Special Report: Thermal Conversion Technologies - An Answer to Recycling Plastic Waste?

2022

NexantECA's analysts and consultants are continuously tracking developments in sustainability

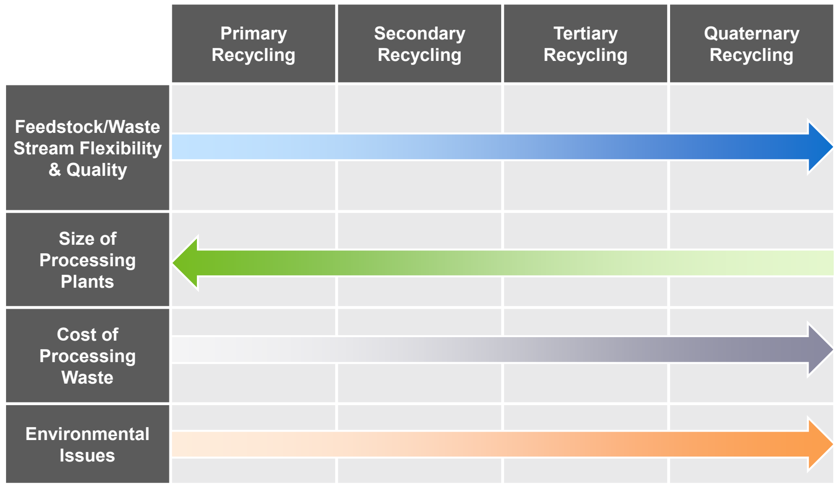
- NexantECA provides clients with understanding regarding the impact of technology developments on markets, such as emergence of advanced recycling, along with demand drivers through changing consumer behavior, legislation and targets
- Our recycling reports provide a comprehensive assessment - technology, markets and economics - of the development of the recycling industries within the plastics and polymers industry
- Recent recycling reports include:

Special Reports	Technoeconomics-Energy and Chemicals (TECH)	Market Insights
• Olefins from Mixed Plastics Waste-Are Thermolysis Routes Viable? • Plastics Recycling: Impact on the Polymers Industry in Asia Pacific- Volume 1: China, Japan, and Australia • Sorting through Plastic Waste-Is Chemical Recycling a Solution	• Emerging Technologies to Recycle Plastic Waste • Advances in Mechanical Recycling of Plastics • Material Recovery Facilities for Plastic Waste • Advances in Depolymerization Technologies for Recycling • Recycling of Mixed Plastics Waste	• Recycled Polyester • Recycled Polyolefins

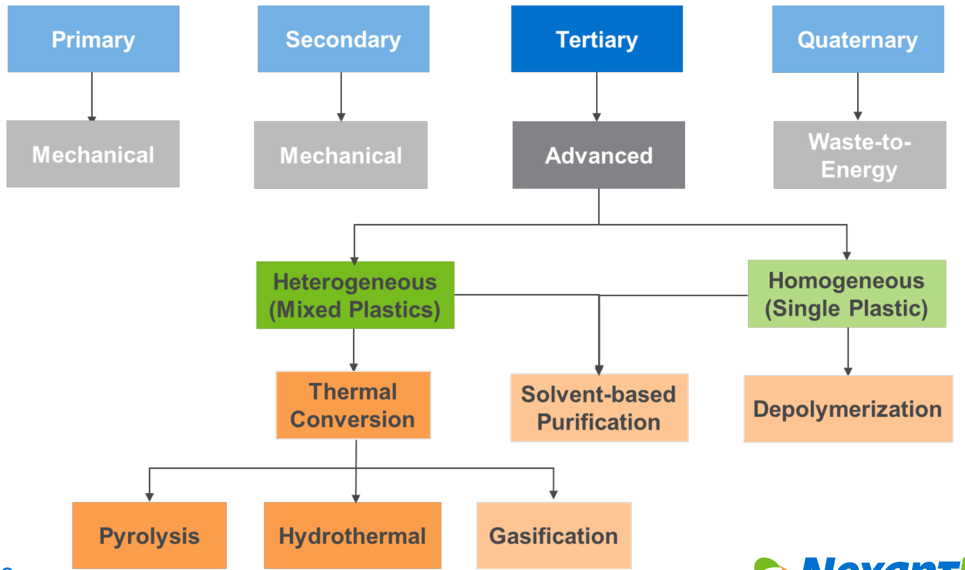
Plastic waste, and how best to dispose of it, remains a global problem

- While plastic waste disposal has been an issue for quite some time, it was not until recent years that the government, and public and private sectors have become increasingly aware of the environmental implications associated with this global problem.
- While mechanical recycling typically processes PET (resin code #1) and HDPE (resin code #2), this process is difficult and often not economical for the other types of plastics (#3 through #7) typically found in products such as fast-food containers, plastic eyeglass frames, etc.
- Since increasing recycling rates is a priority, with more attention being focused on creating a circular economy, new focus is being put on advanced recycling technologies that can complement mechanical recycling.

