NexantECA

Technology and Costs

Biorenewable Insights: Commercial Bioplastics in 2020

Commercial Bioplastics in 2020 is one in a series of reports published as part of NexantECA's 2020 Biorenewable Insights program.

Overview

The bioplastics sector continues to innovate and develop cost-competitive polymers that can address a wide variety of applications. The field has proliferated to address many different visions of sustainability including biodegradability, renewable origins, and combinations thereof. In addition, the ability to compound different plastics has expanded potential addressable markets while reducing costs, while adding a renewable component to many otherwise fossil-origin plastic products.

Despite this innovation, bioplastics have struggled to compete with conventional plastics. Sustainability concerns continue to drive their adoption, but how soon will biopolymers have the ability to break out of the premium "green plastics" market and compete on cost?

Technologies

This report covers all currently commercial bioplastics, segregated by chemistry including:

- Polyolefins from ethanol and bio-naphtha cracking
- Polyesters, including those from bio-monoethylene glycol (MEG), bio-butanediol (BDO), poly(lactic acid) (PLA), 1,3-propanediol (1,3-PDO) and associated poly(trimethylene terephthalate) (PTT), cellulose polymers, and bio-polyesters such as thermoplastic starch and polyesters
- Polyamides, including those from bio-derived azelaic acid, sebacic acid, 11-aminoundecanoic acid and bio-based polyamide 5/X
- Polyurethanes, from pentamethylene diisocyanate (PDI) for bio-isocyanates and from epoxidized oils

These materials are examined from the perspective of the parent monomers and their production technology.

Furan resins, natural latex, pine chemicals, regenerated cellulose, cashew nutshell liquid polymers and traditional oleoresins such as linoleum are not covered in the report, nor are those biopolymers used in food, cosmetic or pharmaceutical applications.

Process Economics

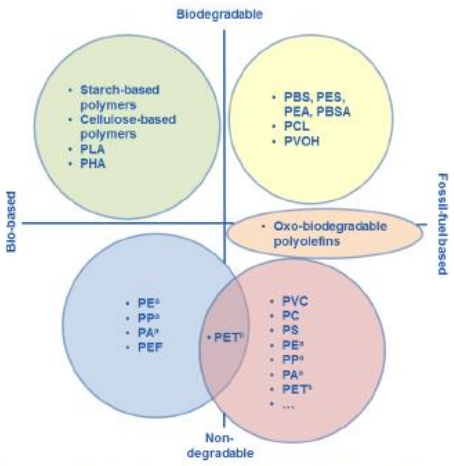
Bioplastic economics are based on the competitiveness of their monomers vis-à-vis conventionally produced alternatives, if applicable. Economics are presented using likely cost of production location scenarios from four major locations (US, Western Europe, Brazil, and China), with regional pricing, on a Q3 2020 basis. Coverage includes:

- Ethylene
- 1,4-BDO
- Azelaic Acid
- Thermoplastic Starch
- Lactic Acid and PLA
- Sebacic Acid
- Propylene
- MEG
- Bio-Polyols
- PDI
- 1,3-PDO and PTT
- Succinate
- PHAs
- Cellulose Acetate

Commercial Impact

This report assesses global capacity of the relevant bio-polymers using a bio-monomer methodology where applicable and assesses current impacts on conventional polymer markets where appropriate.

Overview of Sustainability Metrics for Bio-polymers and Conventional Polymers



[a] Fully biorenewable feedstock routes are available or in development, but not common practice
[b] Partially biorenewable feedstock routes are available, fully biorenewable routes are in development

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- Capacity tables of plants and analysis of announced capacities
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Technology and Costs comprises the Technoeconomics – Energy & Chemicals (TECH) program (formerly known as PERP), the Biorenewable Insights program (BI), the Sector Technology Analysis, and the new Cost Curve Analysis. These programs provide comparative economics of different process routes and technologies in various geographic regions.

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