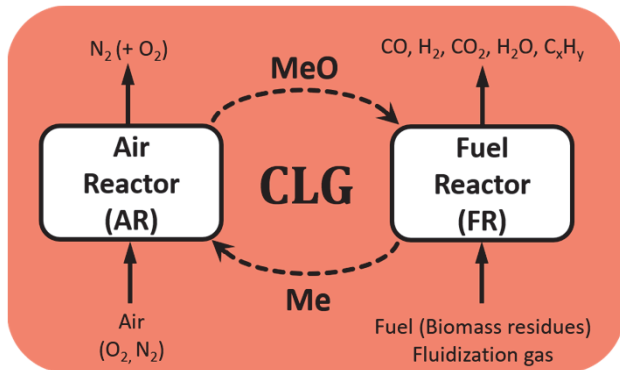
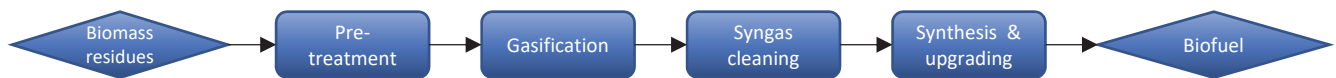
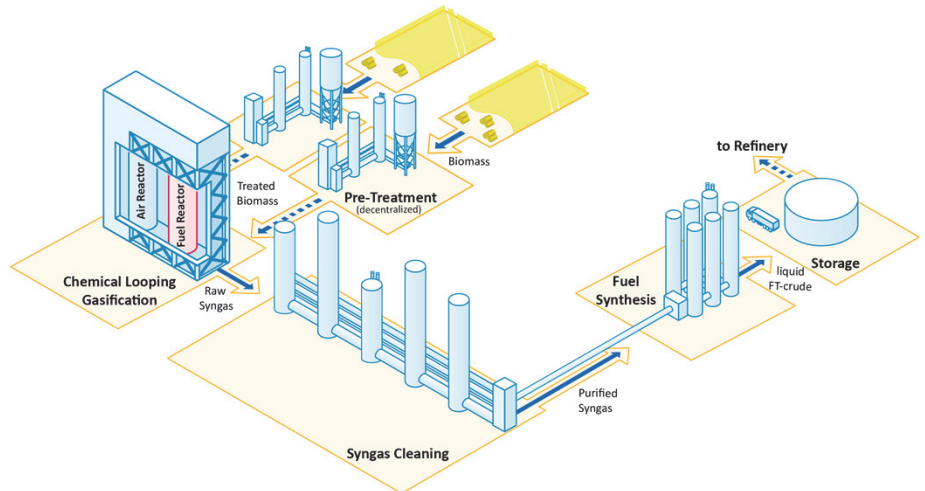


### Background and Motivation

In the project «Chemical-looping gasification for Sustainable Production of Biofuel», or CLARA, cost-efficient production of second generation biofuels from agricultural waste is investigated. CLARA is a EU-financed Horizon 2020 project with 13 partners from across Europe. The biofuel synthesis involves several steps:

- Biomass pre-treatment,
- Chemical-looping gasification (CLG),
- Novel syngas purification concept,
- Fuel synthesis & upgrading (Fischer-Tropsch & hydrocracking).



### CLG technology

The heart of the overall process is the chemical-looping gasification, CLG, which is built around the same principles as indirect gasification, with two interconnected fluidized beds – air reactor and fuel reactor/gasifier – but uses an oxygen carrier, instead of sand, as bed material. Important benefits with the CLG process include:

- The CLG process has very high feedstock flexibility.
- The presence of oxygen carriers open up for catalytic reactions, such as tar reforming.
- All fuel conversion will take place in the fuel reactor – the air reactor conversion will take place in the fuel reactor – the air reactor flue gas (= the bulk of the flue gas) should be clean.
- All carbon dioxide will be generated in the fuel reactor – enabling biofuel production with CO<sub>2</sub> capture and hence *negative emissions*.

### Project goals & Highlights

The over-arching objective of the project is to design and demonstrate an efficient biofuel synthesis route. Some of the key-objectives include:

- Investigate CLG concept using biomass residues for the production of syngas at realistic conditions – demonstration up to 1 MW<sub>th</sub>.
- Investigate the viability of Fe- and Mn-based oxygen carriers for production of a concentrated syngas stream – mainly CO and H<sub>2</sub>.
- Develop and test a novel syngas cleaning technology that meets the specifications for the biofuel synthesis catalyst.
- Demonstrate the full process chain including pre-treatment of feedstock, CLG, syngas treatment, and fuel synthesis.
- Estimate the cost structures in comparison to conventional gasification technologies.

