

Catalysts for Change: Advancing Biomass Gasification for Clean Hydrogen

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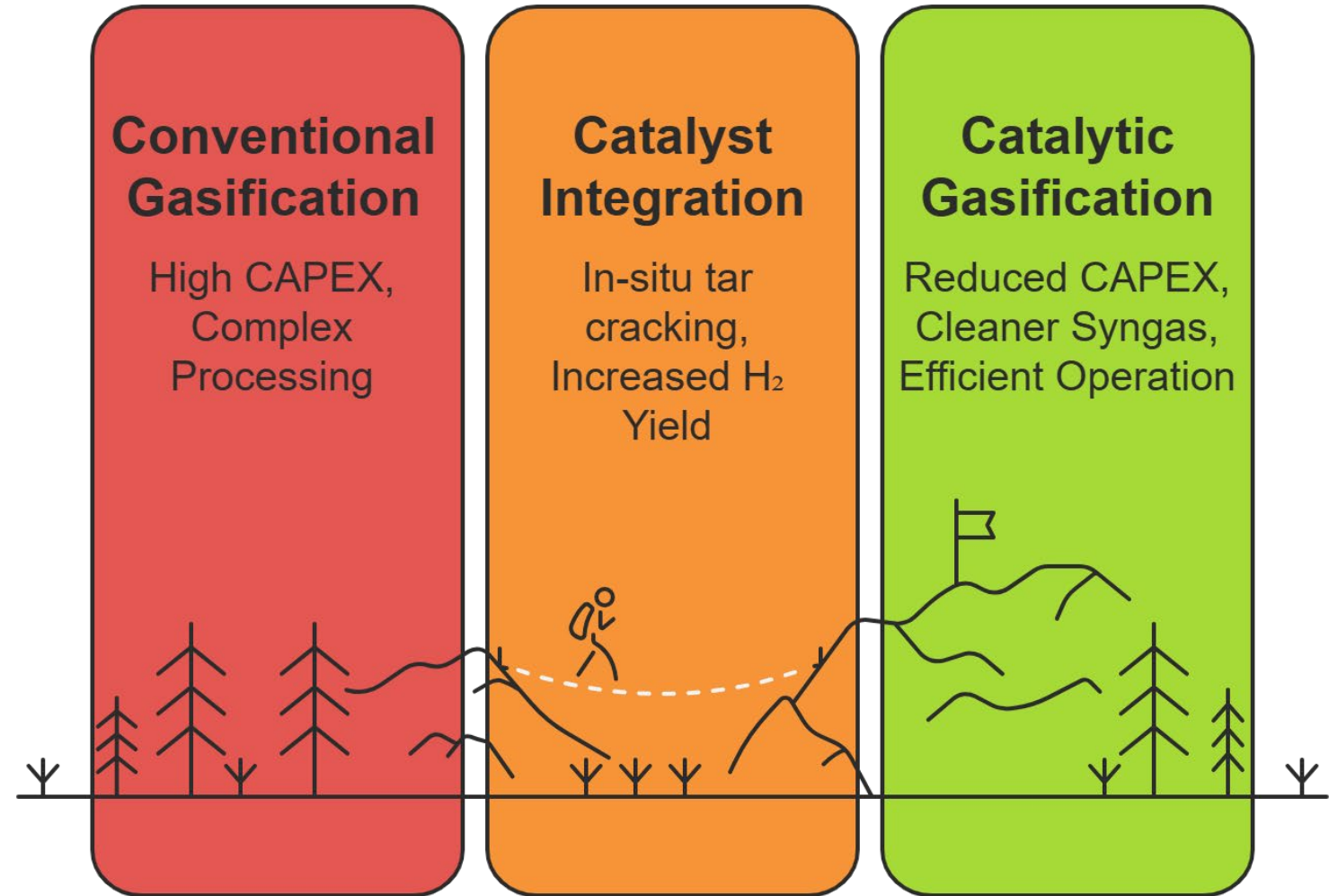
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TRANSITION FROM CONVENTIONAL TO CATALYTIC BIOMASS GASIFICATION

CHALLENGE: High CAPEX from tar handling, gas cleanup, lower Hydrogen yield.

OPPORTUNITY: Catalyst integration simplifies processing and increases Hydrogen yield.



CATALYST MECHANISM OVERVIEW

Simplified Gas Cleaning

Produces a cleaner syngas with fewer impurities, reducing the need for extensive downstream treatment for cleaning.



Enhanced Hydrogen Yield

Promotes reforming and WGS reactions thus increasing Hydrogen concentration in the syngas.



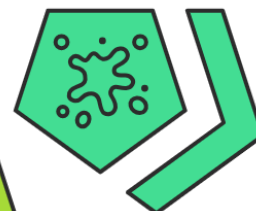
Process Heat Integration

Improves thermal efficiency by utilising reaction heat to sustain endothermic reforming reactions.



Reduced Tar Formation

Cracks heavy Hydrocarbons thus minimising tar formation, (a byproduct that can hinder gasification efficiency).



In-situ CO₂ Capture

Facilitates temporary Carbon Dioxide adsorption or conversion during gasification thus enhancing Hydrogen yield and gas purity.



PATHWAY TO SCALABILITY, LOW-COST HYDROGEN

Catalyst Development: Design and synthesis of efficient catalysts to improve H₂ yield and thermal stability.

Process Optimisation: Tuning gasification parameters for maximum biomass conversion and tar reduction.

Process Intensification: In-situ catalytic reforming and cleaner syngas → reduce downstream cleanup → Lower CAPEX.

Techno-Economic Assessment: Evaluating H₂ yield, process efficiency, and cost reduction potential.

Scale Up & Validation: Pilot-Scale testing and pathway for industrial-scale low-cost Hydrogen Production.



PILOT-SCALE GASIFIER AT EBRI

The Demonstrator Pilot-Scale Gasifier Characteristics

- BFB, 200g/h, up to **12bar pressure**, up to 900°C – realistic gasification conditions.
- Integrated **GC & SPA** for real-time gas and tar analysis.
- Bridges **lab-to-pilot scale** using real biomass feedstocks.
- Data generated supports **Techno-Economic** analysis and system modelling for Hydrogen scale-up.
- Functions as a training and research platform.



THANK YOU!

Internal and External Collaborations are Important..

Get in Touch!

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