SYNCYCLE
unwasting plastic

BDI-BioEnergy & SynCycle
Going circular – a decentralized recycling solution

Fabian Weinhandl

BDI-BioEnergy International | Who we are

- Sparring partner for chemical process engineering
- Engineering, Procurement, Construction (EPC)
- Turn-key solutions
- Up to 200.000 to/a plants
- In-house technologies
- 300+ patents
- 100+ experts
- Graz, Austria

BDI-BioEnergy International: Core business

BDI BioDiesel

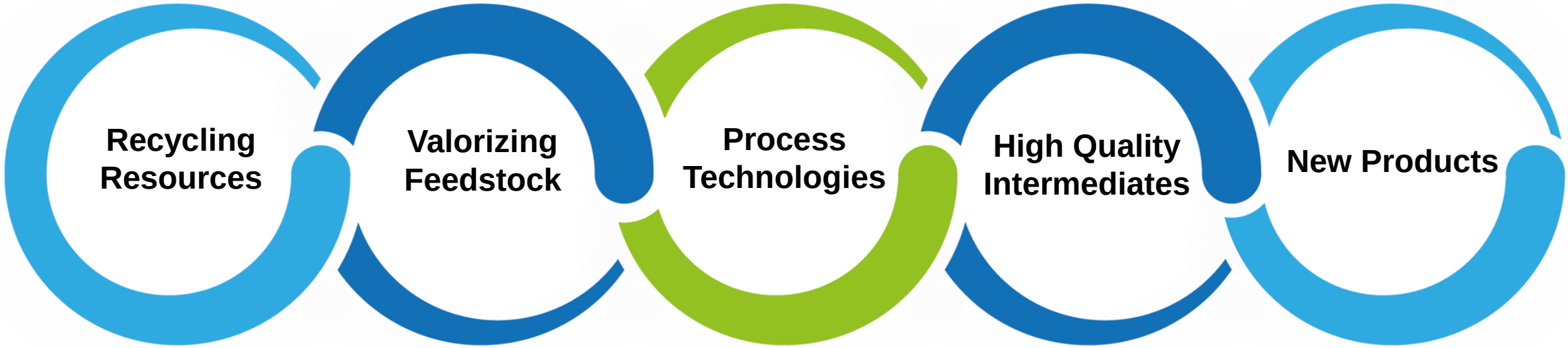
Multi-Feedstock-technology for ultimate feedstock flexibilty

