



IEA Bioenergy
Technology Collaboration Programme



Country Report Germany

Task 33 Gasification of Biogenic and Waste Feedstocks for a Sustainable Future

Update

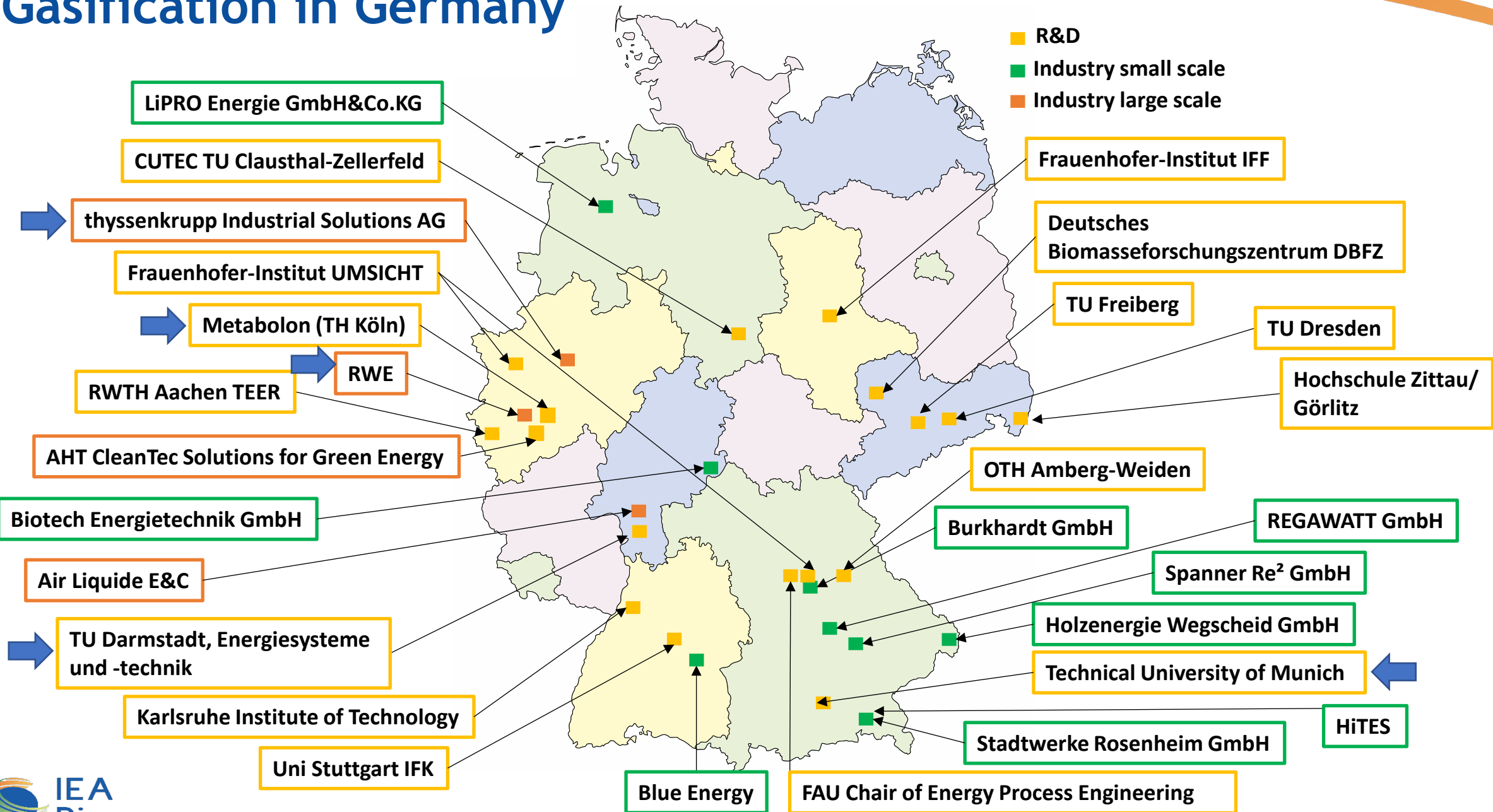
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Glasgow, May 11, 2026

