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High-oleic OxG hybrids: Case Study

María del Pilar Noriega, PhD

R&D and Innovation Dir.

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Outline

- Introduction
  The Biorefinery Approach
  Green Chemistry
  High Oleic OxG Hybrids
  The Bioeconomy Concept
  Biochar and Bioenergy
  Conclusions

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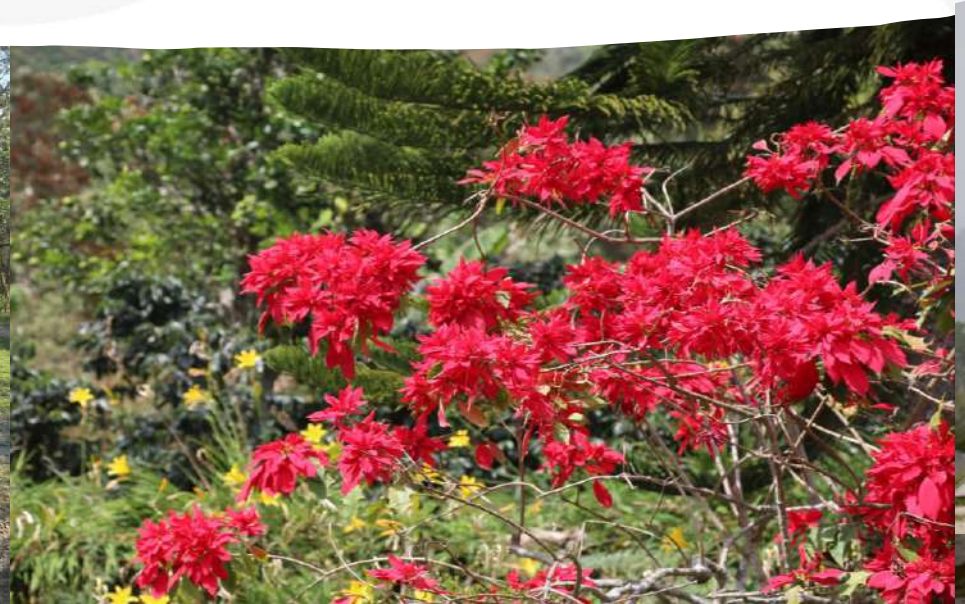
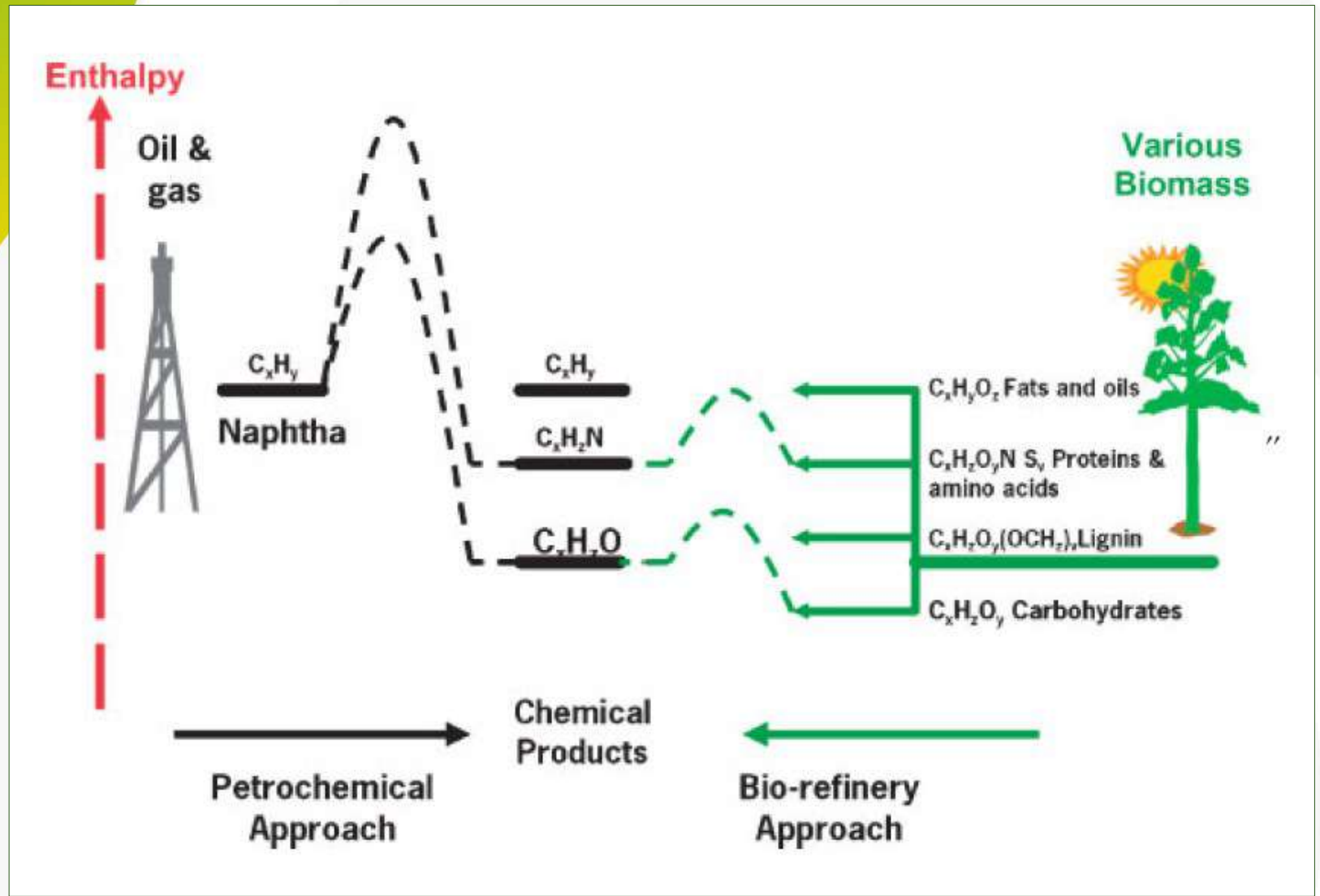
What is a Biorefinery ?