BDI PreTreatment

Tailor made solutions for feedstock PreTreatment for oils and fats

GreenTech Solutions

Sparring partner for chemical process engineering and scale-up


Recycling Resources
Valorizing Feedstock
Process Technologies
High Quality Intermediates
New Products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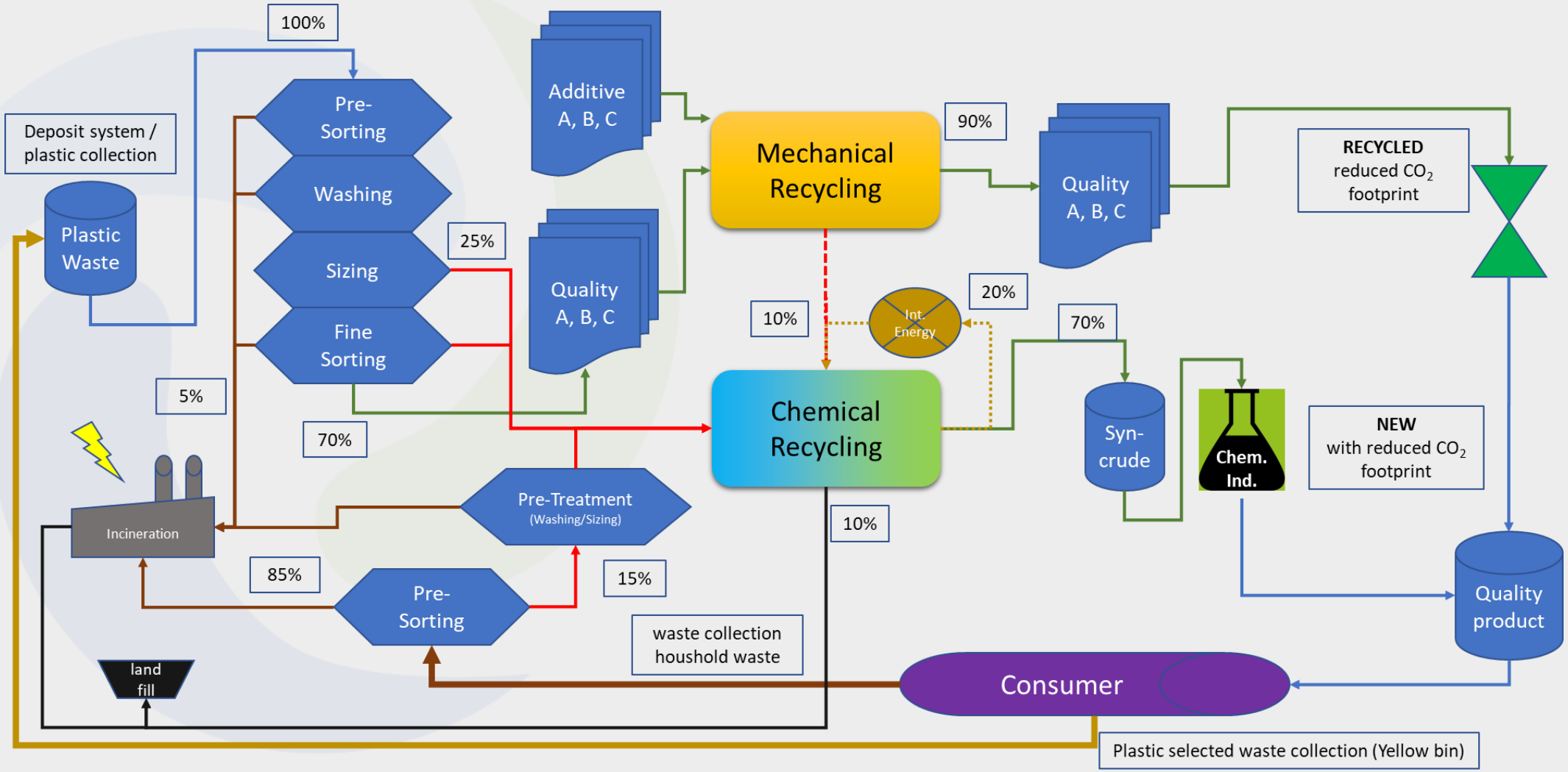
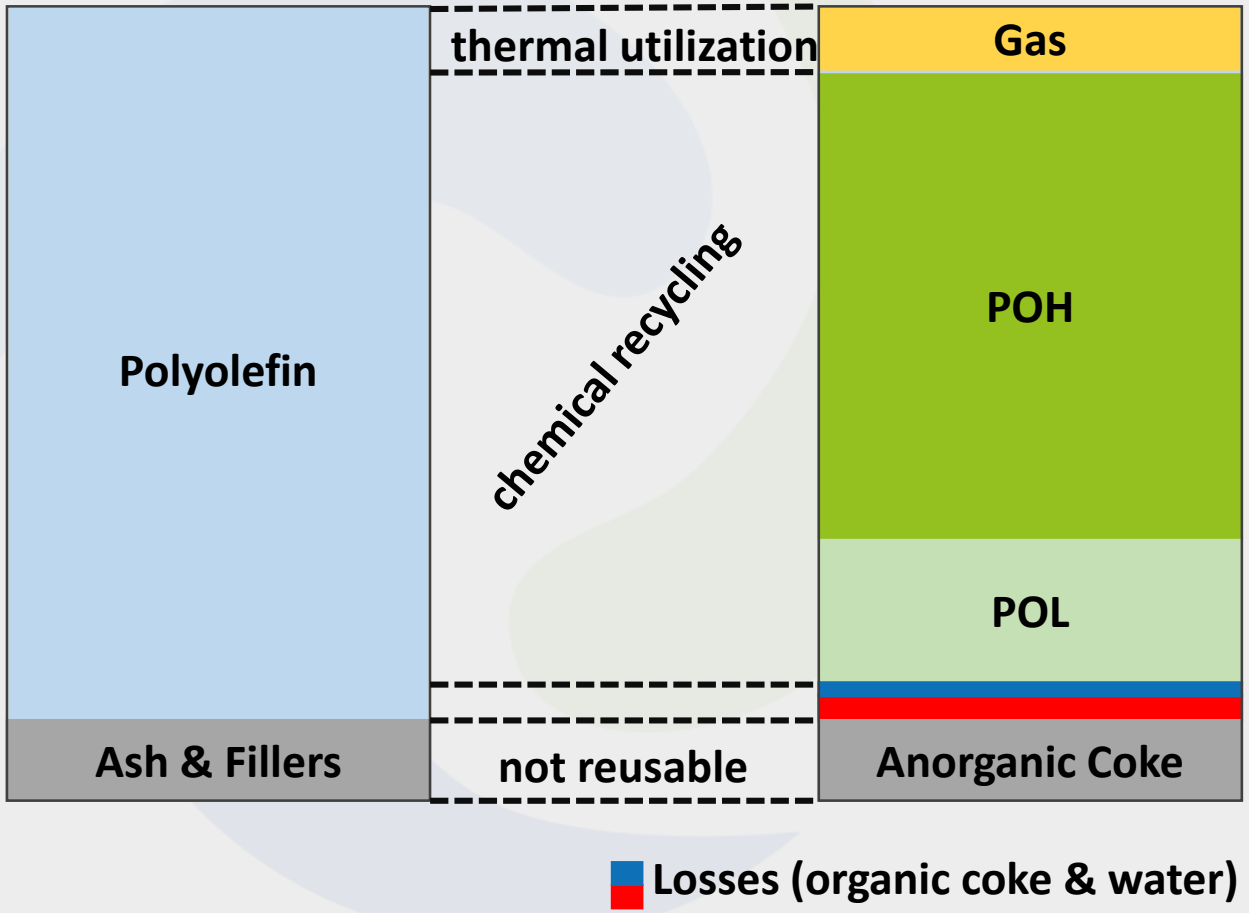
Holistic Approach | Increasing the yield