Comparison of Recycling Levels



Advanced Recycling Classifications



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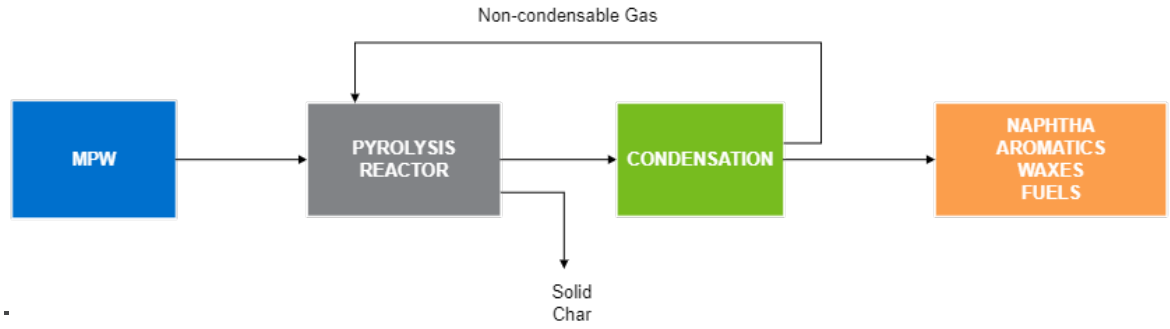
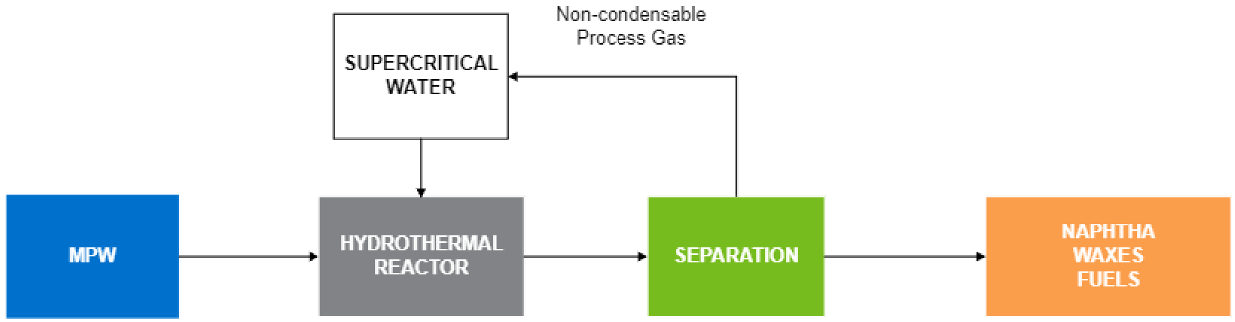
Companies continue to make significant progress in developing commercial technologies to handle mixed plastics waste

- Thermal conversion technologies thermal conversion technologies use heat through pyrolysis, hydrothermal treatment, or gasification to break down plastic waste, typically a mixed plastics feedstock, into hydrocarbon products suitable for use as petrochemicals or fuels, and are sometimes referred to as feedstock recycling processes.
  - They can be used for condensation polymers but are most often applied to addition polymers, such as polyolefins.
- Although similar, thermal conversion processes should not be confused with incineration which, with or without energy recovery, no recoverable products are produced

Pyrolysis Schematic



Hydrothermal Treatment Schematic



The purpose of this report is to provide a strategic analysis of thermal conversion technologies and how viable they are for recycling plastic waste

- The report will include
  - An analysis of the plastic waste stream, including rigid and flexible packaging
  - Recycling regulations and legislation currently in place that support thermal conversion technologies
  - Thermal conversion technologies currently commercialized or under development for recycling of mixed plastics waste, including a comparison of them
  - High level profiles of selected thermal conversion technology developers will be provided, including process description, key features, and development status
  - Screening/ranking of profiled technologies will be developed using parameters (on a best-efforts basis) such as capital investment, feed flexibility, commercial status, patent protection, product range/quality, etc.
  - Economic analysis of generic thermal conversion technologies and chemicals production (e.g., olefins and aromatics), including cost of production estimates and sensitivity analysis to key factors such as raw material pricing
  - Economic advantages of incorporation of carbon capture in plastic recycling
  - Competitiveness under various oil price scenarios and in key regions (e.g., USGC, Western Europe, China, Japan, and Southeast Asia)
  - Analysis of the carbon intensity of recycling plastic waste

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What is new in the 2022 Report?

01 **Improvements needed to collect plastic waste**

02 **New and revised profiles and revised ranking of technology developers (e.g., pyrolysis, hydrocracking)**

03 **Economic analysis will be focused on olefins and aromatics production from mixed plastics waste**

04 **Cost estimates will be modeled with carbon capture**

05 **Carbon intensity analysis based on Scope 1 and Scope 2 emissions (proprietary model)**

06 **Overview of new opportunities for thermal conversion technologies (e.g., medical waste, small-scale applications, etc.)**

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