The concept of integrated biorefinery is closely linked to the circular economy. An existing industrial facility must be redesigned with the objective of integrating residues into current production streams, thereby increasing the product slate and improving overall process profitability.



2019, Doi: 10.1016/j.cogsc.2019.09.002

The Biorefinery Approach



Johan Sanders et. al. (2007)
Bio-Refinery as the Bio-Inspired Process to Bulk Chemicals

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Oil Palm Biomass

1. Empty Fruit Bunch (EFB)

Fresh Fruit Bunch (FFB)

2. Mesocarp Fiber (MF)

3. Palm Kernel Shell (PKS)

Palm Oil *Sustainable* Biorefinery

Integrates Biomass conversion technologies and processes for the simultaneous production of clean fuels, renewable energies, animal feed and biobased materials.

Sustainable Oil Palm Certificates

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Certificates that ensure responsible palm oil production taking care of environmental and social impact. Certifications that demonstrate our dedication to ethical sourcing and high-quality products.

CERTIFIED SUSTAINABLE PALM OIL RSPO 1-0132-12-000-00

FAIR TRADE CERTIFIED

ORGANIC

ORGANIC MAFRA KOREA

USDA ORGANIC

FAMBRAS HALAL BRAZIL

NON GMO Project VERIFIED nongmoproject.org

BIOSUISSE ORGANIC

JAS

Regenerative Organic Certified GOLD

GLOBALG.A.P.

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WHAT IS A BIOREFINERY ?

"Biorefinery is associated with the constant use of innovation, aiming at adding value to intermediates and residues by means of development of new chemical routes, i.e. Green Chemistry"

2019, Doi: 10.1016/j.cogsc.2019.09.002

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WHAT IS GREEN CHEMISTRY ?

"***Green chemistry*** is the *design* of *chemical products* and *processes* that reduce or eliminate the use and generation of hazardous substances. ***Green chemistry*** extends across the life cycle of a *chemical product*, including its *design*, manufacture, use, and ultimate disposal."

https://www.epa.gov/greenchemistry/

Principles of Green Chemistry (12)

- Prevent waste
- Atom Economy (i.e. avoid byproducts)
- Less Hazardous Synthesis
- Design Benign Chemicals
- Benign Solvents & Auxiliaries
- Design for Energy Efficiency

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https://www.acs.org/green-chemistry-sustainability/principles.html

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Principles of Green Chemistry (12)

- Use Renewable Feedstocks
- Reduce Derivatives
- Selective Catalysis (vs. Stoichiometric)
- Design for Degradation or Biodegradation
- Real – Time Analysis for Pollution Prevention
- Inherently Benign Chemistry for Accident Prevention

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https://www.acs.org/green-chemistry-sustainability/principles.html

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Green Chemistry and Biorefinery

- Palm Oils -

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Hybrid Oil Palm (OxG)

