IEA Bioenergy

Task 33

“Gasification of Biogenic and Waste Feedstocks for a Sustainable Future”

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IEA Bioenergy Task 33

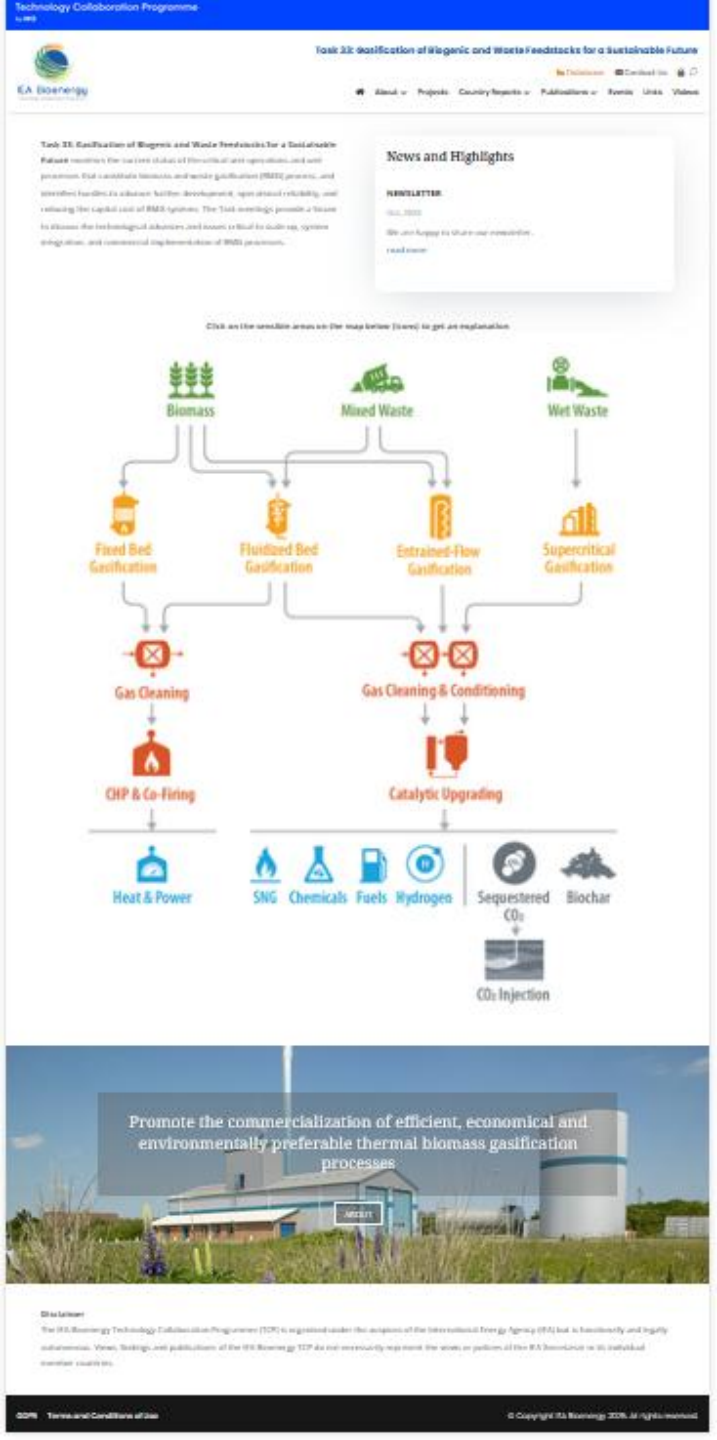
Gasification of Biogenic and Waste Feedstocks for a Sustainable Future

https://task33.ieabioenergy.com/

Task 33: Gasification of Biogenic and Waste Feedstocks for a Sustainable Future **monitors the current status** of the critical unit operations and unit processes that constitute biomass and waste gasification (BMG) process, and **identifies hurdles to advance further development,** operational reliability, and reducing the capital cost of BMG systems. The Task meetings **provide a forum to discuss the technological advances and issues critical to scale-up, system integration, and commercial implementation of BMG processes.**

