

Green H2 from Palm Oil Waste

Grimes Carbon Tech (GCT)

A net negative green technology company changing the world

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CAPER (Caustic, Aqueous-Phase, Electrochemical Reforming)

Distributed CAPER systems using low-grade waste heat to produce hydrogen on-site & on-demand with a zero or negative carbon footprint



CCR (Carbon Capture & Reuse Technology)

CCR technology that converts CO2 into Sustainable Aviation Fuel (SAF) at the cost of conventional, fossil-derived, Jet A fuel

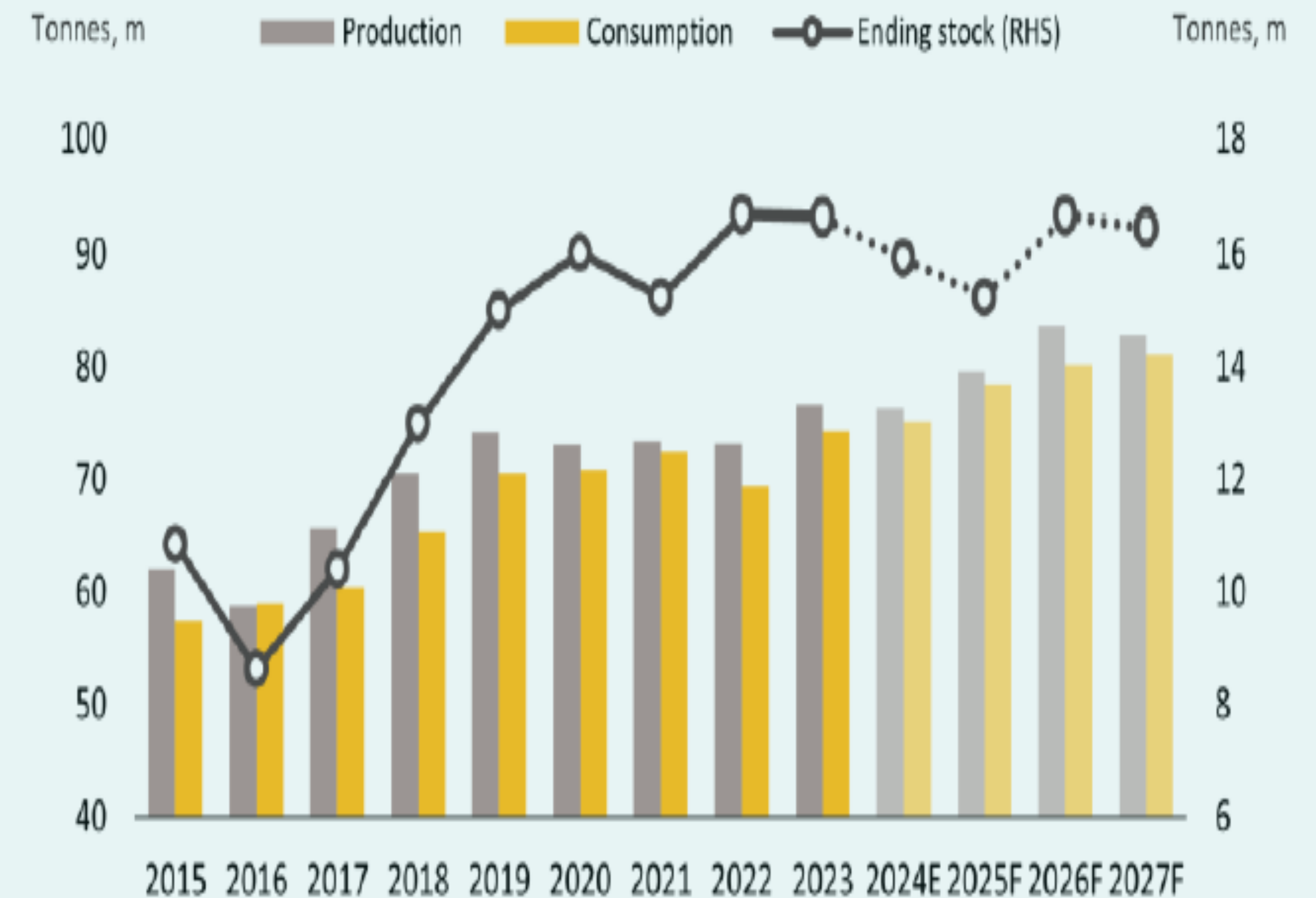
Palm Oil Production Creates Significant Amounts of Waste

About 3.3 tons of waste are produced for each ton of Raw Palm Oil (RPO)

Resource Recovery Practices are Limited

- Demand is growing for both food & fuels
- 2.5-3 tons of Palm Oil Mill Effluent (POME) are produced per ton of RPA.
- Most is dumped in ponds which aerobically emit methane & CO₂.
- Covered ponds recover biogas but only a fraction of the total available energy.
- Processing consumes large amounts of water.
- The residual solids are burnt for energy, creating air pollution, or just accumulate.
- Improper disposal practices contaminate land & water.