FRONDS

Incineration

Combustion for Electricity and Heat

CRUDE PALM OIL

Trunks

EMPTY FRUIT BUNCHES

PRESSED FIBRE

HO PALM OIL

PELLETS/ AGGLOMERATES

ORIGINAL FORM

BIOCHAR

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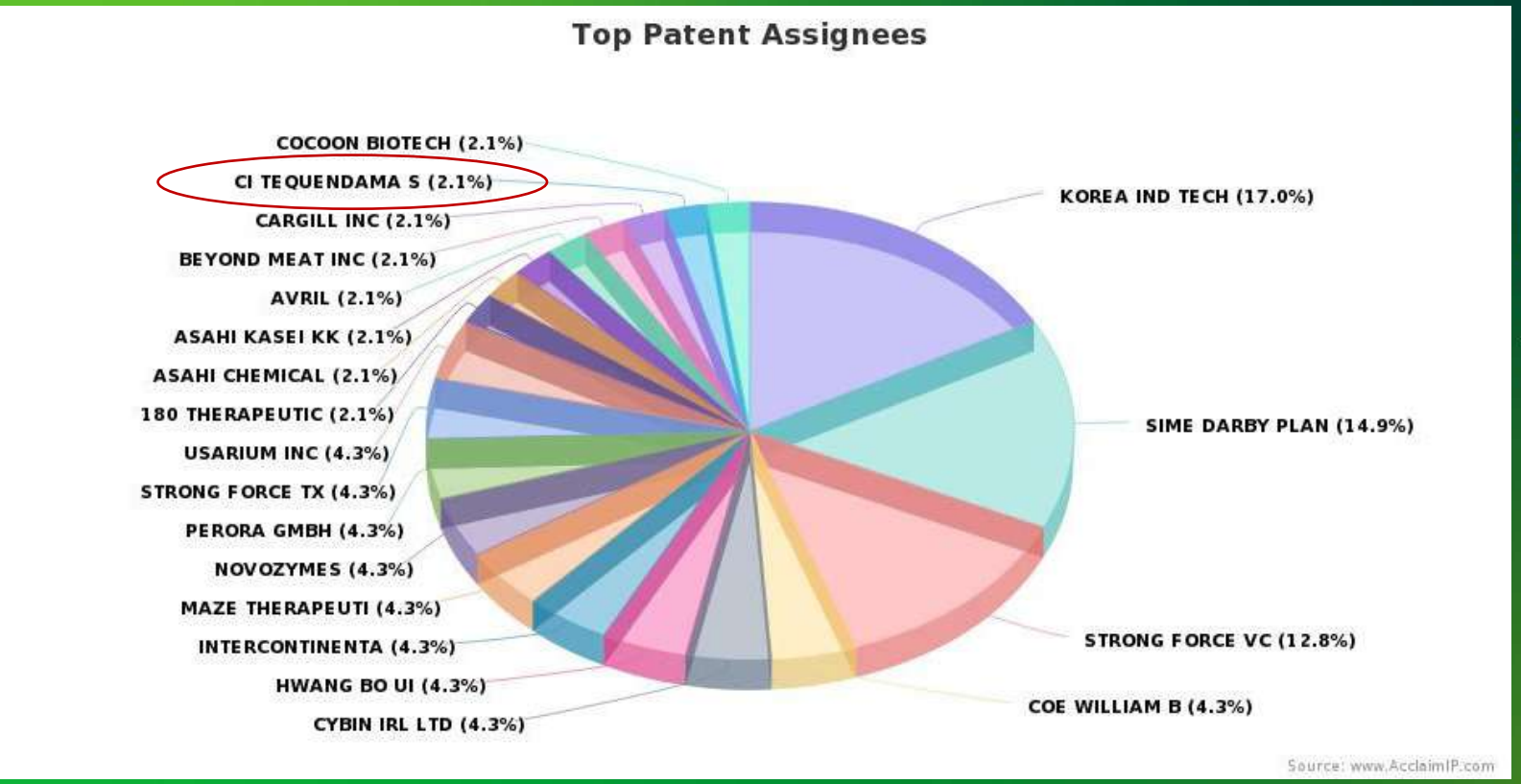
HO PALM OIL PRESSING