13 member countries (2025-2027):
AT, BE, CA, CN, DE, FI, FR, IT, IN, NL, SE, UK, USA

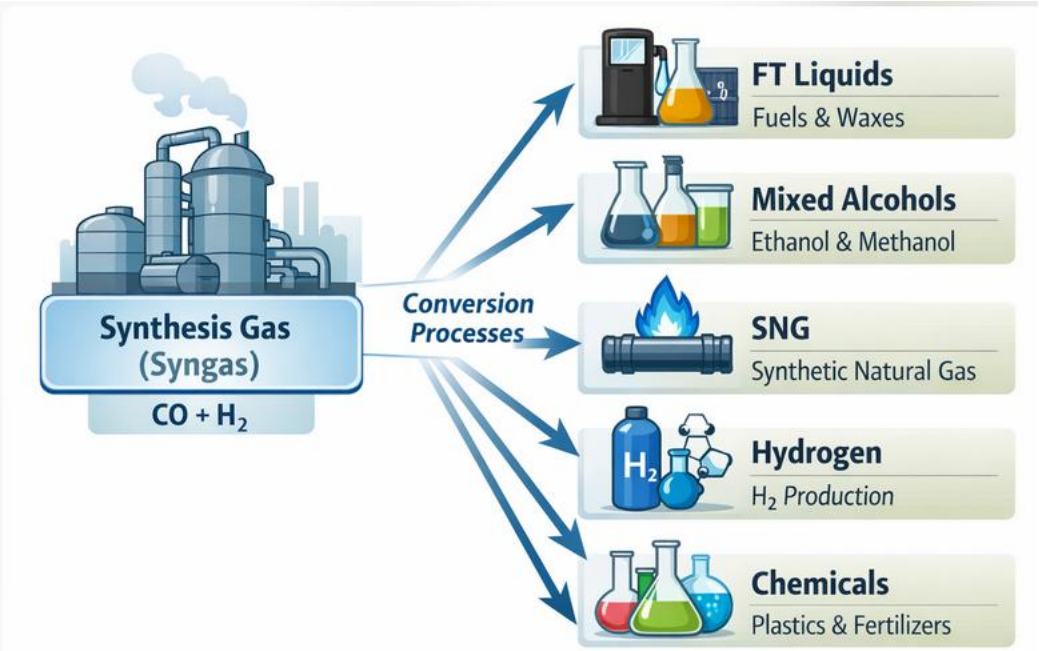
Task lead: Jitka Hrbek, BOKU, AT
Task Co-lead: Joakim Lundgren, LTU, SE



Biomass and waste gasification

Thermochemical gasification **converts** biomass and waste-based **feedstocks into an energy-rich gas** at high temperatures with a limited supply of oxygen and/or steam.

Input	Output	Gas/syngas utilization
Biomass (woody, agricultural)	Producer gas (after cleaning called syngas)	Heat
Waste (RDF/SRF, MSW, industrial Fractions)	Heat and usable process energy	Combined heat and power (CHP)
Process media: oxygen/air/steam	Co-products: Biochar /char	Hydrogen, SNG, Fuels, Chemicals



Transportation fuels through gasification

Status in T 33 member countries*

*source: IEA Bioenergy Task 33 Country reports

Status in Europe

In the Europe, **France, Sweden, Finland, Germany, the UK, and the Netherlands** are the key players in gasification-based biofuels, with **SAF clearly emerging as the dominant growth market**.

France – Strong support for advanced biofuels, focusing on **SAF and synthetic fuels** (BioTJet)

Germany – Leading gasification R&D and pilot plants, shifting toward **SAF and hydrogen**.