Chemical Recycling = Carbon Recycling



- **Chemical Recycling**
  - Recycling of carbon
  - Difficult feedstock processable
  - Anorganic fillers and fibres
- **CO_2 Reduction**
  - No incineration
  - Substitute for Naphtha (crude oil based

CO_2-Saving / to of feedstock compared to incineration:

ca. 2.500 kg

BDI BioEnergy International

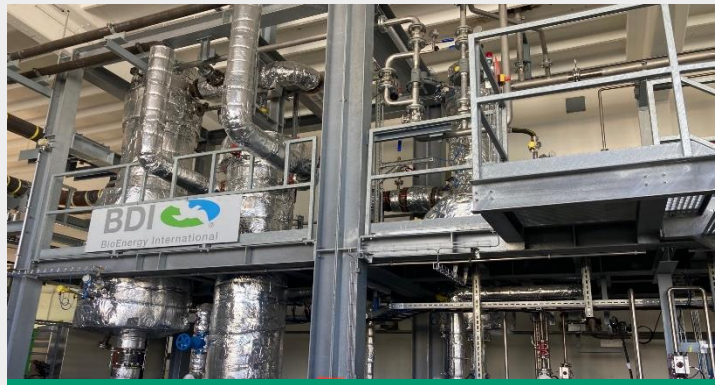
develop.design.build

SynCycle unwasting plastic

- 27 years of experience in development and realization of new technologies
- Expertise | fats & oils & purification

Process concept and trial plant

Design of demo plant layout



Commissioning of demo plant

develop.

- **Lab experiments and concept for trial plant**
  - Commissioning of trial plant
  - Data collection and oil sample generation for engineering of demo plant
- **Operation of trial plant**
  - Operation until summer 2022
  - Campaigns with various feedstock
- **Goals**
  - Indentification and understanding of challenges
  - Displaying of options

Major Challenges

Contaminants in the pyrolysis oil

Unavoidable impurities (N, O, Cl, Si, etc.)

Process Interactions

Understanding kinetics & distribution of impurities

Safety Standards

Deposits

Fouling of pipes and equipment
Intense maintenance

Boiling point range

Quality parameter depending on cracking conditions

design.