Inventors: Robert Johnston, Maria del Pilar Noriega E., Walter Ritzel

US 2024/0308167 A1

Palm Oils and Vegetable Oil Pressing



Acclaim IP

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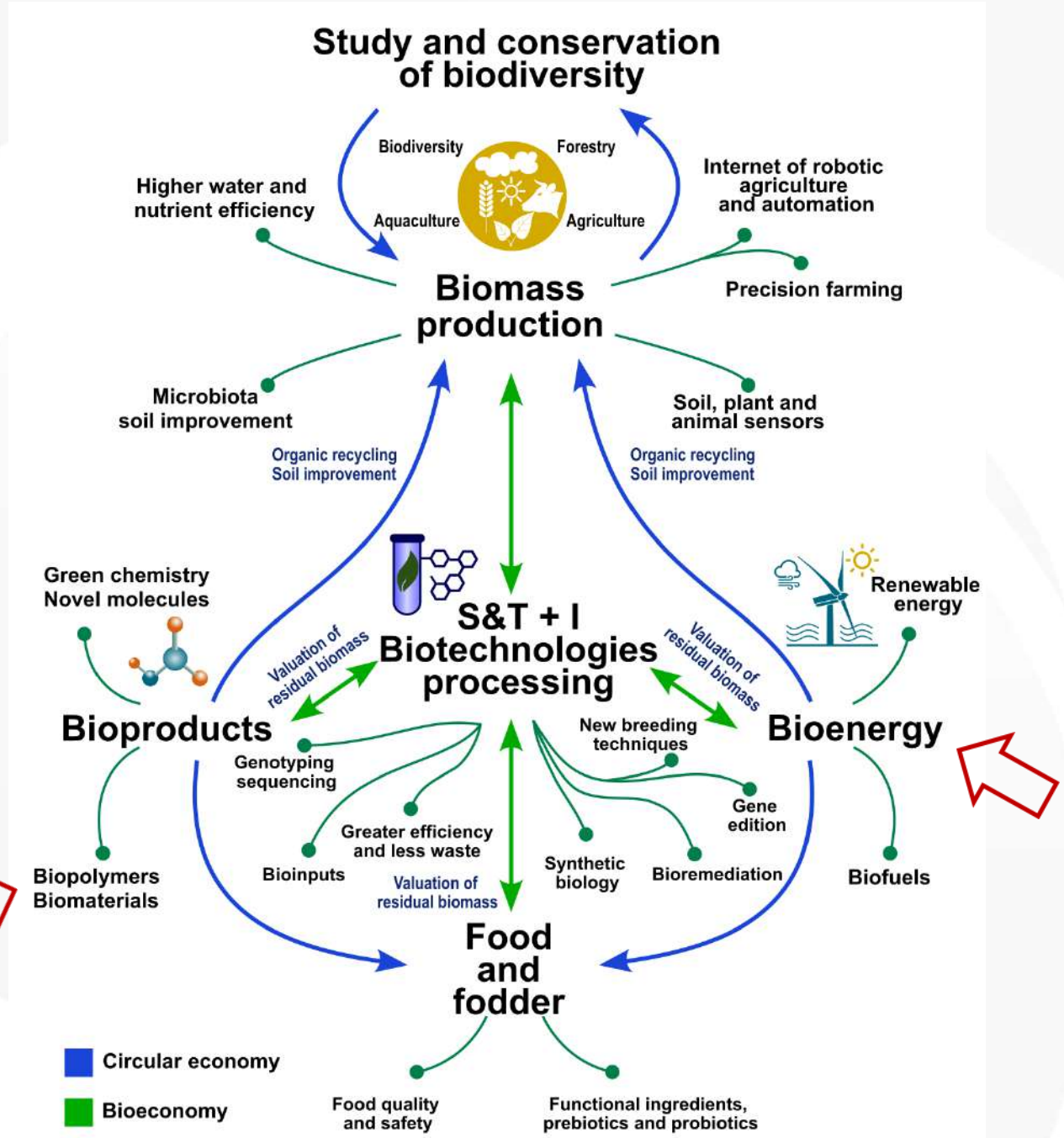

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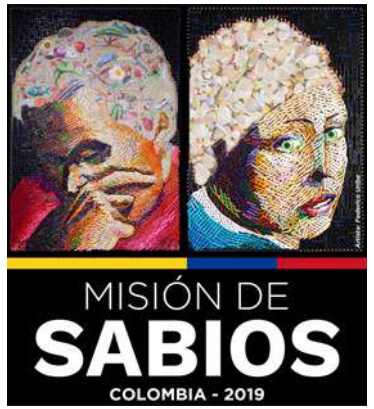
The Bioeconomy Concept



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Biomaterial: Biochar*
From residual sustainable biomass

*Carbon rich material obtained by a thermochemical process, i.e. pyrolysis

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Thermochemical Conversion from PKS to Biochar*