Sweden – Advanced biomass chains and pulp integration, focusing on , **SAF**, **transport fuels** and biorefineries (Östrand)

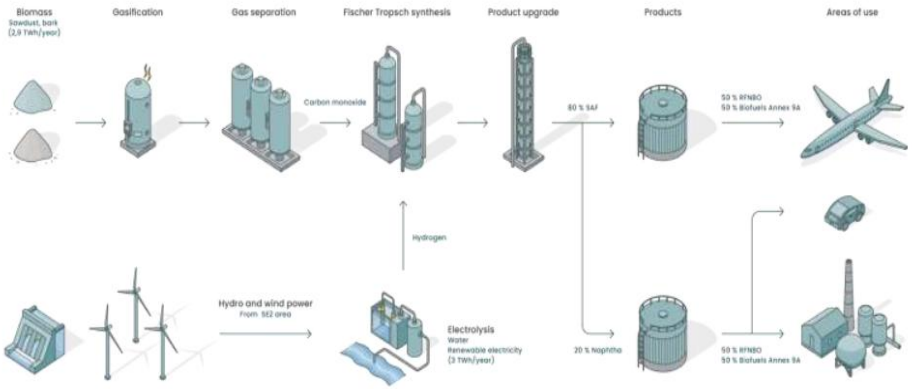
Finland – Expertise in forest biomass gasification, linking biofuels to industrial use.

UK – Policy-driven **SAF** deployment, scaling waste-to-fuel pathways.

Netherlands – Hub for **SAF**, e-fuels, and fuel upgrading, emphasizing import, blending, and market access, SNG

Transportation fuels through gasification - Status in EU

Project FUREC: Hydrogen production (54 000 t/y)



Östrand Biorefinery Project
300 000 t SAF and nahphta/year

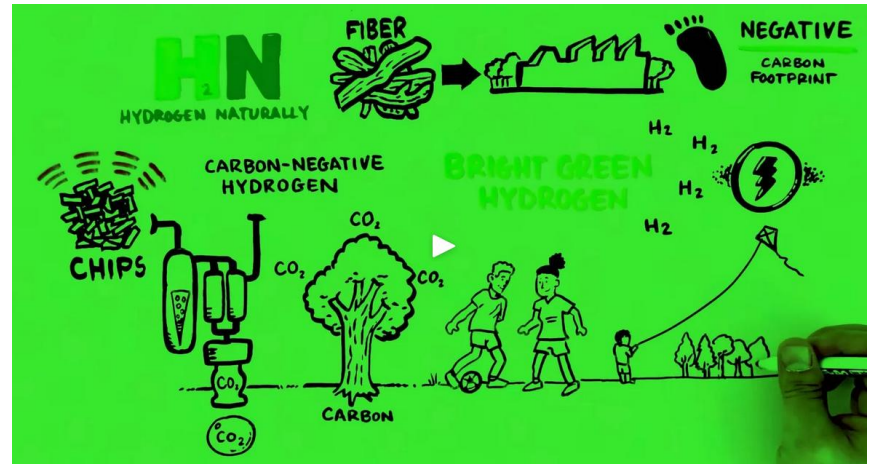
End-to-end production of SAF from biomass and municipal waste

https://www.prnewswire.com/news-releases/honeywell-johnson-matthey-gidara-energy-and-samsung-ea-form-saf-technology-alliance-302473527.html

Status of gasification in USA and Canada

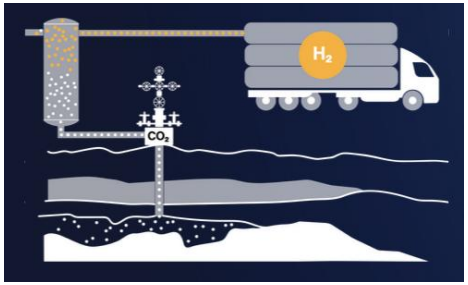
Products focus: Biofuels (SAF), Methanol, Hydrogen

USA: SunGas Renewables
Output: 500 000 t/y methanol



Canada: Project Hydrogen Naturally (coupled with CCS)

