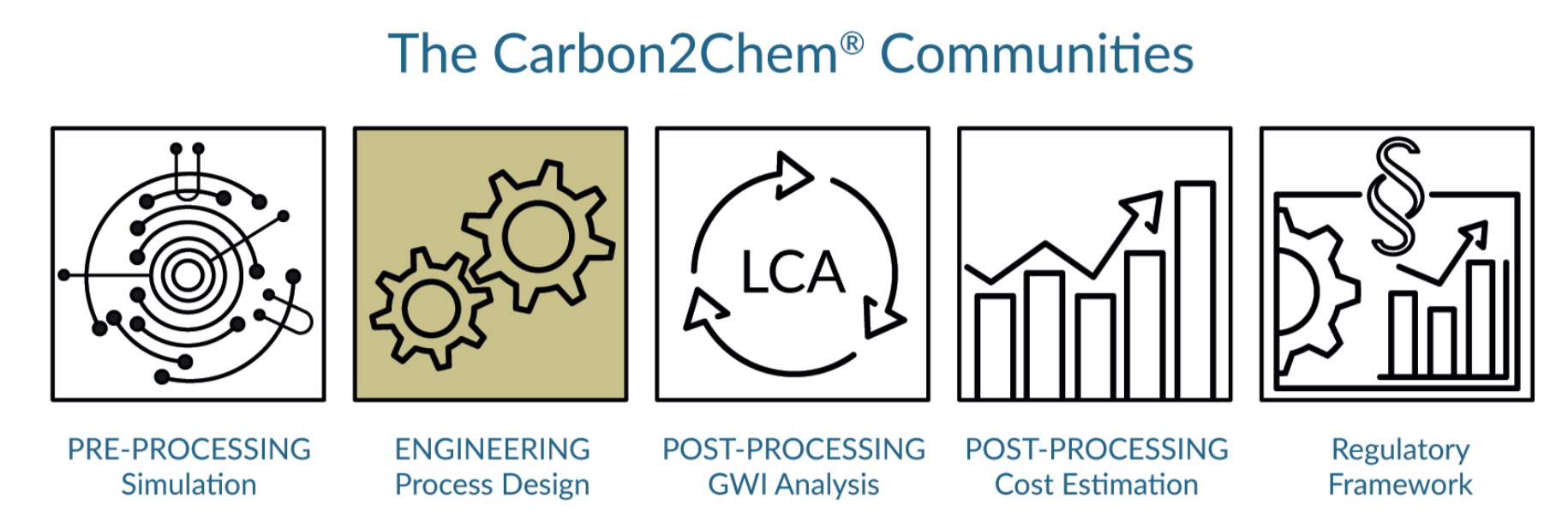# Process Design Community
Technical Implementation

Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT | thyssenkrupp Uhde GmbH

Fraunhofer   **thyssenkrupp**

Challenge

Process design is the technical and mechanical engineering of a process plant based on simulation data and pre-defined boundary conditions. Within the Carbon2Chem® project, a modular toolbox for process units has been established for a shortcut estimation of process data for different process steps.

Objective
Estimation of process design data

Through assessment of the available gas and energy supply on different timescales and thorough interplay of communities and L projects, process and post processing data is created that enables a comparison of different concepts. Because of the complex nature of CCU applications, the retrieved parameters sensitively depend on the project's individual boundary conditions.

Methodology
Generation of building blocks

Each process unit is assigned to a building block with inputs and outputs that represent different streams that can be connected to other blocks. Generic process data like specifications and weights as well as a logical combination of the contained streams is embedded in each block. By individual scaling a building block can be adapted to a distinct link in the process chain.