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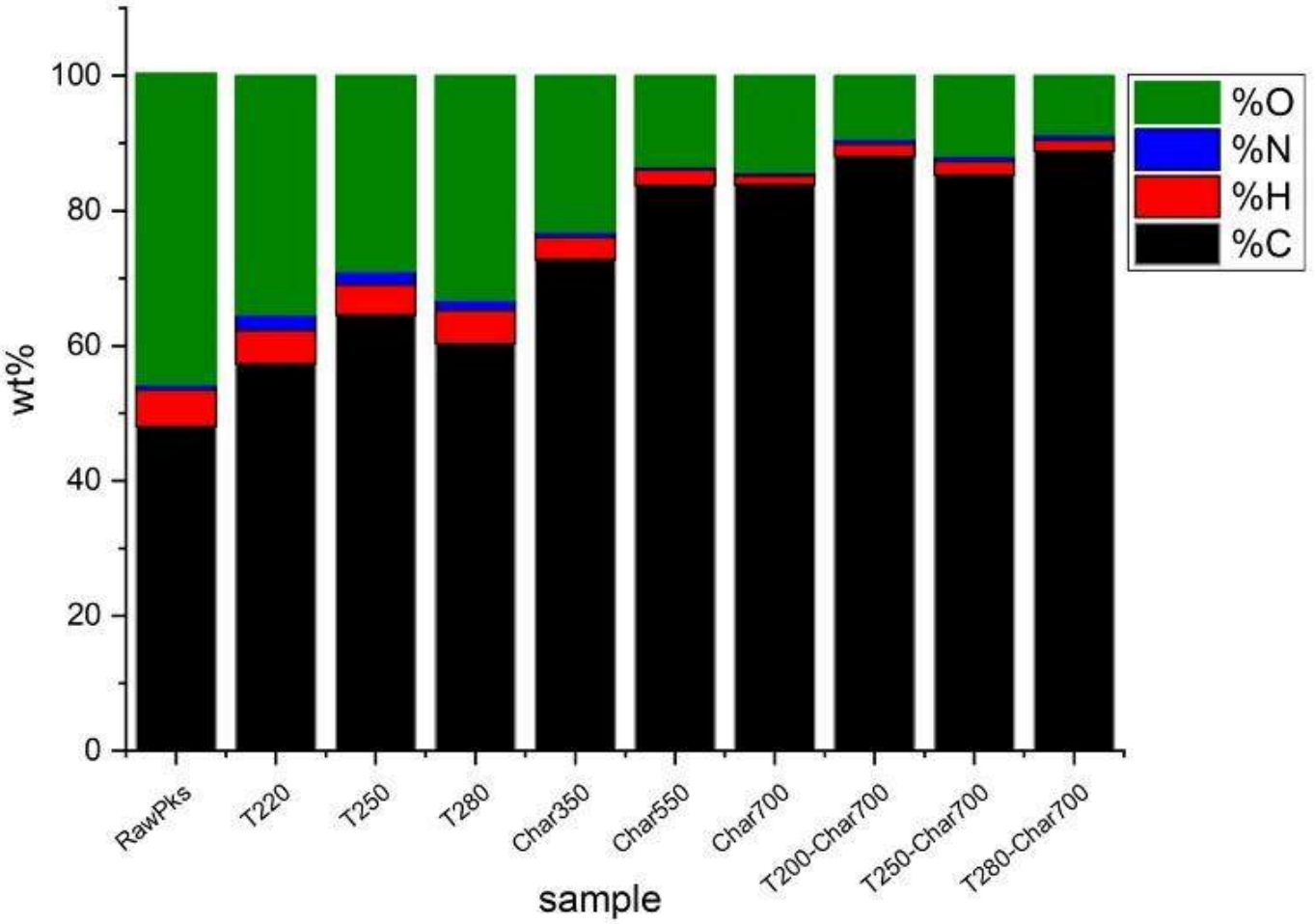
Ultimate Analysis