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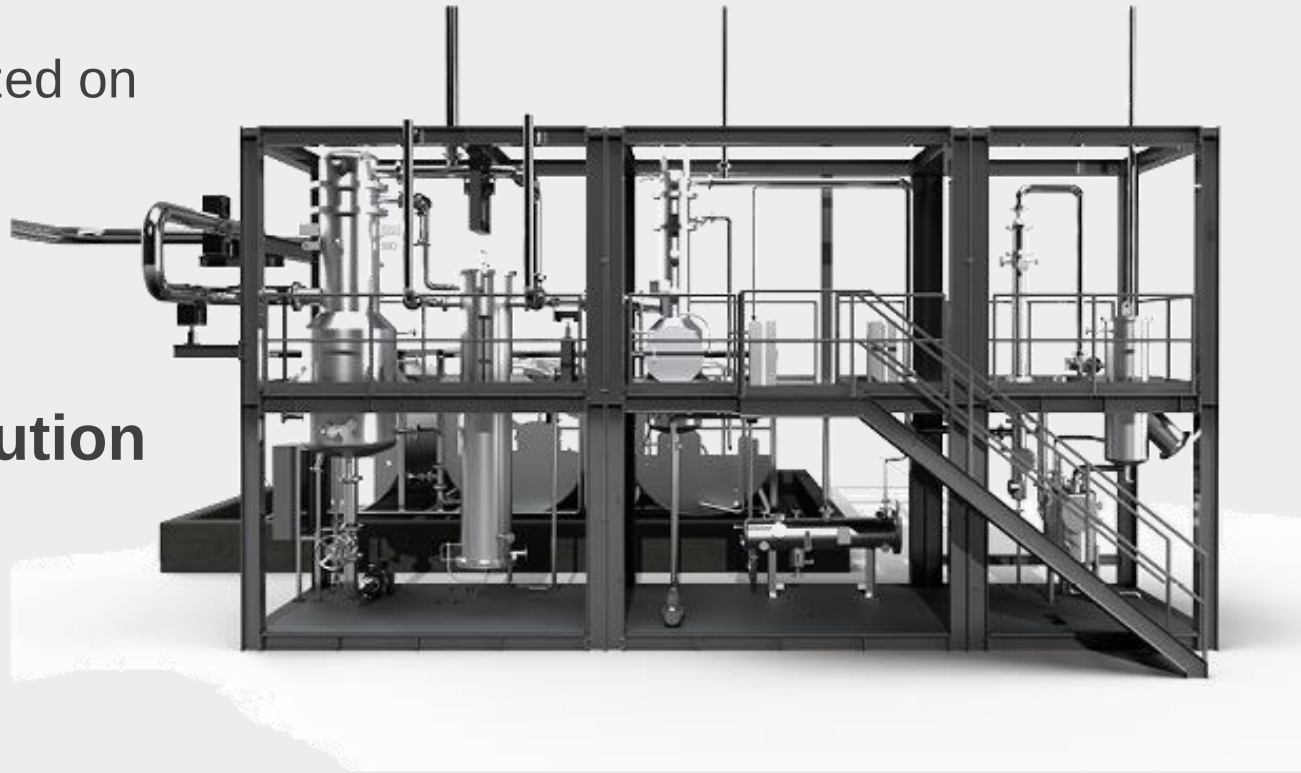
- **Engineering a condensation module**
  - Optimized for T:CRACKER
  - Design of condensation equipment specialized on pyrolysis oils
  - Cleaning of non-condensable gases
  - BDI knowledge from biomass pyrolysis

- **Combination to a unique process solution**
  - Engineering the auxiliaries and utilities
    - Tanks
    - Heat Transfer Media System
    - Safety concepts
  - Skid mounted & decentralized



design.