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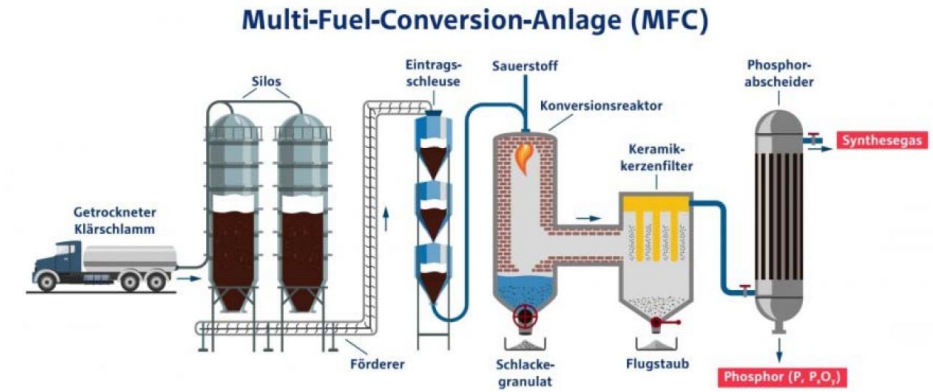
Gasification in Germany



Industrial activities - RWE Innovation Center Niederaußem

MFC (Multi Fuel Conversion) within ITZ-CC (Virtuelles Innovations- und Technologiezentrum Carbon Conversion)

- Pilot plant in Niederaußem
- Atmospheric entrained flow gasifier (max. 850 kW_{th})
- Three-component fuel mixing, refractory lining, dip quench, liquid ash discharge
- Fuels: Sewage sludge, sewage sludge ash, lignite (ca. 130 kg/h, max 800 kW_{th}), hard coal
- Temperature ~1,500 °C



Status May 2026:

- MFC gasifier not operated since May 2023
- Project partner in 3 projects regarding application of waste based residues as feedstock for torrefaction and gasification
 - funded by BMW (8. Energieforschungsprogramm)
 - drafts submitted Jan. 2026
 - Coordinators: TU Freiberg, TU Darmstadt, TU München
 - experimental investigations at MFC gasifier either planned or optional
- FUREC project: Torrefaction of biomass or waste in MHF
 - development of milling process in suitable industrial scale together with supplier

Industrial activities - ThyssenKrupp Uhde GmbH

Several activities running (mostly confidential)

2 public projects:

- **India, Integrated Green Steel Plant in Bhadravati MIDC**
 - Order receipt in 2025
 - PRENFLO gasification technology selected by GRETA ENERGY Ltd for licensing and basic engineering package
 - Feedstock: coal
 - Product: syngas for direct reduced iron (DRI) process
- **Canada, Nova Scotia: Biomass to Methanol**
 - Order receipt in 2026
 - integration and optimization study for Nova Sustainable Fuels biomass-to-methanol project
 - Uhde's PRENFLO gasification technology combined with Uhde's advanced methanol synthesis process
 - Feedstock: woody biomass
 - Product: 450,000 metric tons of MeOH per year

https://www.linkedin.com/posts/uhde-gmbh._thyssenkrupp-uhde-gasification-activity-7452687696369639424-QgpU

More sustainable steel for India's future! Our proven PRENFLO® gasification technology has been selected by **GRETA ENERGY LIMITED** for the Licensing and Basic Engineering Package at the Integrated green steel plant in Bhadravati MIDC, Chandrapur, Maharashtra, India.

PRENFLO® is recognized for its high performance, fuel flexibility, and its capability to produce clean synthesis gas, enabling downstream applications such as direct reduced iron (DRI) and other lower-emission processes.

This project marks a significant milestone in advancing more sustainable steel production in India. By integrating coal gasification into the steel value chain, it aims to improve resource efficiency while reducing environmental impact compared with conventional processes.

This development highlights the growing importance of advanced gasification technologies in supporting India's transition toward cleaner industrial production and a more sustainable energy future.

#thyssenkrupp #Uhde #Gasification #India

02.03.2026 09:00

thyssenkrupp Uhde selected for biomass-to-methanol technology integration study for Nova Sustainable Fuels in Canada



• Planned capacity: 450,000 metric tons of bio-methanol
• Uhde's high-efficiency PRENFLO gasifier and advanced methanol synthesis technology

<https://www.thyssenkrupp-uhde.com/en/media/press-releases/press-detail/thyssenkrupp-uhde-selected-for-biomass-to-methanol-technology-integration-study-for-nova-sustainable-fuels-in-canada-312243>