*: carbon-rich material derived from the pyrolysis of biomass

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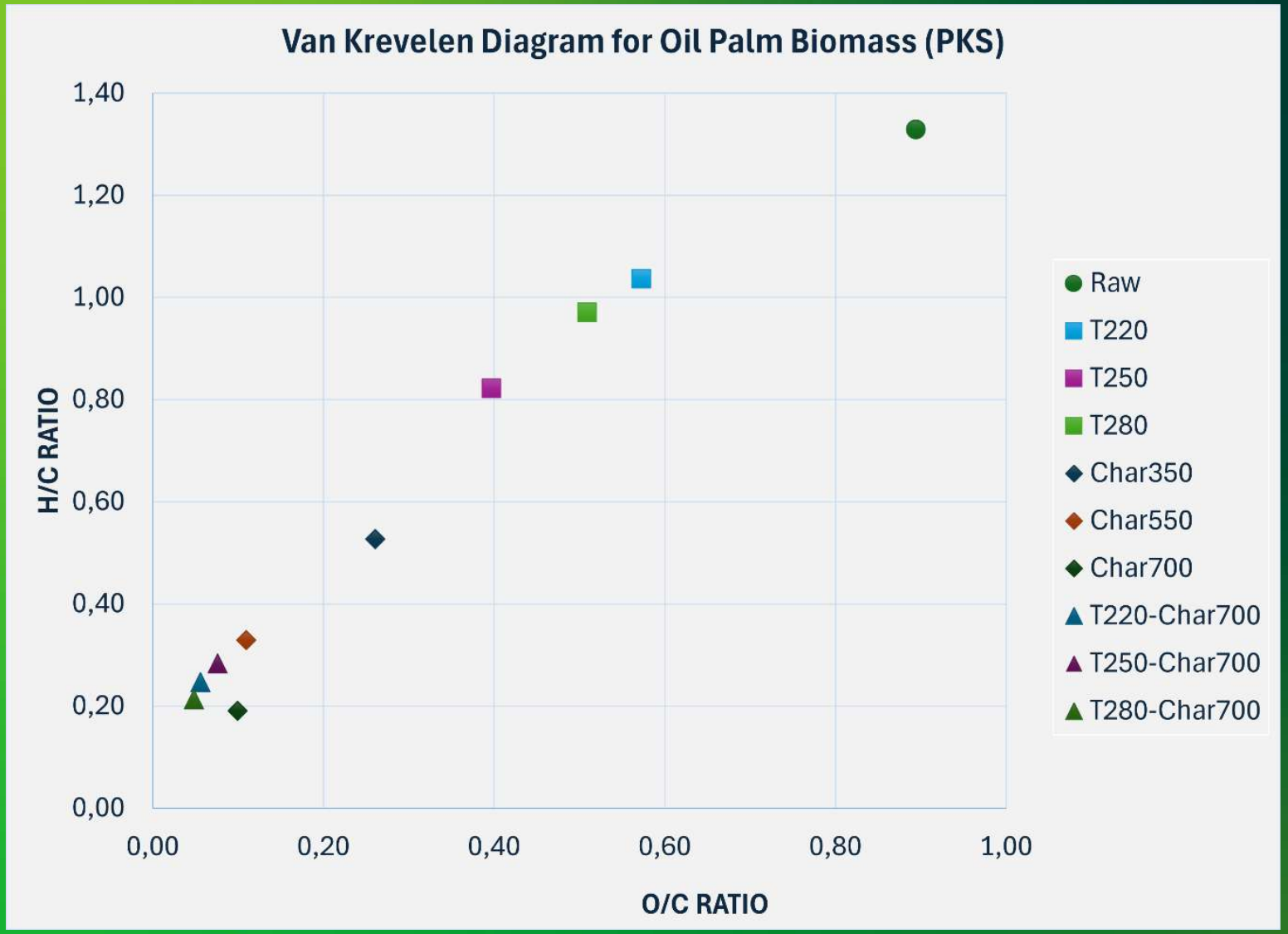

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PKS to Biochar*

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*: carbon-rich material derived from the pyrolysis of biomass

ABISURE