Global Palm Oil Production, Consumption & Ending Stock

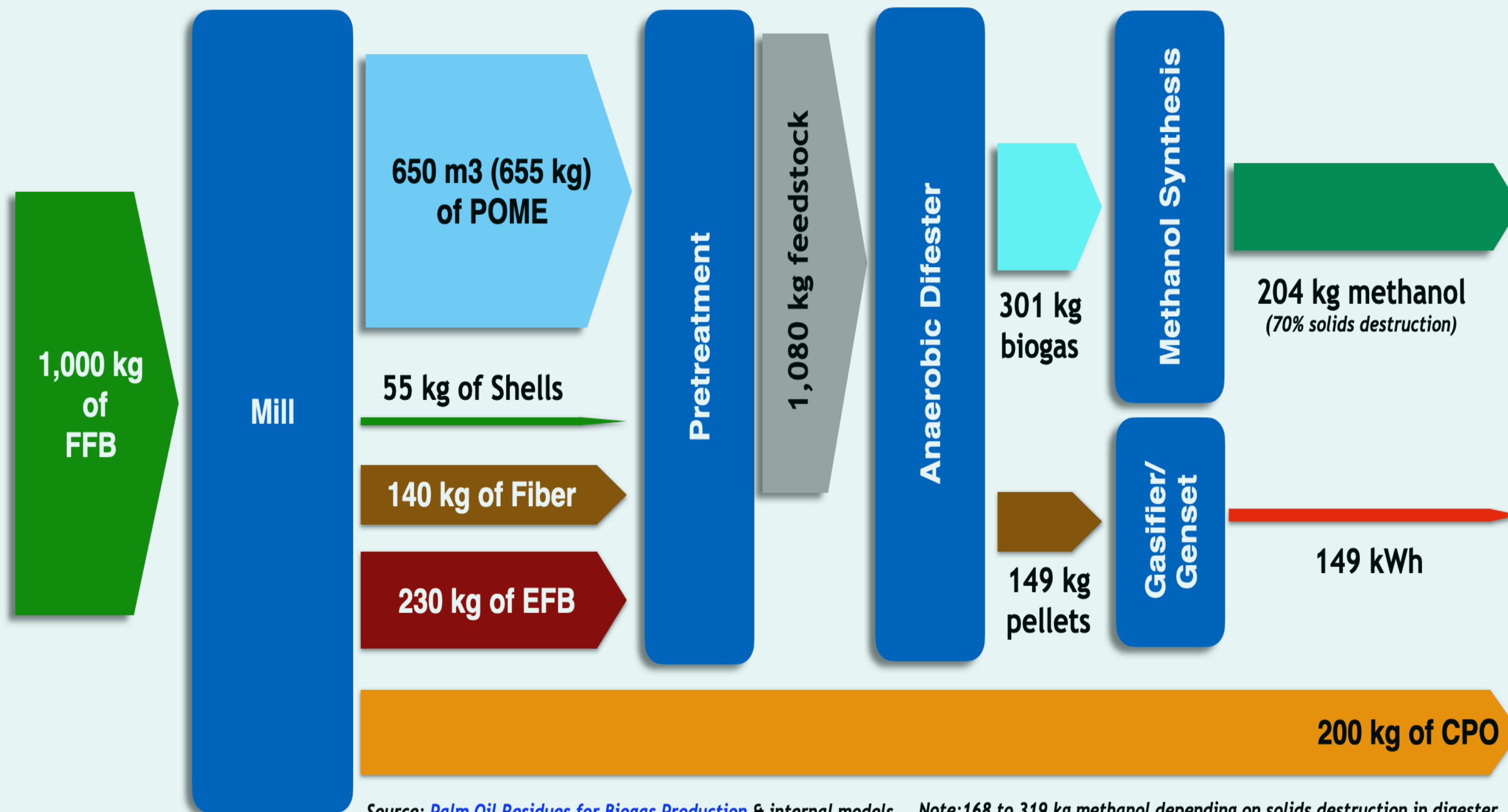


Source: US Department of Agriculture

🌱 GCT systems offer unprecedented profit opportunity

Integrated waste management offer a fivefold increase in recoverable energy

Potential Green Methanol Yield from 1 Ton of Fresh Fruit Bunches (FFB)



Source: [Palm Oil Residues for Biogas Production](#) & internal models Note: 168 to 319 kg methanol depending on solids destruction in digester

