

Production of Circular Styrene Monomer

TruStyrenyx™ is a full polymer-to-monomer advanced recycling solution for polystyrene

T.EN

TECHNIP
ENERGIES

TruStyrenyx™

TruStyrenyx at a glance

TRUSTYRENYX AT A GLANCE

- 99.8% purity
- Styrene product can make food grade products or packaging
- Compliant as an ISCC PLUS certified circular pathway
- Process can handle distressed feedstocks with minimal pre-processing
- Based on T.EN's technology leadership in styrene purification

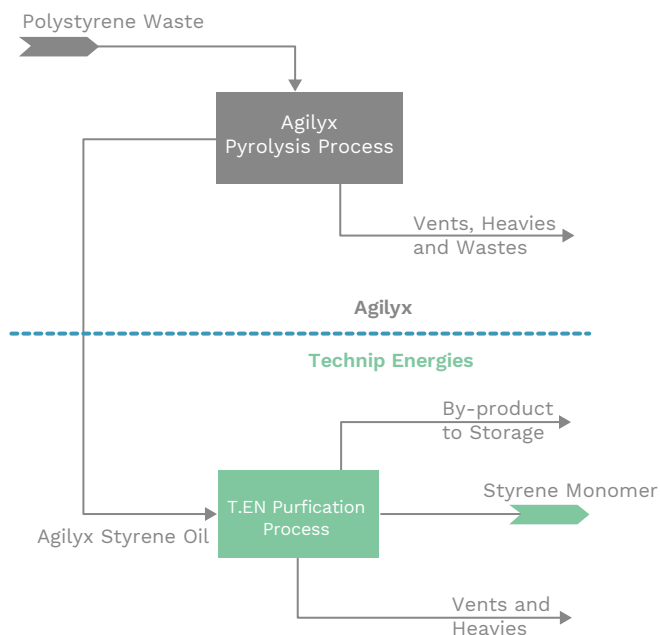
Pyrolysis

- Agilyx's proprietary waste polymer-to-monomer technology
- Polystyrene waste is depolymerized in pyrolysis reactors
- Pyrolyzed gas reaction product is quenched and recovered as Agilyx Styrene Oil (ASO)

Purification

- Based on T.EN's know-how in styrene monomer production
- ASO is purified into styrene monomer

The recycled styrene monomer produced is greater than 99.8 wt% purity and can be directly used as feedstock to current polymer production facilities.



Styrenics Market

Styrene Monomer

Styrene monomer is an intermediate petrochemical product used in a variety of polymer products. In 2021, approximately 42 million tons of styrene monomer was produced worldwide. The predominant uses of styrene monomer are for the production of polystyrene (PS) and the Acrylonitrile Butadiene Styrene (ABS) copolymer.

Polystyrene

Polystyrene, including General Purpose (GPPS), High Impact (HIPS), and Expanded Polystyrene (EPS), accounts for most of the use of styrene monomer. Many of these polystyrene products are single use and not recyclable by traditional means today. These polystyrene products serve as opportune feedstock for the TruStyrenyx technology.

Styrenics Experience

T.EN has significant experience throughout the styrenics chain by licensing our own Styrene Monomer technology as well as partnerships for Polystyrene and ABS licensing. T.EN's Styrene Monomer production technology is used to produce over one-third of the world's styrene monomer. T.EN has produced numerous innovations to styrene monomer production and the styrenics chain.

Agilyx pioneered commercial depolymerization of waste polystyrene in 2018 through its commercial facility in Tigard, Oregon, USA. Agilyx leads the market in providing best-in-class pyrolysis solutions for circular markets.



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Agilyx Pyrolysis

Proprietary Pyrolysis Reactor

Agilyx's proprietary technology is the heart of the pyrolysis process. The reactor can handle a variety of waste polystyrene feedstocks including EPS, GPPS, HIPS, and flame retardant laden PS. The ability to process distressed feedstocks with little to no pre-processing means feedstocks can be easily obtained.

Agilyx has converted over 4,400 tons of polystyrene waste to Agilyx Styrene Oil (ASO) at its Regenx facility. The ASO is used at existing production facilities in North America to make new polystyrene products for the market. The facility processes 10 US tons of feedstock per day and demonstrates the efficacy of the Agilyx Pyrolysis process at a commercial scale.

