FLEXIBLE DIMETHYL ETHER PRODUCTION FROM BIOMASS GASIFICATION WITH SORPTION ENHANCED PROCESSES

ECOSYSTEM
Carbon Dioxide (CO₂) from the atmosphere is converted into Oxygen (O₂) and biomass through Chlorophylline photosynthesis by plants and vegetables.

BIOMASS
Woody and waste biomass is available for biofuel production.

BIOMASS PRETREATMENT
Biomass is pre-treated to reduce its size and moisture content.

FLEGED GASIFICATION
The gasifier requires steam and it produces mainly hydrogen (H₂) and carbon monoxide (CO), carbon dioxide (CO₂) and char. Solid calcium oxide (CaO) reacts with carbon dioxide (CO₂) producing calcium carbonate (CaCO₃) and allows adjusting syngas composition to specifications of the downstream process.

COMBUSTOR
Residual char from the gasifier is burned with air decomposing Calcium carbonate (CaCO₃) back to calcium oxide (CaO) and carbon dioxide (CO₂).

SYNGAS CLEANING
Pollutants (TAR, sulfur and Particulate Matter) are removed from the syngas to meet the specification of DME synthesis reactor.

DME SYNTHESIS
Clean syngas is converted into DME in a novel FLEGED catalytic reactor. A porous sorbent is used to remove in-situ the produced steam, enhancing in this way the DME yield.

SUSTAINABLE HYDROGEN PRODUCTION
Additional Hydrogen (H₂) can be produced by water electrolysis using renewable electricity, boosting DME production and supporting a Power-to-Liquid conversion.

DME FINAL USE
DME can be used as Biofuel to increase the sustainability of the automotive sector, substituting conventional fossil fuels.