Transferability
Scaling by transformation factor

The impact of a transformation process in an industrial sector, e.g. transformation of a blast furnace to a direct reduction process in the steel sector, on the operating conditions of a chemical plant can be assessed by analyzing the individual behavior of the process units in relation to the progress of the transformation, mathematically expressed as the transformation factor. Besides proportional scaling, also complex effects can come into play, e. g. due to non-linearities of the involved processes.
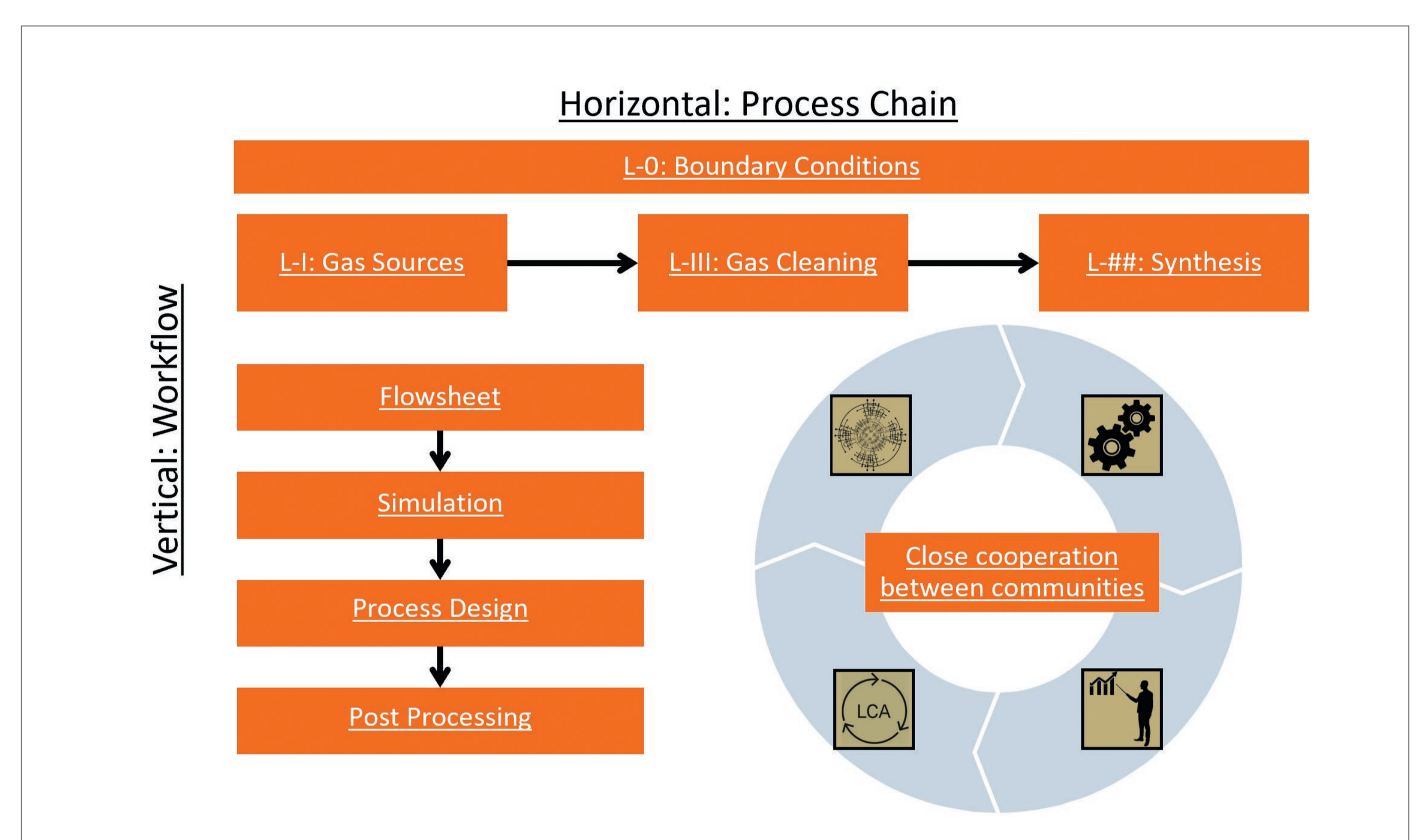
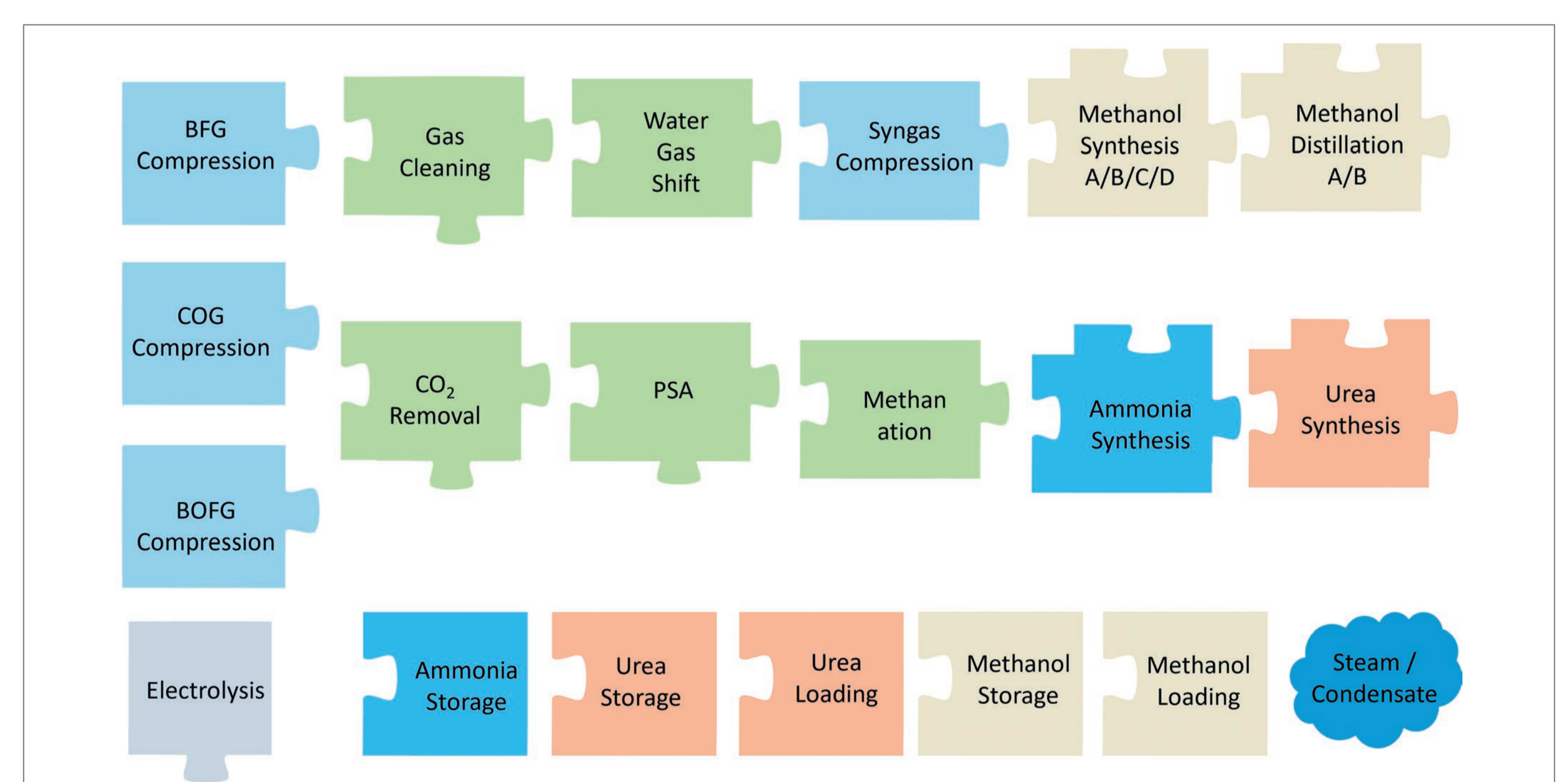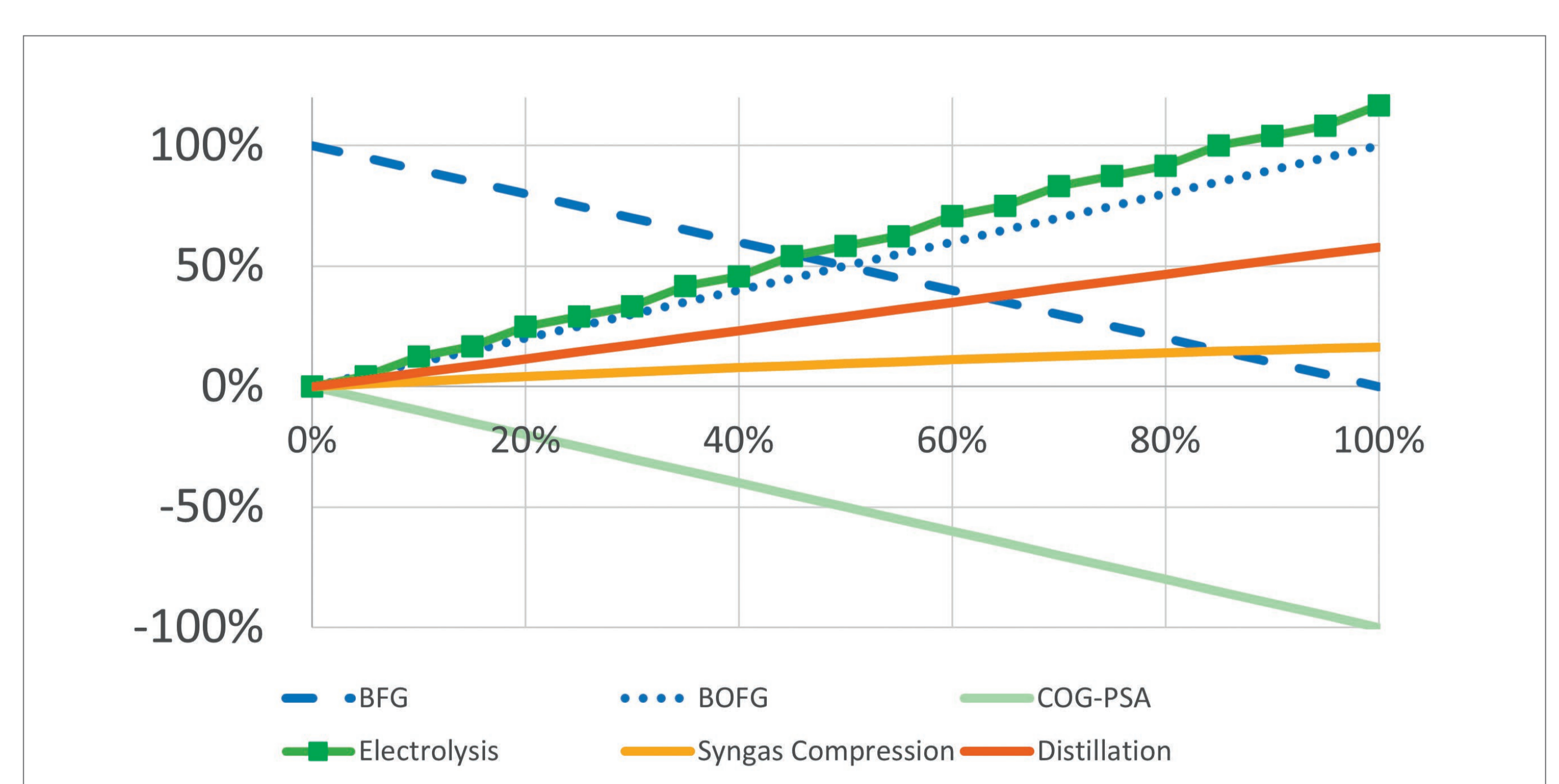Elaboration of selected process concepts involving different communities and L projects.

Illustration of different building blocks used in the Carbon2Chem® project.

Relative load change of process units during the transformation from BFG to BOFG feedstock. The x axis depicts the transformation factor.

A KEY BUILDING BLOCK
FOR THE CLIMATE PROTECTION