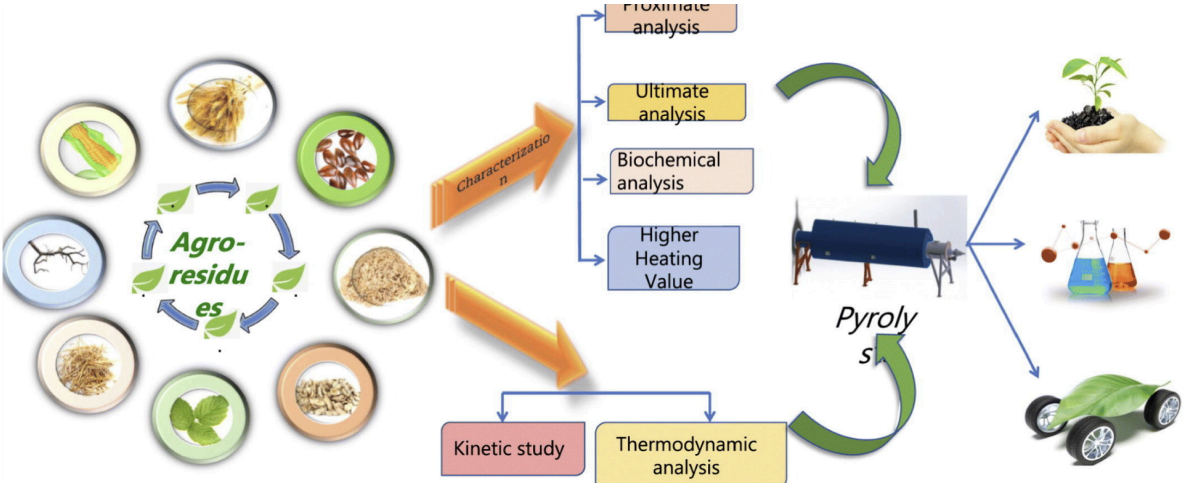
Food and Ag waste improved processing
Pyrolysis / Gasification

with focus on low / no cost start up so that all 8 billion people can benefit quickly from lower fuel costs, energy costs and increased income from better utilization of existing resources

Wastefree23.org | July 2024

Key Points:

- Pyrolysis is one of the most cost-effective, feasible and environmental friendly biomass-to-energy conversion processes
- Gasification of selected waste fractions is environmentally sound with low greenhouse gas emissions compared with, for example, composting and conventional incineration
- Unlike composting or open burning, where air polluting compounds, i.e. H_2S, SO_2 , and NH_3 , are emitted pyrolysis is...a technology for biomass reuse in line with global net zero emission targets



For California...and for the world. Pyrolysis offers a method to process the billions of tonnes of ag waste into carbon, for sequestering and syngas and bio oil which can be used instead of petroleum products for fueling transportation, etc .

Pyrolysis - powered by renewable energy sources and if heat is retained can effectively store solar PV and indirectly convert it into other fuel types and products.

Excerpts from relevant studies:

From among various thermochemical conversion routes, pyrolysis has emerged as a sought-after process due to its flexibility as it provides three forms of energy i.e. solid, liquid, and gas (Lu et al., 2020). Pyrolysis is one of the most cost-effective, feasible and environmentally friendly biomass-to-energy conversion processes (Narzari et al., 2017; Saikia et al., 2018; Ahmed et al., 2020). Pyrolysis converts agro-residues into renewable fuel by thermal degradation in an oxygen-free environment (Mythili et al., 2013). Biomass pyrolysis can be classified into three categories based on the temperature and residence time: slow (traditional) pyrolysis, fast pyrolysis, and flash pyrolysis (Singh et al., 2021a). Slow pyrolysis is conventionally applied to yield biochar. Thermal breakdown of biomass occurs at a relatively low temperature (~400 °C), with enough time provided for repolymerization processes to maximize solid residues. The solid energy produced by pyrolysis, in the form of biochar can be utilized as fertilizers, catalyst development, wastewater treatment, cosmetics, carbon nanotubes, and bio-adsorbents (Gupta et al., 2018; Gupta and Mondal, 2019b).(3)

1.6.4. Suitability for diverting BMW away from landfill

Pyrolysis and gasification of the organic wet fraction of biodegradable waste alone is unusual, as this would need expensive pre-drying of the waste. The processes are more suitable for the dry fraction of the biodegradable waste but would still have to meet the strict emissions regulations set for incineration plants treating municipal solid waste. Gasification of chipped park waste (wood chips), can be carried out in relatively simple

gasification plants designed for biomass, with low emissions. Gasification of other waste fractions and mixtures will increase the complexity and cost of the plant considerably. Gasification can be considered as a treatment method, provided that a stable market for the produced energy and recyclable products is available.
Gasification of selected waste fractions is environmentally sound with low greenhouse gas emissions compared with, for example, composting and conventional incineration, where gasification can be considered as a refined incineration process. .....
It is expected that pyrolysis and gasification plants will have a wider application field in the future due to environmental reasons and the flexibility of the systems which can be combined with other new or existing combined heat and power plants. (2)

The pyrolysis process takes place under strict conditions and limited or no oxygen [Sohi, 2012]. This process makes it possible to manage various types of plant material residues and biomass in an environmentally friendly manner. Unlike composting or open burning, where are polluting compounds, i.e. H_2S, SO_2 , and NH_3 , are emitted [Alhazmi and Loy, 2021; Chungcharoen and Srisang, 2020], pyrolysis is a new technology for biomass reuse in line with global net zero emission targets (1)

,

1. Niedziński, T., Łabętowicz, J., Stępień, W., and Pęczek, T. (2023). Analysis of the Use of Biochar from Organic Waste Pyrolysis in Agriculture and Environmental Protection. Journal of Ecological Engineering, 24(4), pp.85-98. https://doi.org/10.12911/22998993/159347
2. Biodegradable municipal waste management in Europe Part 3: Technology and market issues European Environment Agency Kongens Nytorv 6 DK-1050 Copenhagen K
   E-mail: eea@eea.eu.int Internet: http://www.eea.eu.int
3. Ankita Tagade, Nikhil Kirti, Ashish N. Sawarkar,
   Pyrolysis of agricultural crop residues: An overview of researches by Indian scientific community, Bioresource Technology Reports, Volume 15, 2021, 100761,
   ISSN 2589-014X, https://doi.org/10.1016/j.biteb.2021.100761.
   (https://www.sciencedirect.com/science/article/pii/S2589014X21001390)