USA: MOTE – hydrogen production



Status of gasification in China und India

China

Serial No.	Project Name	Major Investors	Main Technical Parties	Location and Size	Current Progress and Contact Status
1	Goldwind Technology Xing'an League Wind Power Coupling 500,000 Tons of Green Methanol Project	Goldwind Green Energy Chemical Technology (Jiangsu) Co., Ltd.	Sai Ding Engineering (EPC Contractor), Yangmei Chemical Machinery Group Co., Ltd. (Gasifier Manufacturer)	Xing'an League, Inner Mongolia. Planned Investment: 13.665 billion yuan. Annual Production: 500,000 tons of green methanol, 2 million kilowatt wind power plant, 92,200 tons hydrogen production, 118-ton hydrogen storage facility, 160,000-kilowatt/2-hour energy storage facility, biomass power and gasification equipment.	Civil engineering completed, gasifier installed, methanol synthesis section's desulfurization tank hoisted. Expected production start: Q4 2025.
2	Zhongsheng Inner Mongolia Pilot Project	Jiangsu Zhongsheng New Energy Holdings Co., Ltd.	Shanghai Puhe Green Carbon Clean Energy Technology Co., Ltd. (Pure Oxygen Pressurized Fluidized Bed Gasification Technology)	Inner Mongolia, exact location unknown. Daily Processing: 100 tons of biomass, Annual Output: 10,000 tons/year of green synthesis gas.	Project debugging ongoing, pilot test expected completion: June 2024.
3	Shanghai Electric Taonan Wind Power Coupling Biomass Green Methanol Integration Project	Shanghai Electric Group	Shanghai Boiler Factory Co., Ltd., Shanghai Hydrogen Era Technology Co., Ltd.	Taonan, Jilin Province. Total Investment: 5.6 billion yuan. Project Scale: 250,000 tons of green methanol annually coupled with 680,000 kilowatts of new energy.	Phase 1 (50,000 tons/year green methanol) underway, trial production expected by end of June 2025.

- More than 80 large-scale operational biomass gasification plants
- Input mostly 500 t/y to 100,000 t/y
- Output: Syngas, hydrogen, methanol

