



**SYNCYCLE<sup>®</sup>**  
unwasting plastic

# CHEMICAL RECYCLING TECHNOLOGY

to close the circularity gap

SynCycle® provides a cost-effective and environmentally friendly solution for key players in the plastics industry by chemically converting plastic waste into a valuable resource.



**Mechanical Recyclers** – Rather than incinerating recycling rejects, convert them into high-quality circular oil, which can be integrated into refinery processes or used as feedstock for new plastic production. Lower disposal costs while creating a new source of revenue.



**Virgin Polymer Producers** – Convert plastic waste into high-quality circular oil for integration into polymer production. With this valuable resource, reduce dependence on volatile fossil-based resources while meeting growing market and regulatory demands for sustainability.



# APPLICATIONS

of circular oil

Producing circular oil from plastic waste is not just an environmental decision — it is a strategic move toward a more resilient and profitable future in the evolving materials market.



**Supply a growing market** – circular oil can be used to supply companies further along the value chain. Chemical manufacturers, refineries, and plastics producers are increasingly looking toward sustainable feedstocks to reduce their dependence on virgin fossil-based resources in the future.



**Enable sustainable plastic production** – Manufacturers of polymers and plastics can enhance their sustainability efforts by partially replacing virgin plastics with circular plastics. This approach enables them to meet evolving regulatory standards and cater to more sophisticated customers who seek sustainable materials without compromising price or performance.

# PROCESS DESIGN

modularity for efficient use of available space

## 1 Module 1

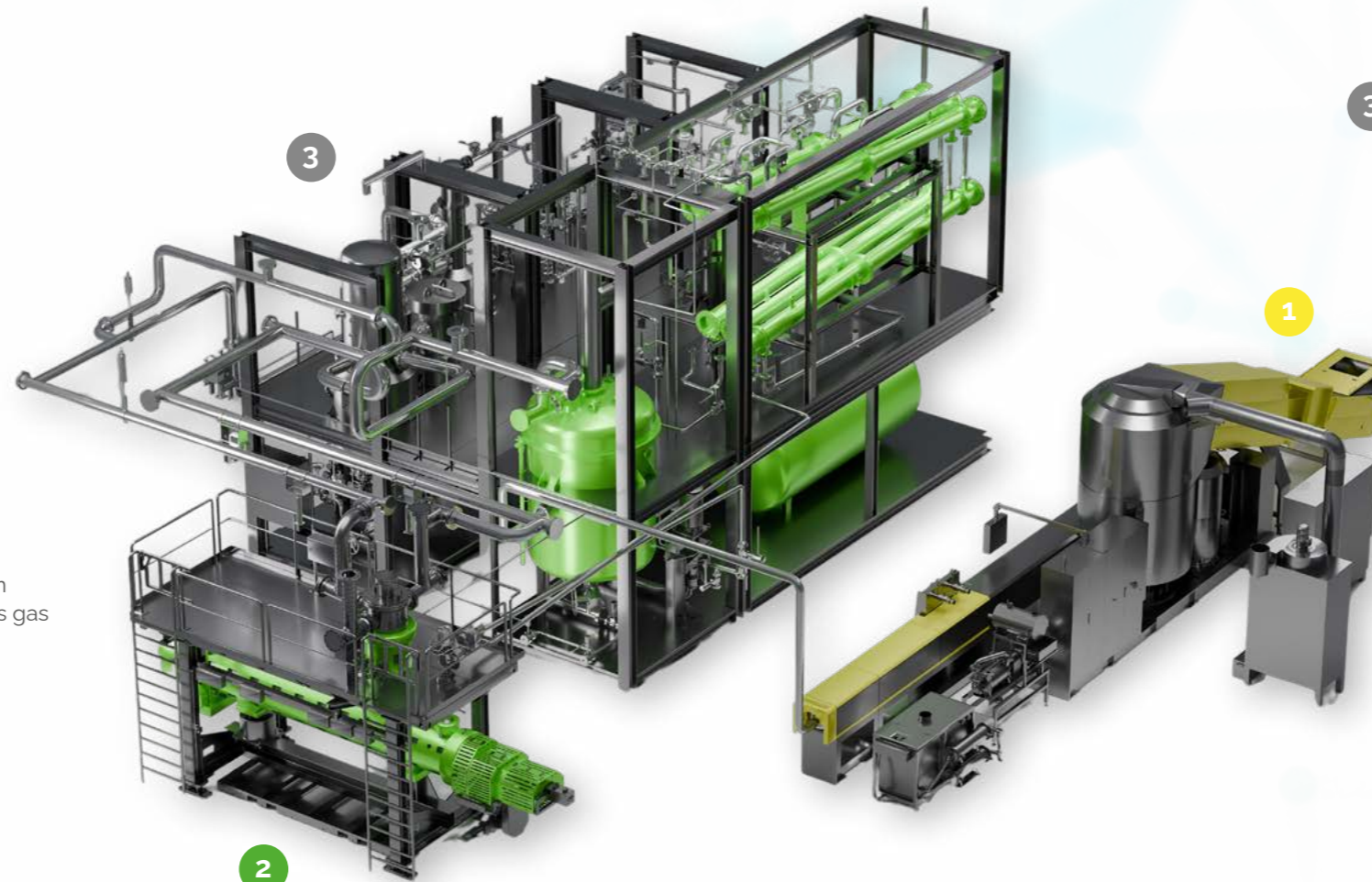
During **melt preparation**, input material is shredded, dried, and heated up to 300°C. The melt is brought directly into the pyrolysis reactor.

- » The extruder is a single unit for melt preparation, designed for high energy efficiency and adaptable to various feedstocks.
- » The system is designed to efficiently process even humid materials.
- » Input materials can include film scrap, HDPE film, plastic flakes, and pre-shredded plastic flakes.

## 2 Module 2

In the **pyrolysis reactor**, the melted material is broken down into shorter hydrocarbons. A so-called pyrolysis gas is formed and extracted at the reactor head.

- » The automated reactor uses a patented screw system and a unique heating system.
- » The reactor's continuous operation enables a throughput of up to 1 ton per hour.
- » Solid residues are continuously discharged from the reactor using an extraction screw.



## 3 Module 3

During condensation, the pyrolysis gas is condensed into circular oil. The two-stage condensation process results in two fractions: light pyrolysis oil and heavy pyrolysis oil.

- » The remaining non-condensable gases are treated for further utilization.
- » Residual water is separated during the process.
- » The resulting circular oil meets highest quality standards.

### Optional Add-Ons

- » Pretreatment
- » Posttreatment (gas utilization, distillation)
- » cooperation with experts for further customized modules

# WHY SYNCYCLE®?

advantages at a glance

- » Modular design for adaptable plant capacity
- » Decentralized installation reduces transport emissions
- » Tailor-made plant solutions for specific needs
- » Scalable systems with multi-line expansion
- » Compact processing unit and combination of extruder and reactor for space efficiency
- » Advanced reactor with multiple adjustable temperature zones
- » Localized value creation for economic and environmental benefits
- » High production capacity exceeding 5,000 tons per year, feedstock-dependent

» *SynCycle® ensures that the recycling feedstock reenters the value chain of a growing market with a robust, modular and continuous process.*

# IMPRESSIONS

SynCycle® plant in Kühnsdorf, Austria





## Company Profile

BDI-BioEnergy International (BDI) is a full-service provider of innovative green technology, offering patented solutions for maximizing value from waste and residual materials. In addition to biofuel production solutions, BDI specializes in environmentally-friendly process engineering for plastic waste upcycling. BDI's comprehensive services include contract research, process development, engineering, scale-up, and customer support.

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