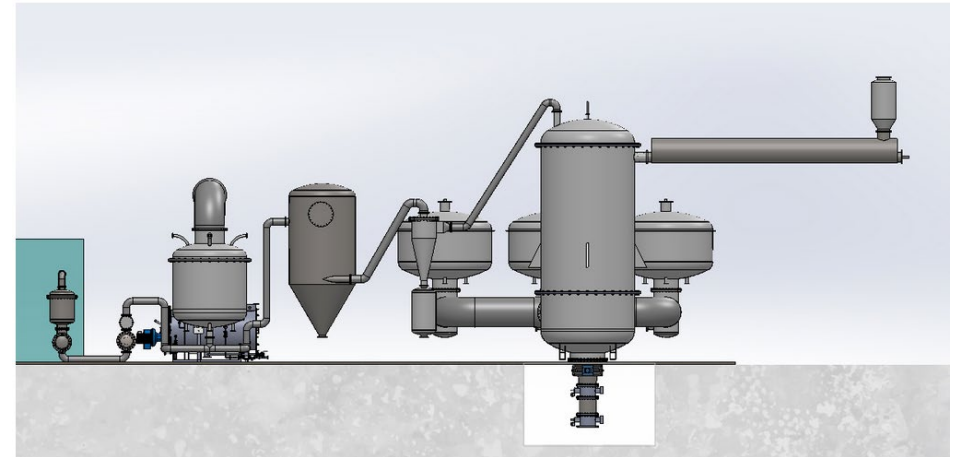
Industrial activities - HiTES energy

- **H₂ from biomass**
- Allothermal steam reforming of forest waste / agricultural residues
- Gasification medium: highly superheated steam (1200 °C) produced by waste energy (tail gas from PSA)

Status May 2026 (info from homepage):

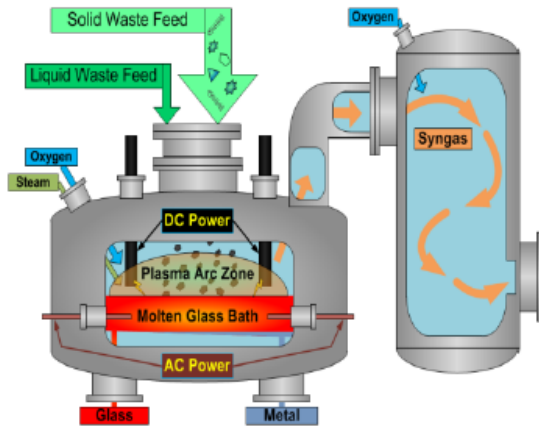
- Planning and design of industrial demonstration plant completed
- Approval and execution currently in preparation
- Commissioning planned for spring 2027
- Biomass input: 4 t/h dry biomass (24000 t/a)
- H₂ production: 400 kg/h (2400 t/a)
- Operating hours: 6000 hours/year

System diagram of the technical pre-planning/design



<https://www.hites-energystorage.de/>

Industrial activities - Plagazi (Germany: Handelsvertretung Bock)



Waste Transformation Technology

- Optimized plasma gasification
- Intellectual property covered by both and foreign patent in world markets
- Positive net energy balance for conversion of most targeted waste streams

Syngas Use

- Produces ultra-clean syngas for use in downstream conversion technologies
- Negative raw materials cost advantage

Environmental Benefits

- Close to 100% recycling of organics
- Meets or exceeds US EPA requirements
- No potentially hazardous ash, dioxins, furans, or other pollutants

Other Benefits

- Cost competitive with landfill disposal
- Reduces transportation, insurance & environmental costs and liabilities
- Extends life of landfills

Benefits in developing PEM projects

- Standard modular design
- Flexibility to process a variety of heterogeneous waste streams



Status May 2026 (info from Handelsvertretung Bock):

- Plagazi is bankrupt
- future activities unclear!

Industrial activities - Blue Energy CHP

Blue Energy Europe Holzgas-Heizkraftwerk Senden

Wood gas cogeneration plant to be converted into an advanced bio-energy park

Future Products:

- Heat and Power
- Bio-oil
- Hydrogen

Status October 2024

Plant out of operation

- Commissioning of industrial scale gasifier planned for October 2024 is delayed due to larger changes in gasifier design
- Commissioning now planned for spring 2025

