

Full-scale R&D

R&D Project Title : Proof-of-concept of Green Gas Production by Thermochemically-recuperative Biomass Gasification

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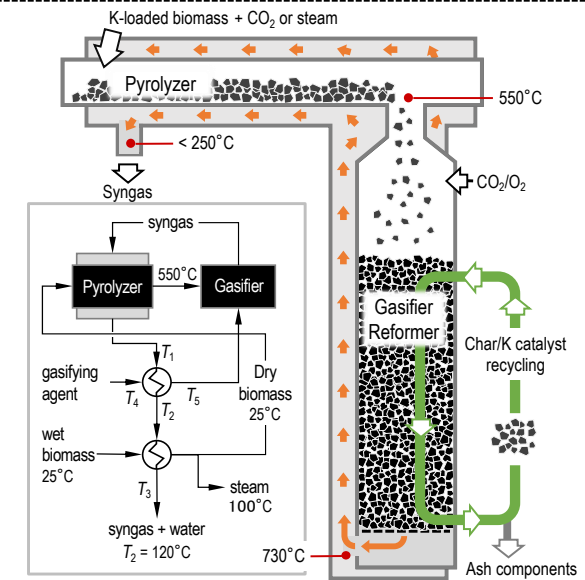


Project Summary :

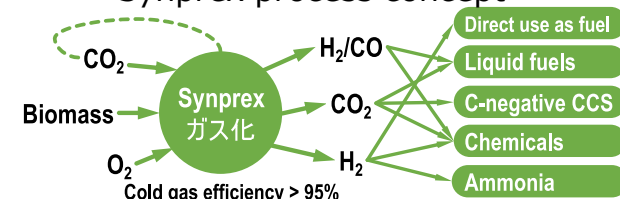
This project aims at demonstration of the concept of a thermochemical regenerative gasification process (Synprex⁺) that converts biomass into synthesis gas and hydrogen with unprecedented energy efficiency, and design of a full-scale process 30,000 t-biomass/year. We will clarify the effectiveness of the new process principles included in Synprex (separation of pyrolysis from volatiles-reforming/char-gasification, application of potassium catalyst circulating in the reaction system, multi-stage decomposition/elimination of tar, and driving pyrolysis with sensible heat of syngas) through bench-scale tests on a 5 kWth scale, and demonstrate process performances such as syngas yield > 95% on LHV basis, tar concentration in syngas < 1 mg/Nm³, hydrocarbon concentration < 2%, potassium catalyst recycling, and avoidance of ash problems. We will also develop cutting-edge particle/fluid/reaction simulation methods that quantitatively explain the test results, and based on the results, we will create the basic design of a full-scale process (18,000 kWth).

It is expected that Synprex co-produces hydrogen, syngas and CO₂ from forestry, agricultural and waste biomass, and by linking this with hydrogen production from renewable electricity and CO₂ storage, it aims to meet green-gas demand (for liquid fuels and chemicals) from 2030 onwards and to introduce a carbon negative system to industries.

⁺Synprex is an abbreviation for Syngas production from biomass by pyrolysis-reforming complex and is a registered trademark of GPE Co., Ltd.



Synprex process concept



Role of Synprex in future industries