Large-scale optimisation of production and logistics in chemical plants

The goal is to develop a site-wide optimisation model to enable an optimal planning of the operation for the complete site. The ammonia network serves as a proof of concept.

**Use Case**

- Models from planning tools of INEOS in Köln
- Data-based relations identified by TUDO
- Generic constraint formulations for discrete decisions

**Modelling and Optimisation**

- Plant models need to be formulated
- Time consuming and tedious work

**Optimisation problem**

- Constraints from distributed data sources
- Objective functions of the individual units/plants

**Solving the large scale MILP**

- Efficient solvers required
- Optimal schedule for site-wide operation

**Input-output relations**

- INEOS in Köln-on-site planning models
- Affine input-output relations identified from production data

**Benefits for INEOS in Köln**

- Faster (re-)scheduling and planning of the site operation
- Taking into account customer relations
- Integration of supply chain and operations

**Requirements**

- Easy to use and to maintain
- Efficient data handling
- Intuitive visualisation
- Extensible to more plants/networks/customers

**Implementation**

- CoPro Toolbox for efficient implementation at partner side
- Tight collaboration between the project partners
- Synergies of the tools enable an efficient workflow for optimal planning

**Conclusions**

- We modelled the NH3 network of INEOS in Köln
- An optimal site-wide schedule can be computed

**Outlook**

- Our optimiser is able to quickly recompute a new optimal schedule
- Flexibility exists for buffers, some plants, and in the delivery schedule for the customers

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