AGILYX'S ADVANTAGES

- First commercialization of waste polystyrene pyrolysis
- Best-in-class reactor yields
- High selectivity to styrene
- Ability to handle distressed feedstocks and flame retardants

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T.EN Purification

Piloted

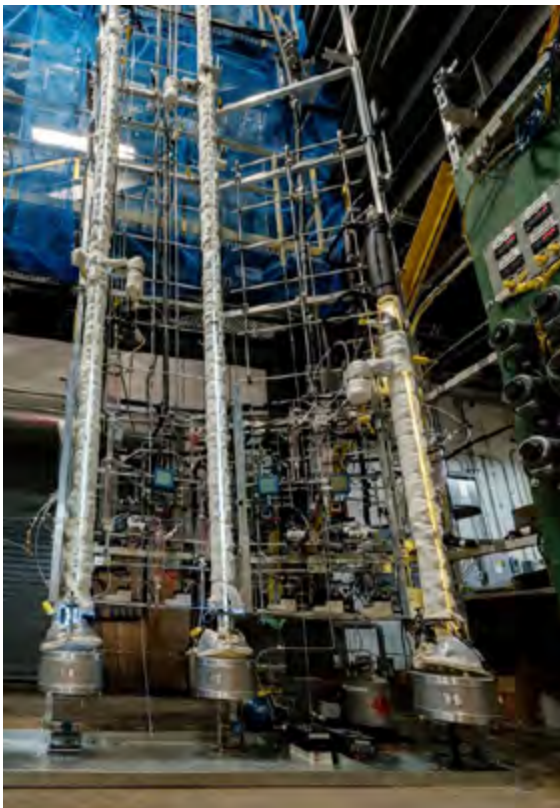
Using ASO from Agilyx's facility, T.EN has fully piloted a continuous purification technology and was able to achieve a styrene monomer product purity of greater than 99.8 wt%. The piloted purification was also able to show that halogens from flame retardant feedstock are not detectable in the styrene monomer product.

Scalable

T.EN's purification process is fully scalable to any capacity and does not require multiple trains to achieve larger capacities. Further, equipment is well-known in the industry and does not require any special utilities to support operations. This provides a lower installed cost option for the purification of pyrolysis styrene oil.

T.EN ADVANTAGES

- Leader in styrenics technology offerings
- TruStyrenyx purification capable of ASTM quality styrene monomer product that can be directly used in polymer facilities
- Equipment is mostly carbon steel
- No special refrigeration requirements
- Entirely scalable process.
- Designs tailored for project specifics



Together, Agilyx and Technip Energies have the full pyrolysis/purification solution for the recycling of post use polystyrene waste back to a valuable monomer product.

Full Circular Solution for Polystyrene Waste



About us

About Agilyx

Founded in 2004, Agilyx is a technology company that enables customers to convert difficult-to-recycle post-use plastics to high value, virgin-equivalent products. With a focus on diversion and conversion of plastic waste, Agilyx is uniquely positioned with a molecular recycling technology offering and an integrated feedstock solution by way of Cyclyx, an innovative feedstock management consortium of partners that drives up global plastic recycling rates by chemically fingerprinting plastic waste and matching it to appropriate recycling processes.

Agilyx was the first to establish a commercial scale closed loop plastic-to-plastic chemical recycling facility and holds over 20 patents. Agilyx conversion technology utilizes pyrolysis without a catalyst and can convert mixed waste plastic to naphtha and fuels or depolymerize specific plastics such as polystyrene and PMMA (acrylic) back into virgin-quality products.



About Technip Energies

Technip Energies is a leading Engineering & Technology company for the energy transition, with leadership positions in LNG, hydrogen and ethylene as well as growing market positions in blue and green hydrogen, sustainable chemistry and CO₂ management. The company benefits from its robust project delivery model supported by extensive technology, products and services offering.

Operating in 35 countries, our 15,000 people are fully committed to bringing our client's innovative projects to life, breaking boundaries to accelerate the energy transition for a better tomorrow.

Technip Energies is listed on Euronext Paris with American depositary receipts ("ADRs"). For further information: www.technipenergies.com.





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