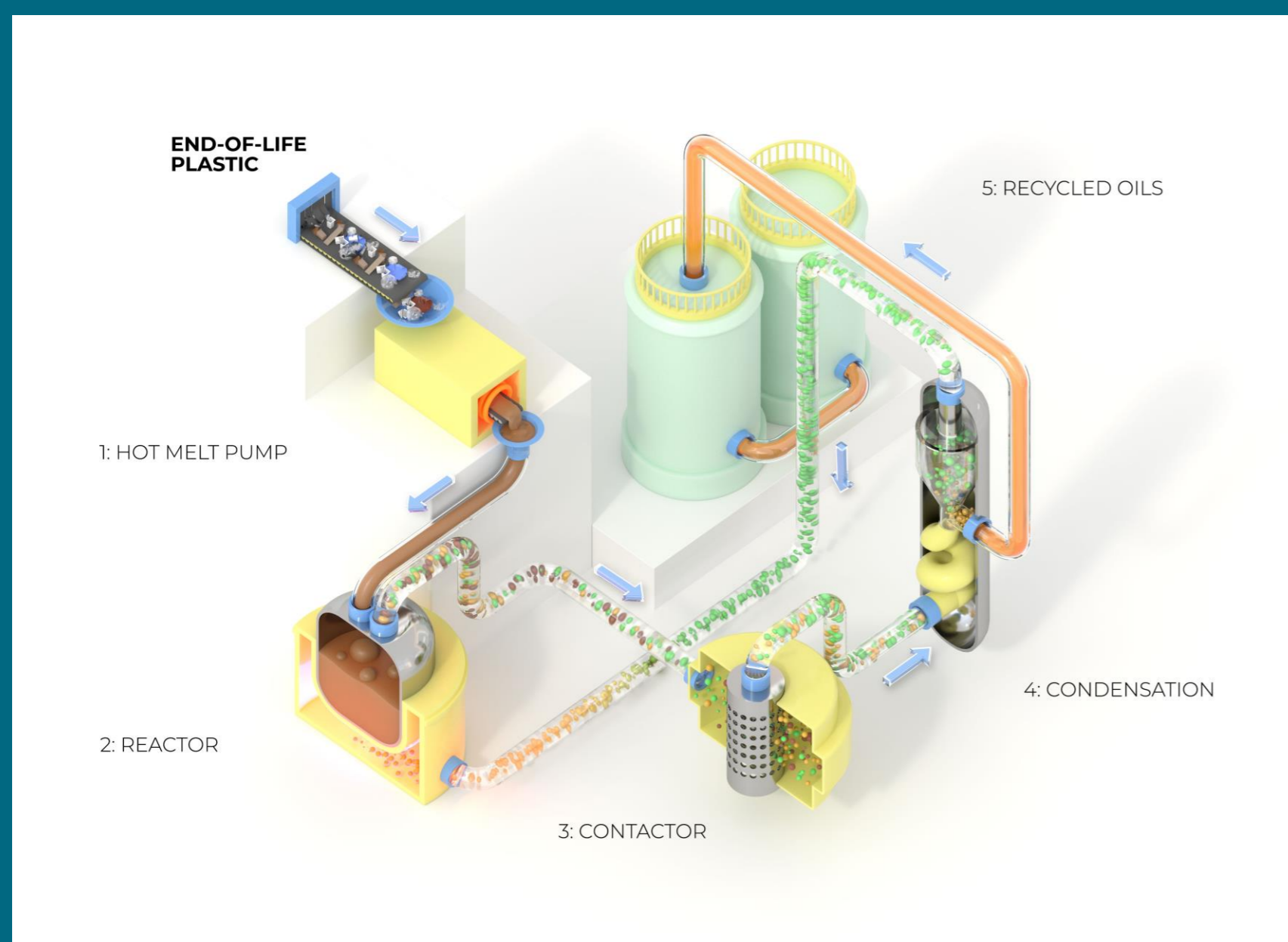


Priority Topic Area: Responsible Production, Innovation and Industry

1 – The Plastic Problem

Plastic is an essential part of modern-day living, and its consumption is continually increasing. Plastic production and single use plastics are leading to detrimental consequences on the environment. I am working on global projects to design and build advanced plastic chemical recycling plants, whilst supporting two operational plants. These plants convert previously unrecyclable plastics into a feedstock that can then replace fossil fuels in new plastic production. The aim of the plants and technology is to pave the way for creating a circular economy for plastics, shrink global CO2 footprint, and reduce fossil fuel dependence.



2 – The TAC™ Process

I am involved in plant design, construction and operational support of End-of Life plastic recycling plants. From the graphic:

- 1) End-of-Life plastic is heated until it becomes molten, before being fed into the reactors
- 2) The plastic melt is pyrolysed to become a vapour. A small portion of solids are extracted as char.
- 3) The longer chains are condensed and further pyrolyzed, whilst the shorter chain vapours go on to be condensed
- 4) A synthetic oil, which is a feedstock for new plastics, is produced through refining the vapours by condensation, separation and filtration,

3 – Changing the Narrative in Plastic Recycling

Although the technology is still in its infancy, it is changing the landscape of plastic production, with more and more oil and gas companies looking at advanced chemical recycling, creating further reason to invest and develop the technology. I have worked across multiplate project phases to enable this:

- Support of the operating Spanish plants, troubleshooting operational incidents and delivering improvement projects. These plants have from 2019 – 2023 recycled 16kT of plastic and saved more than 17kT of emissions compared to incineration. The product from these plants have since been used in packaging such as Heinz bean snap pots and Magnum ice cream tubs.
- Engineering of construction phase project in the Netherlands, that will start-up later in 2024 with a 20 kT/ annum throughput, one of the first of its kind to produce certified circular polymers on a large scale.
- Delivery of the Process Design Package for a license project to build a 66 kT/annum plant on the world's first advanced recycling complex in South Korea. The complex will be able to process 60% of Korean annual consumption of PET water bottles, a pivotal shift in recycling.



4 – Forming a Circular Economy

Despite the technology's infancy compared to traditional plastic production, it is already creating a benefit to society. Upon expansion and further development of the technology, it will become a cornerstone in the circular economy for plastics. This is key to achieving the UN's Sustainable Development Goal 12, whilst also:

- stopping plastic pollution to oceans, land and our water systems
- reduce dependency on fossil fuels
- reducing greenhouse gas emissions
- creating local jobs

5 – Next steps

Through optimisation and trials, the plant design can be developed to increase the throughput, suitable plastics for processing and energy efficiency. Processing of the final product could also be progressed to reduce the requirement for additional treating to improve purity.