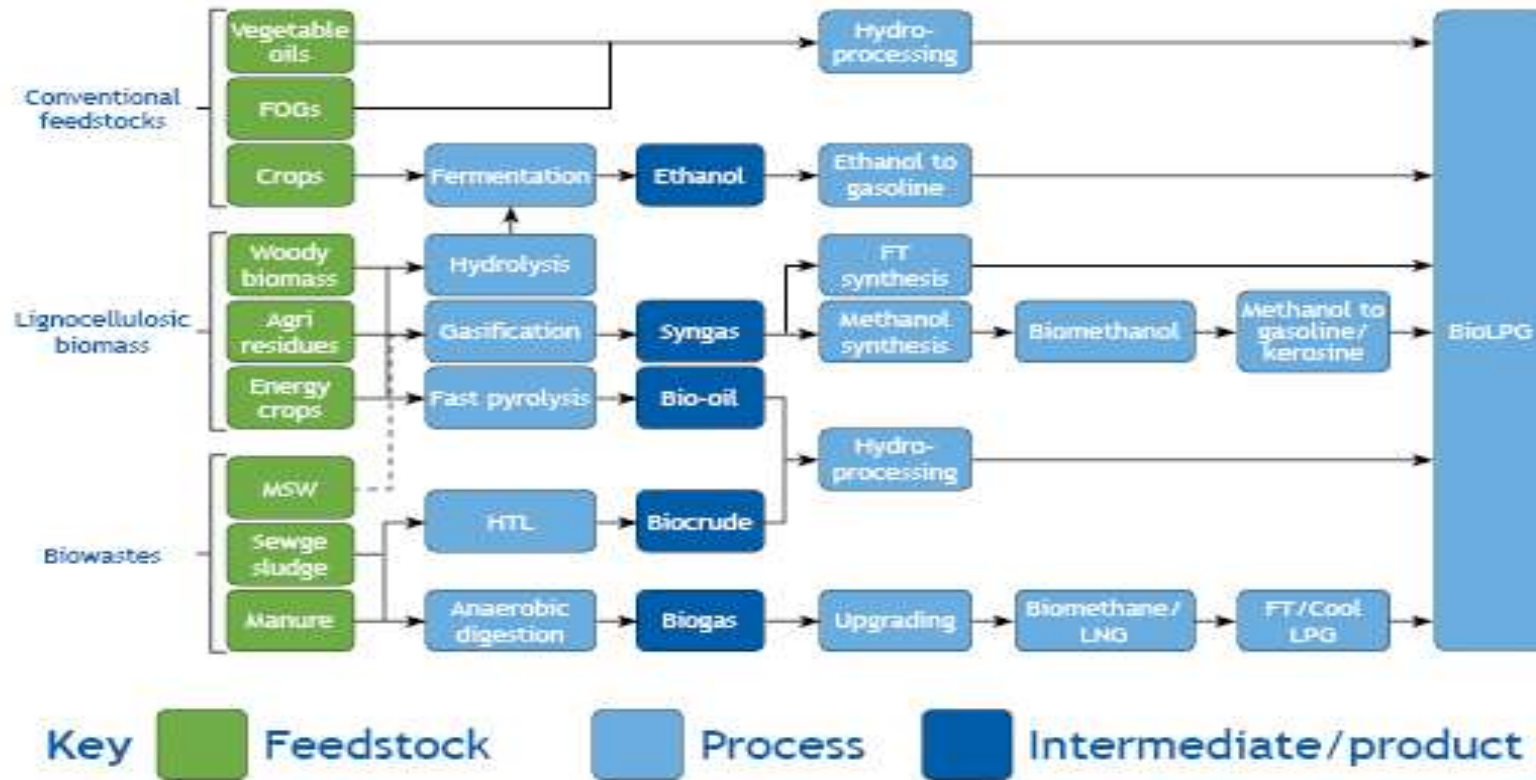


# BioLPG

Overview of most commercialised biomass-to-X pathways



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# What is Net zero

- ▶ achieving a balance between the amount of emissions produced and those removed from the atmosphere in order to reduce global warming.
- ▶ state in which greenhouse gases going into atmosphere are balanced by removal out of atmosphere
- ▶ Carbon neutral, ghg neutral, carbon negative, climate neutral
- ▶ Anthropogenic emissions to achieve net zero



# OPPORTUNITIES

- ▶ Biofuel production in india is in its nascent stage compared to world over
- ▶ Tremendous impetus from government for setting up plants
- ▶ Availability of local market for consumption
- ▶ Long term procurement contracts with government
- ▶ Virtually no competition as demand exceeds production



# Challenges

- ▶ Competition among biofuels for feedstocks pushing prices up
- ▶ Uncertainty in geopolitical as well as environmental causing supply chain disturbance
- ▶ Food vs Fuel
- ▶ Policy of states and center are not in sync
- ▶ Grey area in technology





# Recommendation

- ▶ Allow imports and ban exports of feedstocks for manufacturing of biofuels
- ▶ Allow exports of biofuels from India
- ▶ Localisation of production is key
- ▶ Encourage smaller plants district wise mapping the feedstock availability
- ▶ Platform development for agri,municipal,food waste trading



Thank you