

BIV-04-mckechnie-C1net-public-summary-application

PI Jon McKechnie

### Cost Implications of Syngas CO<sub>2</sub> content for Fermentation Process

Syngas, derived from gasification of coal, biomass, waste or natural gas, is a potential feedstock for C1 fermentation. Syngas composition varies depending on its source and production conditions and is primarily composed of carbon monoxide (CO, 30% to 60%), hydrogen (H<sub>2</sub>, 25% to 30%) and carbon dioxide (CO<sub>2</sub>, 5% to 15%).

During fermentation, CO<sub>2</sub> is typically not reacted while CO and H<sub>2</sub> are converted to products. CO<sub>2</sub> can be stripped from the syngas stream prior to fermentation, but CO<sub>2</sub> stripping incurs an additional process cost. Alternatively, fermentation of syngas could take place with CO<sub>2</sub> present. However, this could have knock-on effects on process cost due to the larger syngas volume input to fermentation (e.g., compressor size; reactor volume; mass transfer effects).

The aim of this project is to evaluate the consequences of CO<sub>2</sub> content in syngas on fermentation process cost. To achieve this aim, the project will:

- Evaluate costs associated with CO<sub>2</sub> stripping from Syngas
- Evaluate syngas fermentation costs for a simplified fermentation system model, accounting for differences in equipment size and energy consumption when CO<sub>2</sub> is/isn't present in syngas

The project outputs will suggest whether it is financially preferable to remove CO<sub>2</sub> from syngas prior to fermentation.