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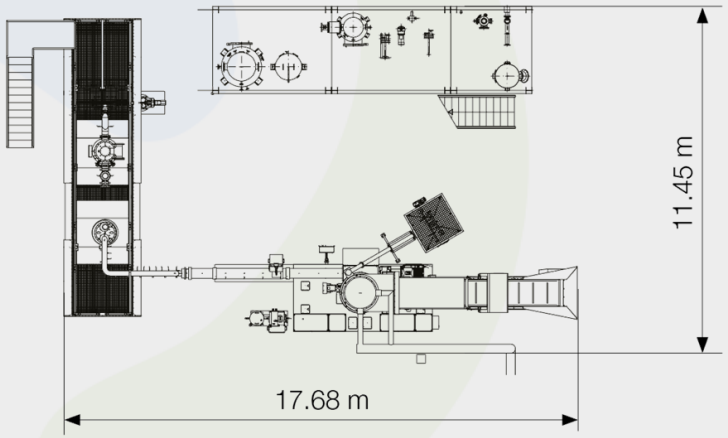
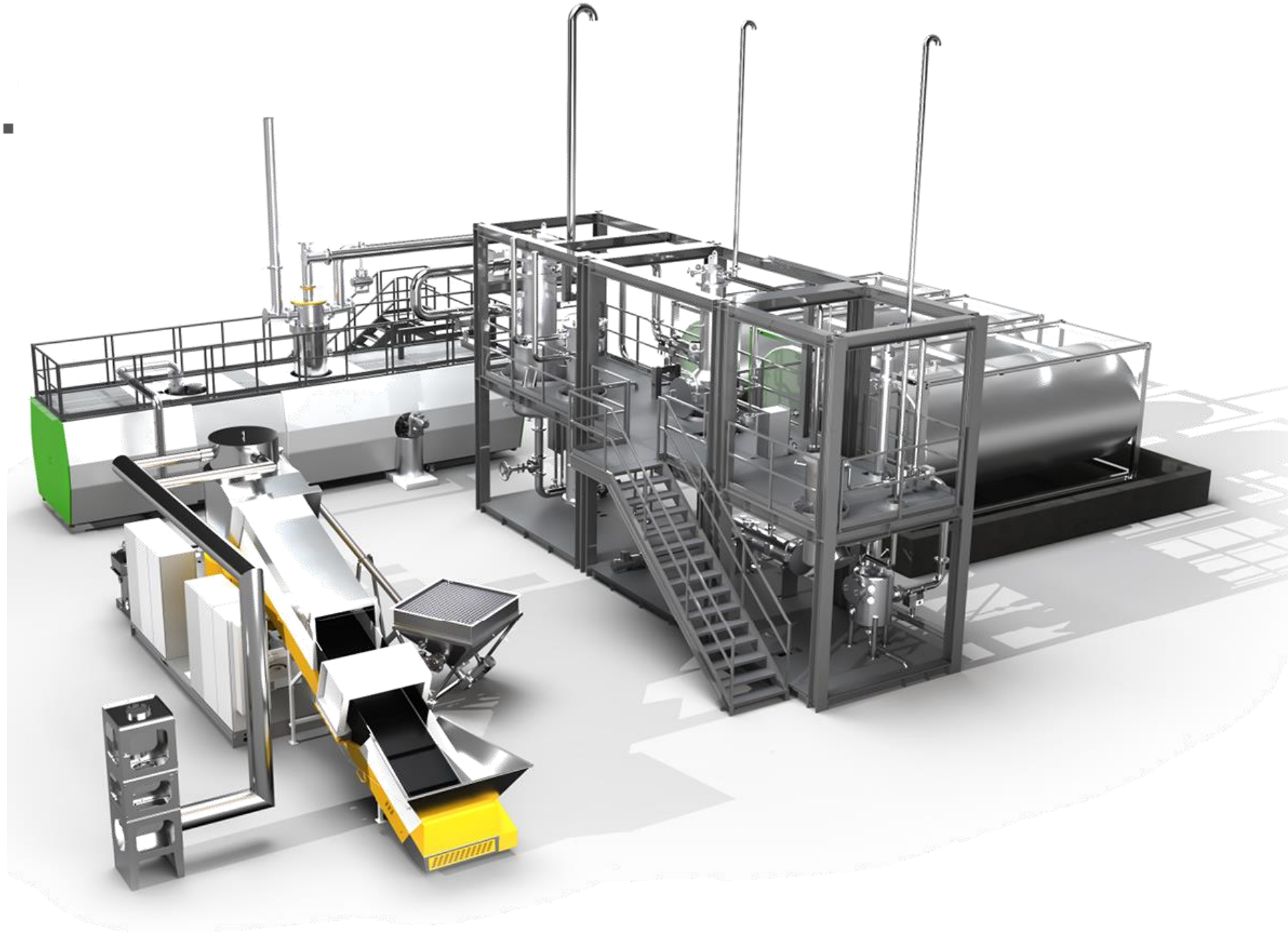
400 - 500 °C

500 - 1,000 kg/h

> 5,000 t/a
depending on feedstock



design.



build

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- Combined forces to commission the demo plant (<4 month)

Upcoming challenges

- **Regulations and legal requirements**
  - Pyrolysis oil is considered waste in terms of transport
  - End of waste status is not given for the products from decentral operation in Austria
- **Missing standards and analytical norms**
  - No commodity product
  - Bilateral quality definitions between producer and off-taker
  - No unified methods

OTLG
Volkswagen Original Teile Logistik

lyondellbasell
Advancing Possible

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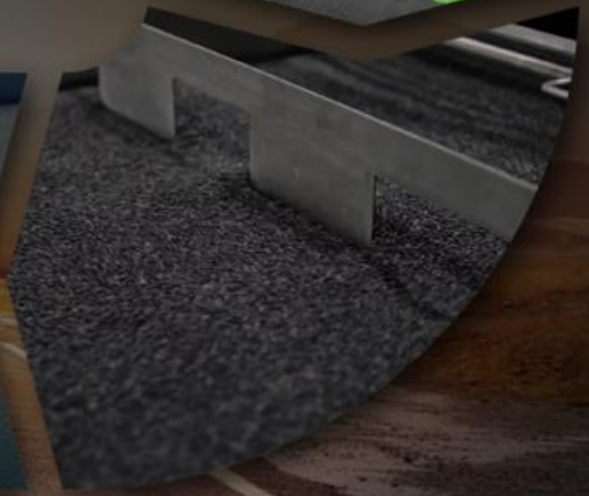

PlasticLoop – Closed loop for automotive mixed plastic waste

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In Collaboration with

BDI
BioEnergy International

NGE
MATERIAL MORPHING TECHNOLOGY

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