India

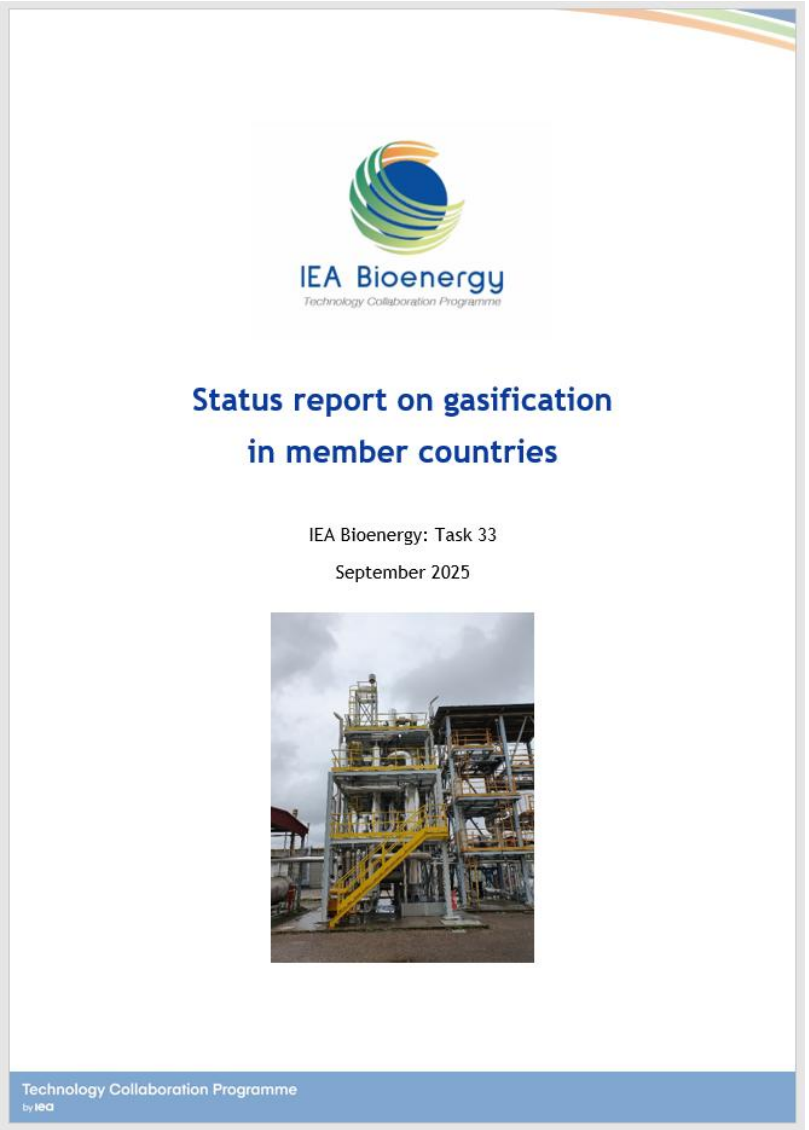
2G ethanol plant

Feedstock: 200 000 t straw/y (606 t/day)
Product: 100 000 l bioethanol /day
Owner: Indian Oil Corporation Limited
Start up: 2022

IEA Bioenergy Task 33 - Status Report 2025

https://task33.ieabioenergy.com/projects/

- Annex1_CHP_Plants_Status_Heat_and_Power
- Annex2_CHP_Plants_Status_SNG
- Annex3_CHP_Plants_Status_Hydrogen
- Annex4_CHP_Plants_Status_Chemicals
- Annex5_CHP_Plants_Status_Fuels



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Database

Filter Projects

Country: === show all ===

Type
- TRL 1-3 Research
- TRL 4-5 Pilot
- TRL 6-7 Demonstration
- TRL 8 First-of-a-kind commercial
- TRL 9 Commercial

Technology
- Circulating Fluidized Bed
- Fluid Bed
- Fuel Gas (Heat)
- Fuel Synthesis
- Gasification
- Other Gasification Technology
- Power / CHP
- dry torrefaction

Status
- no status
- planned
- under construction
- operational
- non operational
- cancelled
- idle
- on hold

Raw Material
- agricultural residues
- biomass / biomass coal blends
- forest residues
- lignocellulosics
- organic residues and waste streams
- other
- unknown