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Biorefinery
- Oil Palm -

Capture biogas (CH_4), which is produced by effluents from the extracting plant (*POME*). This energy is used for own support and the surplus goes to the public network of the region.

http://www.daabon.com/en/energy.php

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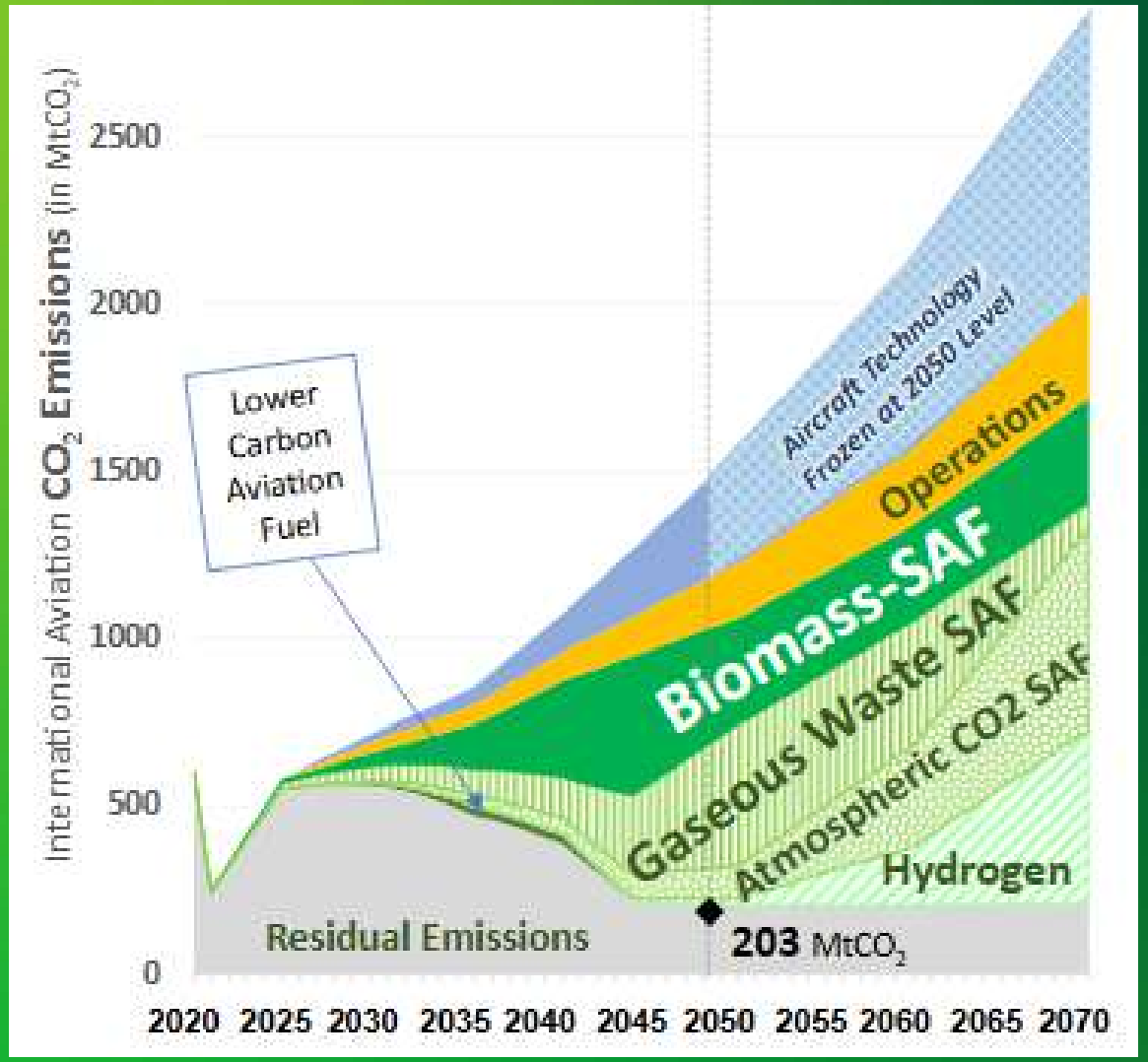

