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## Bioplastics: Technologies and Global Markets

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### Report Summary

Bioplastics will grow at a significant pace over the next 5 years. The total worldwide use of bioplastics is valued at 571,712 metric tons in 2010. This usage is expected to grow at a 41.4% compound annual growth rate (CAGR) from 2010 through 2015, to reach 3,230,660 metric tons in 2015.

By 2010, ready access to crops such as soybeans, corn, and sugarcane moved the United States strongly into bioplastics. North American usage is estimated at 258,180 metric tons in 2010 and is expected to increase at a 41.4% compound annual growth rate (CAGR) to reach 1,459,040 metric tons in 2015.

Use of bioplastics got off to a faster start in Europe than in the United States. European usage is now reported at 175,320 metric tons in 2010 and is expected to increase at a 33.9% compound annual growth rate (CAGR) to reach 753,760 metric tons in 2015.

### INTRODUCTION

Market forces, especially increasing focus on environmental threats such as global warming and disposal of products containing toxic materials, have strongly driven development and early use of bioplastics.

Bioplastics are plastics that are made from renewable resources, such as food crops or biomass. The terms 'bioplastics' and 'biodegradable plastics' have been used interchangeably, but there is a difference between the two types of polymers.

BCC Research defines a fully biodegradable polymer as a polymer that is completely converted by microorganisms to carbon dioxide, water, and humus. In the case of anaerobic biodegradation, carbon dioxide, methane, and humus are the degradation products. Some, but not all, bioplastics are also biodegradable.

### STUDY GOALS AND OBJECTIVES

**Goals and objectives of this study include:**

Identifying trends that will affect use of bioplastics and their major end-use application markets

Reviewing, analyzing, and forecasting specific end markets for bioplastics by material types, with sections devoted to each type of renewable-sourced plastic

Analyzing and forecasting market developments from the viewpoint of major applications for bioplastics, that is, packaging, automotive, electrical/electronic, medical, building, and construction and others

Profiling many of the most important suppliers of bioplastics, including resin producers and compounders

### REASONS FOR DOING THE STUDY

The rapid emergence of bioplastics is one of the major materials stories of the period starting in 2010. Once billed as biodegradable plastics, the theme for renewably sourced plastics has shifted dramatically in recent years to sustainability. In order to maximize market impact, there is now a growing trend to compound bio-based plastics with oil-based plastics to extend their reach into markets for durable products used in cars, cell phones, and elsewhere. The focus has shifted to total carbon footprint, and away from

contribution to the solid waste stream.

## INTENDED AUDIENCE

Due to the growing concern about climate change and negative health impacts of many existing materials, this report will be of interest to anyone who sells, designs, or manufactures products that are, or could be, made from polymeric materials. This report will also be of value to individuals who are helping to establish public policy about issues ranging from limits on use of plastics packaging to potential limits on use of vinyl compounds in medical applications.

This report will be of value to technical and business personnel in the following areas, among others:

Personnel in end-user companies in a wide range of industries from retail bags to solar cell manufacturing

Marketing and management personnel in companies that produce, market, and sell any type of plastics

Companies involved in the design and construction of process plants that manufacture resins and products made from the resins

Companies that supply, or want to supply, equipment and services to plastics companies

Financial institutions that supply money for such facilities and systems, including banks, merchant bankers, venture capitalists, and others

Investors in both equity and fixed-income markets; the fate of the plastics very much weighs on the values of the publicly traded stocks of companies such as Eastman, Bayer, DSM, and DuPont

Personnel in government at many levels, ranging from federal to state and local authorities, many of whom are involved in trying to ensure public health and safety; the report also will be of interest to military scientists studying new packaging and equipment.

## SCOPE OF REPORT

The focus of this report is plastics that are made from renewable resources such as biomass or food crops. There is even some potential development of bioplastics from animal resources. Plastics that may be potentially made from waste carbon dioxide are reviewed because of their potential impact on bioplastics, but their data is not included in the forecasts presented here. Bioplastics are further defined here as polymer materials that are produced by synthesizing, either chemically or biologically, materials which contain renewable organic materials. Natural organic materials that are not chemically modified, such as wood composites, are excluded. The report includes use of renewable resources to create monomers that replace petroleum-based monomers, such as polyester and polyethylene that use feedstocks made from sugarcane. Ethanol, a major product in Brazil, is one small chemical step from ethylene.

**The focal point is on the following resin chemistries, including:**

Polylactic acid

Thermoplastic starch

Bio-polyamides (nylons)

Polyhydroxyalkanoates (PHA)

Bio-polyols

Cellulosics

Bio- polytrimethylene terephthalate (PTT)

Bio-polyethylene

Bio-bottle-grade polyethylene terephthalate (PET)

**Biodegradable and photodegradable polymers made from petrochemical feedstocks are not included.**

Other renewable resin chemistries are also covered but in less detail because their roles are not as well developed. They include collagen and chitosan.

## METHODOLOGY AND INFORMATION SOURCES

Both primary and secondary research methodologies were used in preparing this report. Extensive searches were made of the literature and the Internet, including many of the leading trade publications, as well as technical compendia, government publications, and information from trade and other associations. Many background sources were used to develop chemical and property descriptions, but all forecasts are solely attributable to BCC Research.

## **AUTHOR'S CREDENTIALS**

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