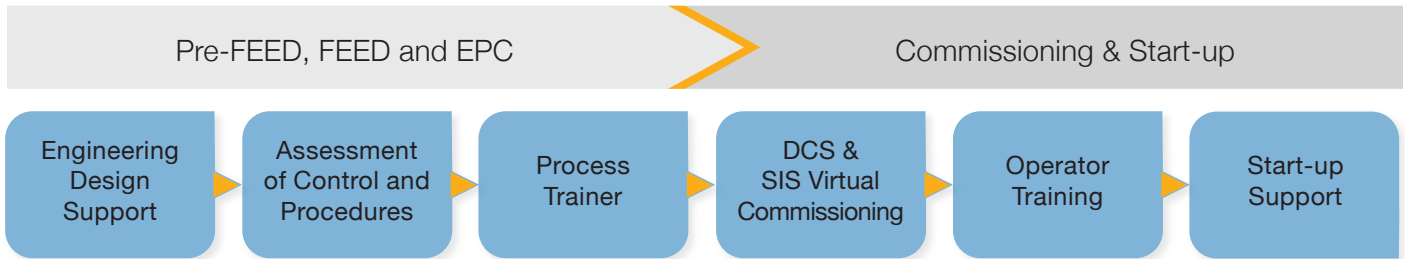**inprocess**

simulation
knowledge
profit

Successful SAF Process Digitalization

Digitization of Sustainable Aviation Fuel (SAF) processes is a rapidly evolving field aimed at making SAF production, distribution, and certification more efficient, transparent, and scalable.

At Inprocess, we focus on process improvement & de-risking of SAF Processes, e.g. by applying Digital Process Twins simulating SAF production processes to de-risk greenfield project, e.g. through virtual commissioning – as well as monitoring the real-time performance of SAF processes and thus enabling reduced energy consumption and process improvements.

Inprocess Digitalization Applications for SAF Greenfield Projects

Pre-FEED, FEED and EPC	Commissioning & Start-up

Engineering Design Support	Assessment of Control and Procedures	Process Trainer	DCS & SIS Virtual Commissioning	Operator Training	Start-up Support

- **Engineering Design Support**
  - Equipment Sizing
    - Reactor sizing and control settings
    - Anti-surge protection design for compression systems

- **Validation of Control Philosophy and Operating Procedures**
  - Defining and testing of operating procedures for Start-up, Shutdown, load changes, products transition
  - Cause & Effect Matrix Verification
  - Set point values, Alarm rationalization, pre-tuning of controllers

- **Process Trainer (Emulated OTS)**
  - With the Dynamic Model and the validated Control Philosophy it is possible to train operators on the processes independently of the DCS vendor delivery schedule.

- **DCS & SIS Virtual Commissioning**
  - Check out of the Control and Safety logics
 - Controlers De-bugging

- **Operators Training with OTS**
  - Direct-Connect Operator Training Simulator
  - Train Operators on SAF control and safety

- **Support during facilities Start-up**
  - Support to commissioning activities

Inprocess Digitalization Applications for SAF Brownfield Projects

Production

Operators Training	Real Time Simulator	Operations & Maintenance
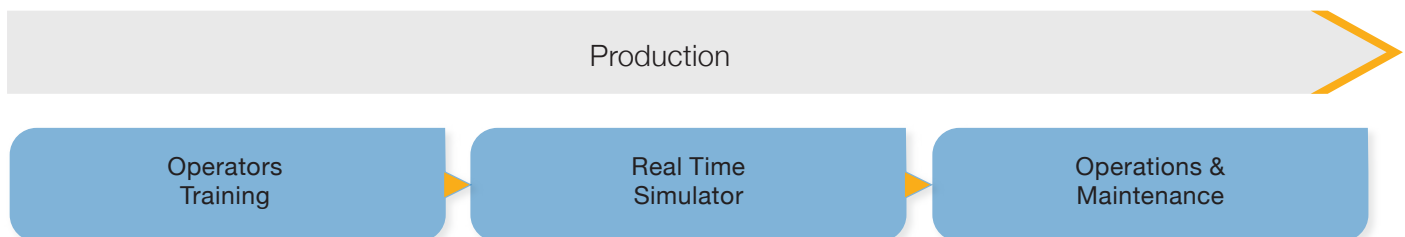
- **Operators Training with OTS**
  - Refresher trainings
  - Train new hires
  - Trainings after major revamps
  - Simultaneous Training of control room and field operators

- **Real-Time Simulator: Online Digital Twin**
  - What-if analyses
  - Equipment monitoring
  - Look-ahead studies
  - Inferential measurements

- **Operations & Maintenance**
  - Flare system revalidation
  - De-bottlenecking studies
  - Emissions reduction
  - Controllers fine-tuning
  - Post-incident analysis for flaring episodes
  - Development of procedures for new operating conditions – e.g. modes transitions (depending on process pathway)

Digitalization Benefits of Inprocess' dynamic process simulation application

With Inprocess' simulation-based digitalization applications during Engineering, Commissioning, and Operations, our customers can improve and fasten decision-making processes across the whole SAF Process lifecycle.

• Development Phase

- Ensure safe-by-design processes through realistic engineering studies
- Reduce capital costs (CAPEX) by accurate design of the equipment
- Detect process inefficiencies before construction
- Minimize commissioning time by having virtually checked out the DCS & SIS
- Train Operators on time, before start-up

• Production Phase

- Reach Operational Efficiency utilizing optimized operating procedures
- Infer process values by simulation for non-instrumented variables
- Detect deviations of equipment performance
- Decision support with real time information obtained from process simulation

Additional benefits by combining digitalization applications to Multi-Purpose Dynamic Simulator (MPDS)

A Multi-purpose Dynamic Simulator (MPDS) aims to optimize the utilization and the benefits of dynamic process models across all the applications described above.

It serves as a valuable tool from initial stages in design and development of Greenfield projects up to operational and maintenance stages of both Greenfield and Brownfield projects.

Key benefits of MPDS include de-risking projects, virtual DCS & SIS commissioning, availability of offline and online process Digital Twins (Real Time Simulators), among many others.
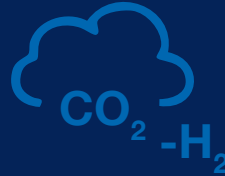
Sustainable Aviation Fuel

Feedstocks

Biomass

Waste Oils

CO_2 + Hydrogen

Waste Carbon

Production Processes

Biomass

Gasification

Fischer-Tropsch

Alcohol-to-Jet

Power-to-Liquid

SAF

Conventional Fossil Fuel

UP TO

50%

Blending

UP TO 30% LOWER GREENHOUSE GAS EMISIONS*

*Relative to conventional jet ol, depending on feedstock and prc

SIGNIFICANT LOWER LIFE CYCLE CARBON FOOTPRINT

REDUCED PARTICULATE AND SULFUR EMISSIONS

Usage

COMMERCIAL AIRCRAFT