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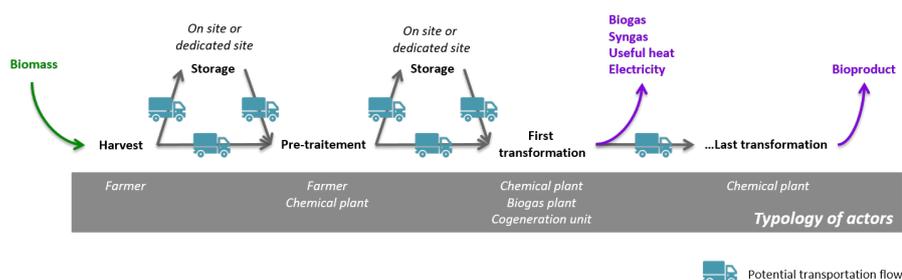
AGILITY OF MATTER TRANSFORMATION PROCESSES UNDER UNCERTAIN DEMAND AND SUPPLY: APPLICATION TO BIOMASS PROCESSING

Agilité des procédés de transformation de la matière dans un contexte d'approvisionnement et de demande instables : application au traitement de la biomasse

The biorefinery is one of the main pathways towards energy transition. However, the standalone and highly specialized biomass processing systems have to face high variability due to several internal and external constraints (quality, quantity, seasonality, etc.). It is necessary to provide agility in terms of both physical structure and organization to cope with this uncertainty.

My thesis aims to design a framework for virtual biorefineries, i.e. a collaborative and decentralised processing of biomass, which can adapt the process and its structure to the above-mentioned variability and dispersion. The purpose is to overcome the traditional and disciplinary-centered view of the biomass process industry that leads to a lack of agility facing changes, whatever their nature.

The first step of my work focuses on designing a generic meta-model of the collaborative network and its context for biomass processing. The servicization of the stakeholders' biomass processing activities is supported by this meta-model. The second part consists of modelling the knowledge found in the literature about the existing processes for a given biomass and a given product. Based on the previous results, the third part is to design an algorithm for an automated deduction of the virtual biorefinery structure (i.e. process, stakeholders, services) based on the targeted input biomass and output product. The deduction step has also to take into account factors such as the distance among the candidate stakeholders, etc. The last part of my work aims to implement a proof of concept of the whole framework. To this end, I use realistic data provided by SOLAGRO (industrial expert in biomass processing). This work is funded through the ANR project ARBRE (Agility for BioRefineries).



Agile biorefinery concept