# Triton Hydrogen Corporation

Caretaker of the Ecosystems

Several technologies are used to convert biomass into biofuels, each with unique processes and outputs. Here’s a breakdown of the main conversion technologies and what sets **Triton Hydrogen Corporation's technology** apart:

## 1. Key Technologies for Biomass-to-Biofuels Conversion

### Thermochemical Processes

- **Gasification**: Biomass is converted into syngas (a mix of CO, $H_2$, and $CO_2$) at high temperatures with controlled oxygen or steam. The syngas can be further processed into fuels via the Fischer-Tropsch (FT) synthesis.

- **Pyrolysis**: Biomass is heated in the absence of oxygen to produce bio-oil, biochar, and syngas. Bio-oil can be upgraded to biofuels.

- **Hydrothermal Liquefaction (HTL)**: Biomass is treated with water under high pressure and moderate temperatures to produce bio-crude oil, which can be refined into biofuels.

- **Catalytic Hydroprocessing**: Converts bio-oil or syngas into drop-in biofuels, such as sustainable aviation fuel (SAF) or biodiesel.

**Biochemical Processes**

- **Anaerobic Digestion**: Organic material is broken down by microorganisms in the absence of oxygen to produce biogas (methane and $CO_2$), which can be upgraded to renewable natural gas (RNG).
- **Fermentation**: Sugars in biomass are fermented into ethanol or butanol.
- **Enzymatic Hydrolysis**: Biomass is pretreated, and enzymes are used to break down cellulose into sugars for fermentation.

## Algal Biofuel Production

- Algae are cultivated and harvested to produce oils, which can be processed into biodiesel or jet fuel through transesterification or hydroprocessing

## Advanced Technologies

- **Supercritical $CO_2$ Extraction**: Efficiently extracts lipids or oils from biomass for biofuel production.
- **Synthetic Biology**: Genetically engineered microorganisms convert biomass into specific biofuels.

## 2. What Sets Triton Hydrogen Corporation's Technology Apart

### Focus on AI and Machine Learning Integration

- Triton's technology leverages **Artificial Intelligence (AI)** and **machine learning (ML)** to optimize biomass-to-biofuels conversion processes.
  - Real-time monitoring and predictive analytics to maximize \ efficiency.
  - Optimization of feedstock composition and process parameters.
  - Predictive modeling for catalyst performance and reaction pathways.

## Hybrid Processing Techniques

- Triton integrates HTL, Catalytic Hydrogenation, and Supercritical $CO_2$ Extraction into a single workflow.
  - Enables the simultaneous production of multiple biofuels (e.g., biodiesel and SAF).
  - Maximizes yield by minimizing waste and improving energy efficiency.

## Hydrogen Utilization for Carbon Intensity Reduction

- Triton incorporates green hydrogen derived from renewable energy sources into its catalytic processes
  - Hydrogen is used to upgrade bio-oils and stabilize hydrocarbons.

- This reduces the carbon intensity (CI) of the produced biofuels, making them more environmentally sustainable.

**Focus on Scalability and Localized Solutions**

- Triton's modular systems are designed for scalable deployment, suitable for both small- scale local applications and large-scale industrial operations.
  - Emphasizes adaptability for diverse feedstocks, such as agricultural residues, algae, and Nopal cactus biomass.

**Alignment with Circular Economy**

- Triton's technology integrates biochar production into its process chain.

- Biochar can be used as a soil amendment or carbon sequestration tool, contributing to a closed-loop carbon cycle.

## 3. Competitive Advantages of Triton's Technology

- **Efficiency:** Enhanced through AI/ML-driven optimization.
- **Versatility:** Compatible with a wide range of biomass types and tailored to produce biodiesel, SAF, and renewable hydrogen.
- **Sustainability:** Uses green hydrogen and minimizes waste while maximizing resource recovery.
- **Innovation:** Combines cutting-edge AI with hybrid processing techniques to stay ahead of traditional biomass-to-biofuels conversion methods.

Triton's differentiated approach positions it as a leader in clean energy innovation, with a focus on scalable, efficient, and sustainable biofuel technologies.

# Thank you

Triton Hydrogen Corporation (Canada)

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