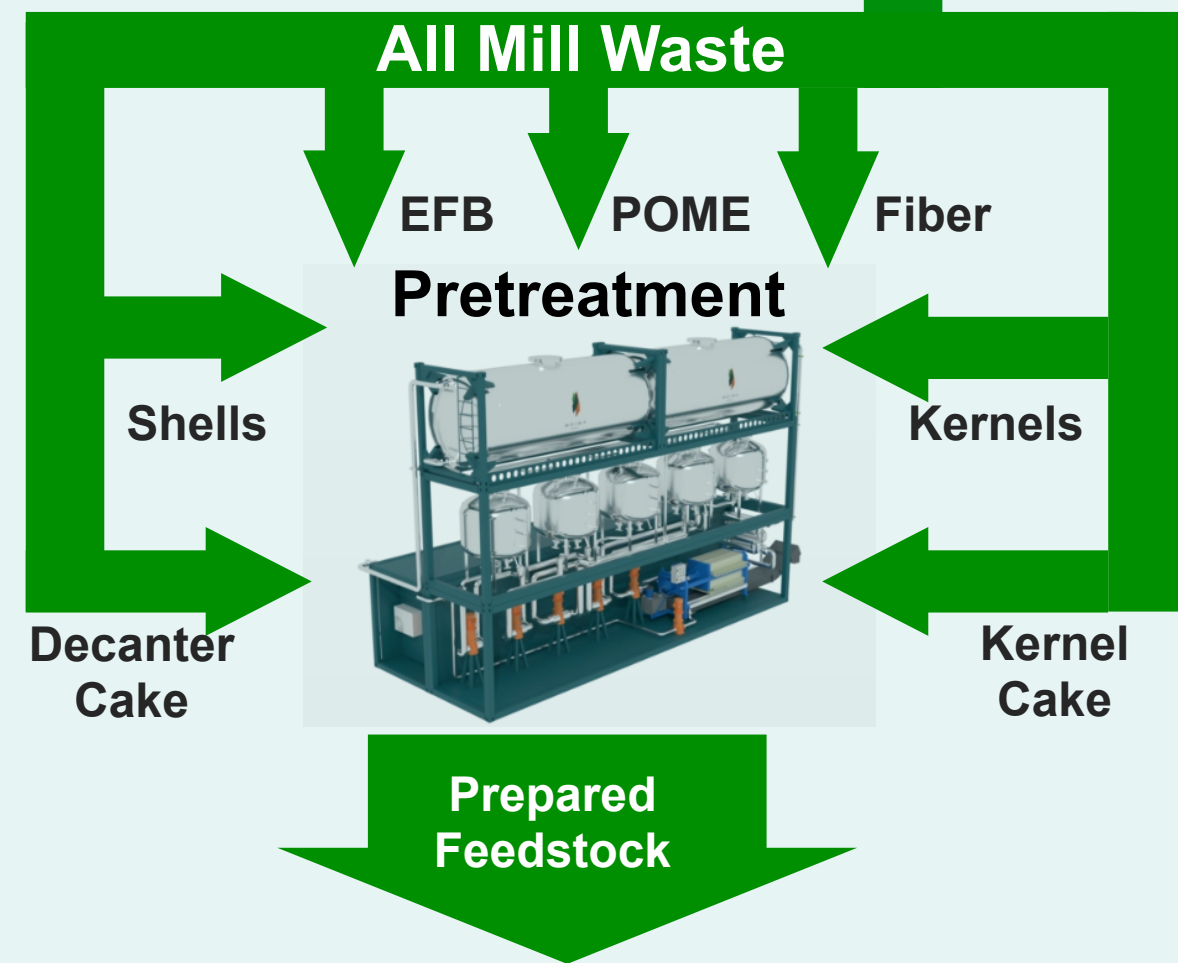
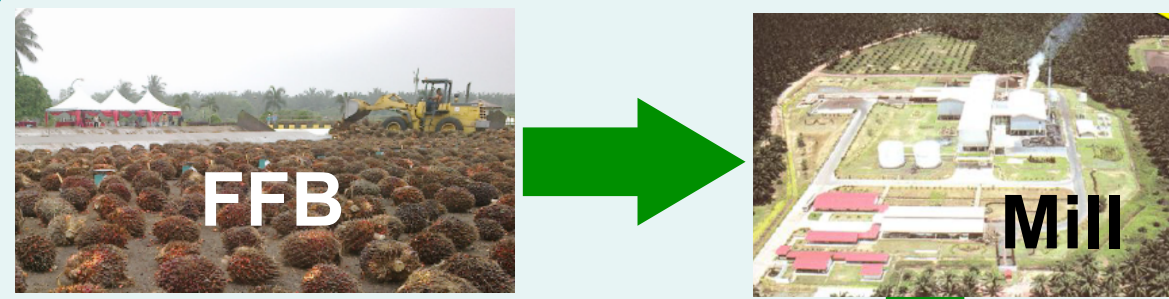
GCT Approach:

- Can convert 100% of all waste into energy.
- Can provide all energy needed to operate the mill, ate conversion & methanol production.
- Can create 1,020 kg of cost effective affordable Green Methanol (~\$350/ton) per ton of crude palm oil.
- Technology improvements can increase this yield to ~1,600 kg.
- Can create 188.7 kg of Green Hydrogen onsite & on demand per ton of Green Methanol @ \$2.00/kg.
- Will create 50 kg of organic fertilizer per ton FFB (not shown)
- Will return 870 tons of potable water per ton of FFB (not shown)

CAPER of syrup & bio-methanol creates affordable Green H2

Electrical efficiency can increase as much as 50% over conventional plants

Inputs



CAPER Cost ~\$100,000/TPD

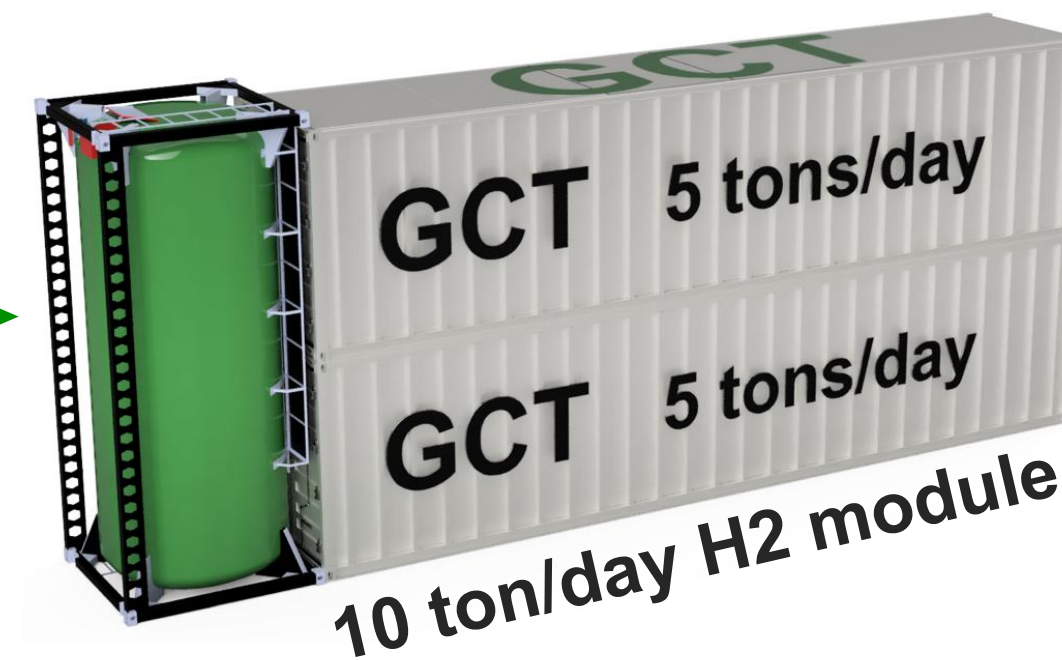


Modular, flexible and distributed

GCT's CAPER converts syrup & methanol in factory-built shipping containers that eliminate the need for H2 pipelines. The CAPER can be operated alone or integrated with a CCR system to produce fuels.

Green Methanol

< \$500/ton



H2

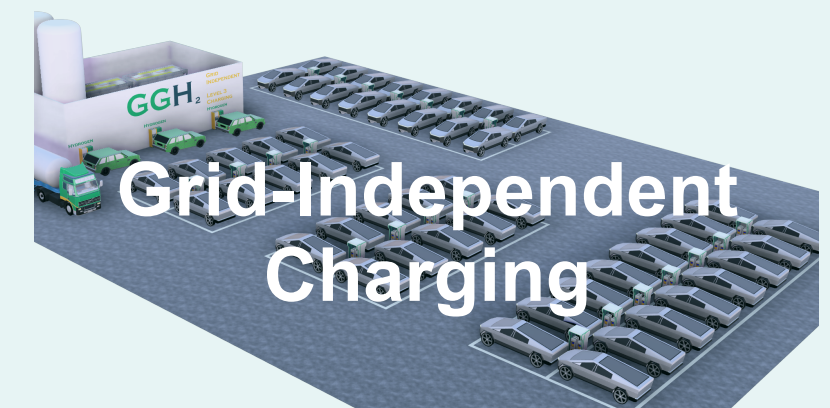
< \$2.75/kg



Low energy, liquid-phase

GCT's CAPER operates on waste heat (< 200°C) and in liquid-phase, eliminating the need for gas-phase compression, a major cost. The system only produces H2, eliminating the need for gas separation as well.

Outputs



Organic Fertilizer