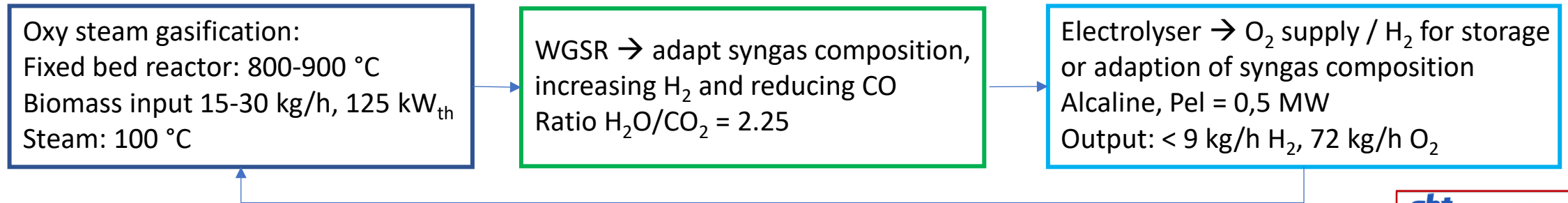


May 2025

No information received
→ Status unclear, gasifier
probably not in operation

Research activities TH Köln / Metabolon SYNELGAS Project (Oct 2024 - March 2029)

Flexible hydrogen and syngas production from biomass gasification with electrolysis and watergas shift
(funded by Bundesministerium für Bildung und Forschung)



Status May 2026:

- Focus in 2025 on system analysis and engineering of process chain
- Evaluation of air gasification of biomass: process stability confirmed, data on syngas composition for validation of thermodynamic simulation model
- Engineering of main components finalized → purchase started
- Economic and ecological evaluation started regarding application MeOH synthesis
- First tests planned operation the gasifier with air-steam-mixtures as preparation of future oxy-steam operation



Research activities: TU Darmstadt, Energy Systems and Technology (EST)

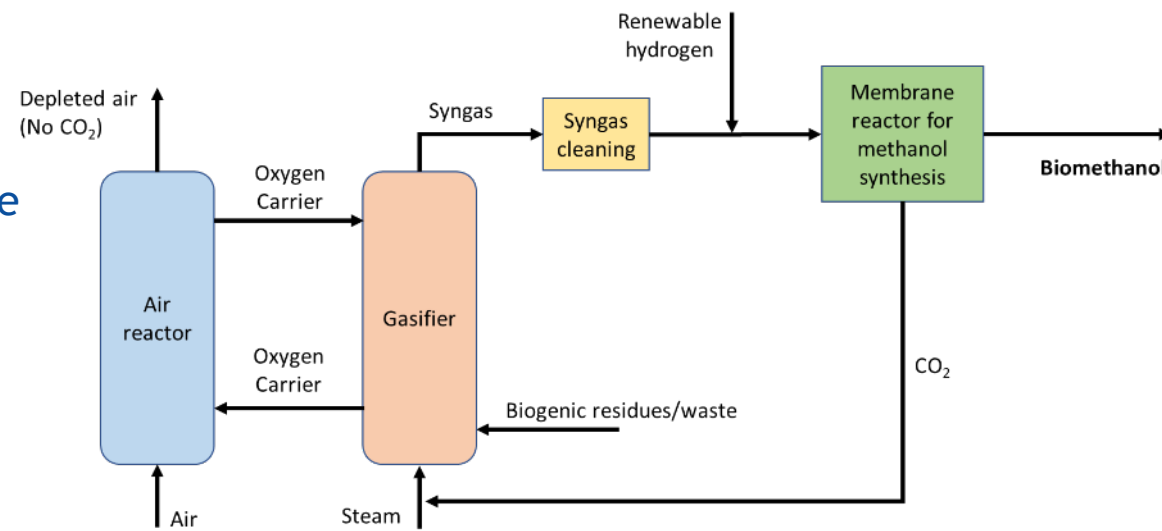
Bio-MeGaFuel Bio methanol production via Chemical Looping Gasification Coupled with Membrane Reactors (Sept. 2024 - Aug. 2028)

- Convert low value biogenic residues and nonrecycable waste to biomethanol through chemical looping gasification coupled with membrane reactors
 - Gasification with oxygen carriers to maximize conversion of biogenic residues to syngas
 - Developing of membrane reactors for methanol synthesis - with recirculation of unconverted CO₂ to maximize conversion of biogenic carbon to product
 - Exploitation and analysis of whole value chain from low-value biogenic residues and waste to biomethanol



Status May 2026

- Test campaign „Chemical looping gasification“ to be started soon.