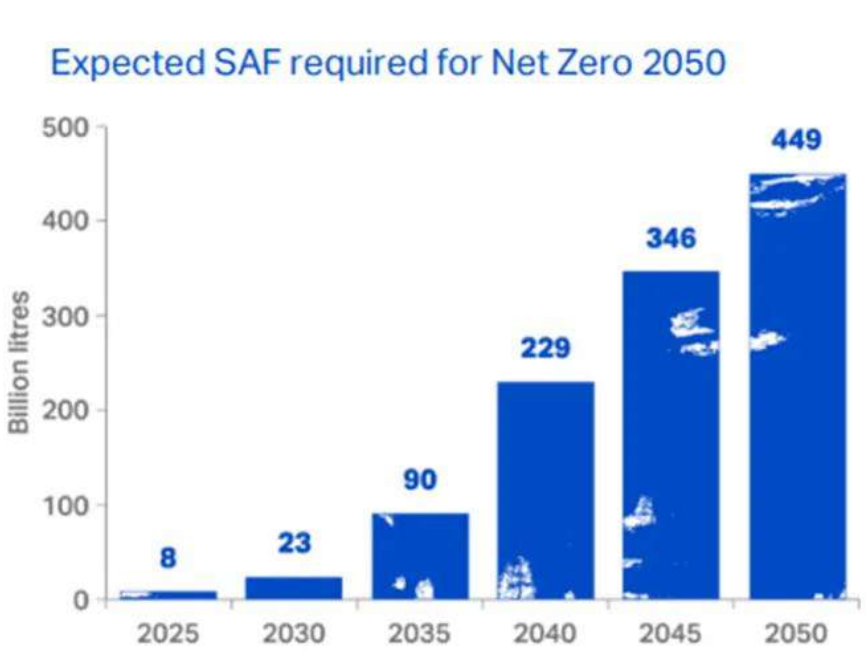

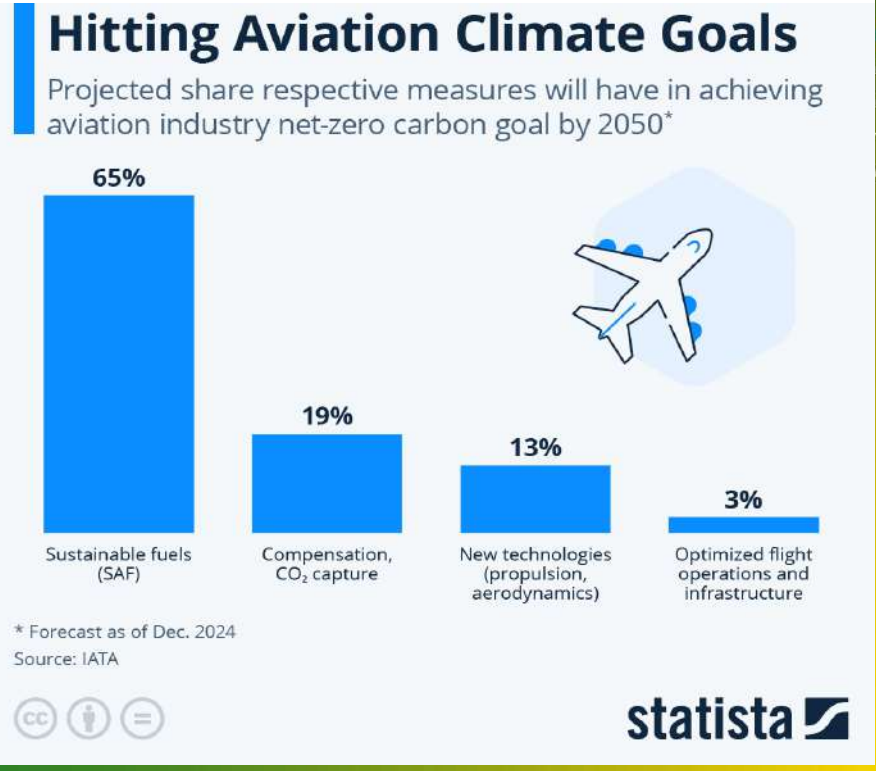

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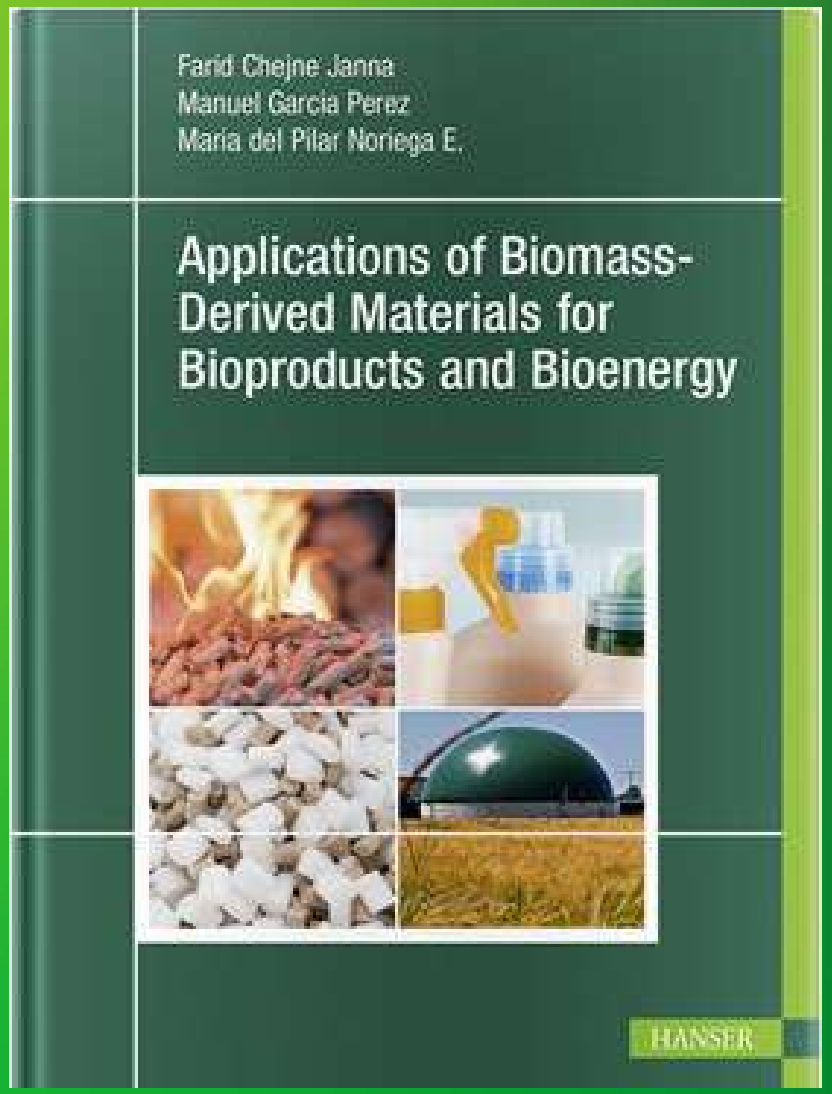
BIOENERGY

ICAO



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https://www.hanser-fachbuch.de/fachbuch/artikel/9781569908976

https://www.amazon.com/-/es/Applications-Biomass-Derived-Materials-Bioproducts-Bioenergy/dp/1569908974

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Let us not just imagine the future of oil palm, let us build it, together, with courage, wisdom, and purpose.

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