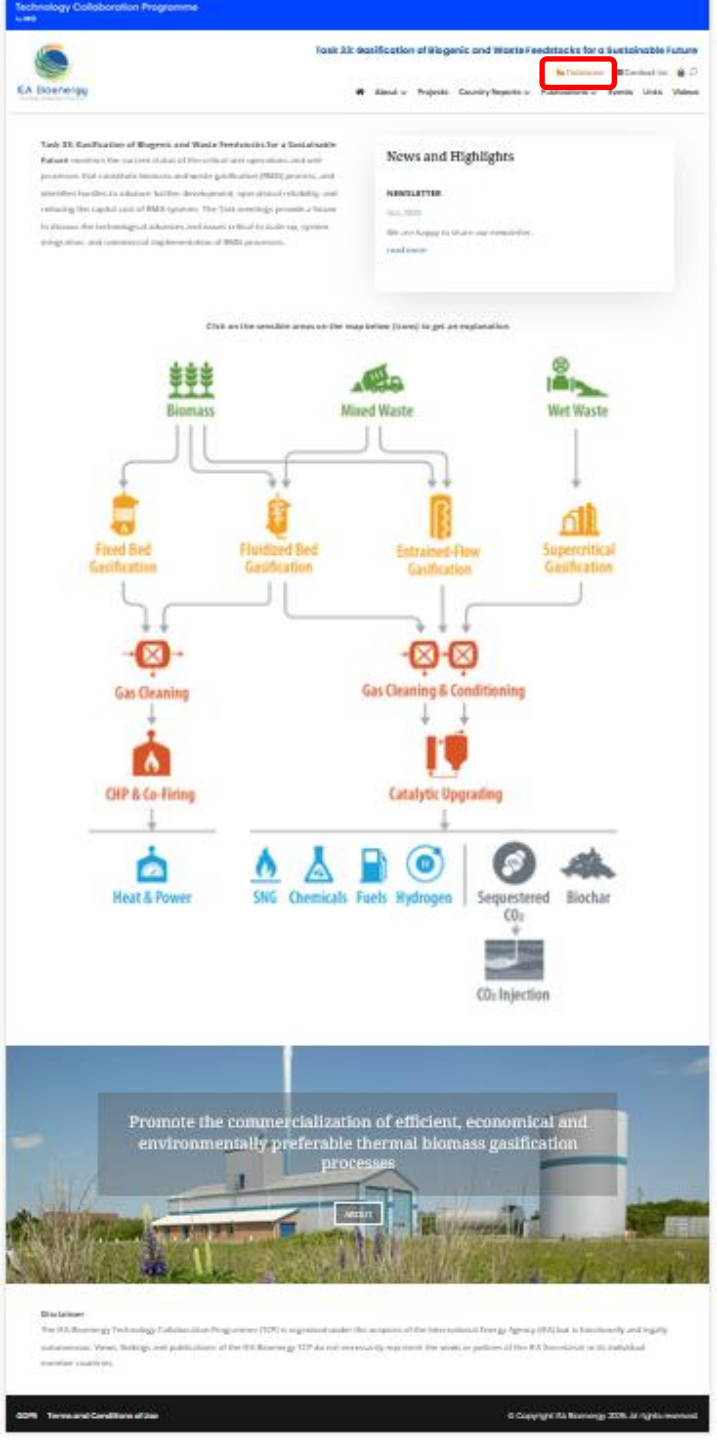
Output
- clean syngas
- DME
- ethanol
- FT liquids
- heat
- hydrogen
- methanol
- other
- power (electricity)
- SNG
- steam
- sustainable aviation fuels SAF
- unknown

Submit

Projects | Map

Search Owner/Name/Input — Submit

Owner	Name	Location	
Advanced Biofuels Solutions Ltd	Swindon Advanced Biofuels Plant	United Kingdom	Info
Advanced Biofuels Solutions Ltd	ABSL bio-SNG demonstrator	United Kingdom	Info
Aemetis/Lanzatech	Project Aemetis Riverbank	United States	Info
Aerni Pratteln	CHP Pratteln	Switzerland	Info
AEW Energie AG	Pelletvergasser AEW Rheinfelden	Switzerland	Info
AEW UK	Hoddesdon Advanced Thermal Treatment	United Kingdom	Info
Agnion Technologies GmbH	CHP Agnion Biomasse Heizkraftwerk Pfaffenhofen	Germany	Info
ARBRE Energy Limited (AEL)	IGCC ARBRE Energy Eggborough	United Kingdom	Info
ATCG	BIOGAZ Gardanne	France	Info



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Conclusions

Large-Scale Biomass Gasification – Global Status & Outlook

- **Europe & North America**
  - Small-scale gasification is mature (in EU), but **large-scale projects have struggled**
  - Multiple flagship plants stopped last year due to **financial, technical, and regulatory risks**
  - Current focus on **high-value products**:
    Sustainable Aviation Fuel (SAF) and **(carbon-negative) hydrogen**

- **Asia (China & India)**
  - **China leads globally** in large-scale deployment
    (>80 operating plants; >90 renewable methanol projects underway)
  - Growth driven by **renewable methanol and liquid biofuels**
  - **India** advancing gasification via **2G ethanol** aligned with national blending targets

Thank you!

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IEA Bioenergy

Technology Collaboration Programme

www.ieabioenergy.com