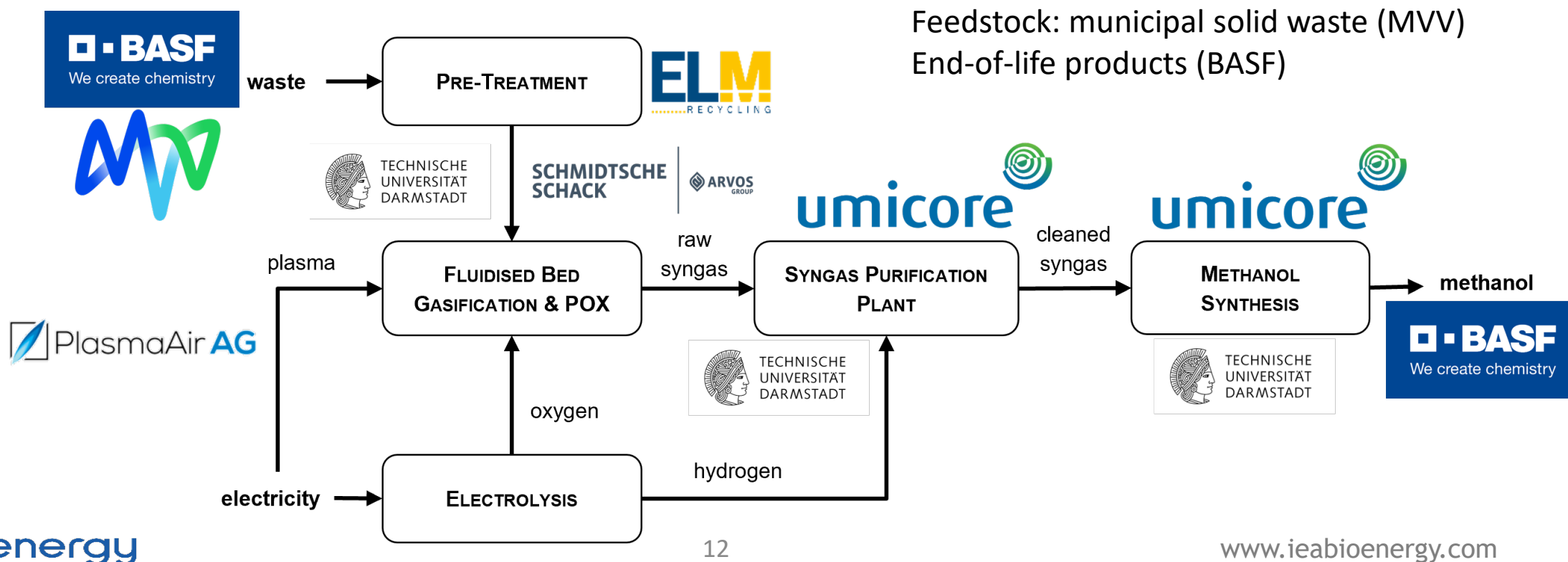


<https://www.biomegafuelproject.eu/>

Research activities: TU Darmstadt, Energy Systems and Technology (EST)

CELINA Chemical recycling of waste by fluidized bed gasification (11/2025 - 10/2029)

- In order to reduce CO₂ emissions, which are difficult to avoid in thermal waste treatment, thermochemical gasification of waste with conversion to basic chemicals will be employed.
- At TU Darmstadt, a circulating fluidized bed (1 MW_{th}) with downstream partial oxidation (plasma burner 100 kW), innovative synthesis gas processing, and methanol synthesis will be operated up to pilot scale.
- Using the data generated, an industrial plant for this process chain can be planned at the MVV site in Mannheim.



Research activities: TU München, Chair of Energy Systems

Reality Lab Burghausen

- Transformation of the chemical industry in the ChemDelta Bavaria towards a sustainable hydrogen-based circular economy
 - Gasification not included, but pyrolysis + plasma treatment in AP4
- <https://www.epe.ed.tum.de/en/es/research/projects/h2-reallabor/>

EU project GIFFT (Sustainable Glass Industry with Fuel-Flexible Technology)

- Reduce CO₂ emissions of the energy intensive glass industry
- Novel heat generation process concept for a sustainable, hybrid, and fuel-flexible low-CAPEX technology
- Combine biomass e-gasification with syngas production, a plasma-assisted multi-fuel combustion device, and the utilization of ash materials as potential value-added raw materials for glass manufacturing.
- Development of a 100 kW plasma-gasification pilot plant based on the entrained flow gasifier at TUM to investigate the process regarding syngas composition, efficiency, and flexibility.
- CFD modelling of the process for fundamental understanding of the process, identification of optimization potential, and scale-up applications of plasma gasification.
- Process modeling of the different glass production processes, for overall process optimization and input data for techno-economic assessment.

<https://www.epe.ed.tum.de/es/forschung/projekte/gifft/>

Successful test campaign on plasma gasification

- Results to be published after data evaluation



Thanks for your attention!

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