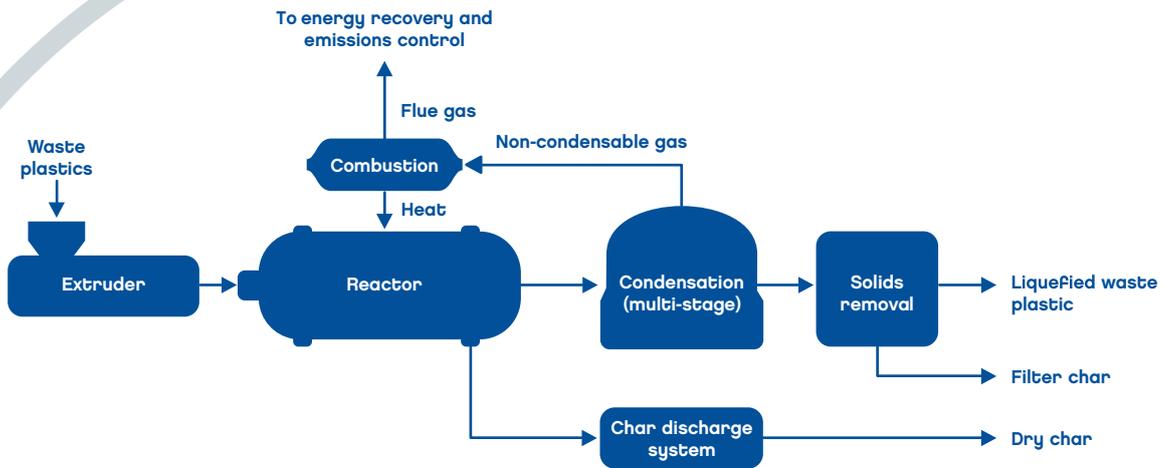


ALTERRA

# Robust technology for waste plastics liquefaction



# Flexible and continuous liquefaction of hard-to-recycle plastic materials

Plastic enables modern life, but as waste it generates adverse environmental effects. Chemical recycling through thermochemical liquefaction and intermediate refining can turn discarded plastics into valuable raw materials for new, high-quality plastics and chemicals. A commercially proven liquefaction process for heterogeneous waste plastics provides a reliable solution for turning traditionally hard-to-recycle plastics into an excellent intermediate product, suitable for further refining.

## Process solution

**Altterra technology** is a liquefaction process designed for hard-to-recycle plastics, such as multilayered, colored and contaminated materials. The process is based on a rotary kiln thermal decomposition reactor, which is continuously fed with discarded polymers, predominantly polyolefins. The indirectly heated kiln reactor is operated at elevated temperatures and oxygen-free conditions. The process breaks down the long hydrocarbon chains of polymers into short hydrocarbons, which exit the reactor through condensation. In addition, the reactor has a solid output stream, the so-called char, which is continuously removed from the reactor as dry, free-flowing solids.

After condensation, the short hydrocarbons are either in liquid or gaseous form. The liquid end product, liquefied waste plastic, can be further refined into raw material for new plastics. Within the process, it is stabilized for safe transport to a downstream customer. The non-condensable gasses are used on-site as the main energy source for the reactor, thus lowering the operating cost of the process. The process concept includes the heating system and the conditioning needed for the gas prior to its use. Heat recovery options can be tailored to further improve energy efficiency.



## What are the benefits?

### Operational benefits

- Technology proven in commercial scale operation processing actual post-consumer plastic waste feedstocks.
- Robust and fouling resistant design including self-cleaning rotary kiln reactor, condensation system designed to tolerate entrained solids and waxy hydrocarbons, and continuous removal of dry, free-flowing reactor solids.
- Improved energy efficiency by utilization of non-condensable process gas as the primary energy source and flexible downstream heat recovery options.

### Economical benefits

- Standardized design improves business case accuracy, and accelerates project delivery and subsequent investment returns.
- Liquefied waste plastic is a sought-after circular resource - Neste sources plastic-derived oils from several partners for further refining into a drop-in raw material for new plastics.
- Robust design enables valorization of heterogeneous discarded plastics that have low or no value in traditional, mechanical recycling.

### Project benefits

- Standardized design minimizes pre-FID cost and engineering schedule, and increases predictability of final investment at FID.
- Technology licensor Neste is one of the most advanced and knowledgeable players in chemical recycling, and developer of several world-leading processing technologies.
- EPF (Engineering, Procurement, Fabrication) delivery by renowned and reliable engineering partner Technip Energies.

### Environmental benefits

- Chemical recycling through liquefaction and intermediate refining reduces dependency on virgin fossil resources and accelerates the circular economy of plastics.
- Altterra technology enables maximal plastic recycling as it is capable of processing heterogeneous raw material streams without loss of efficiency or operability.