

NEW Forecasts for 2015 & 2020 in 16 countries

World Bioplastics

Study # 2823

November 2011

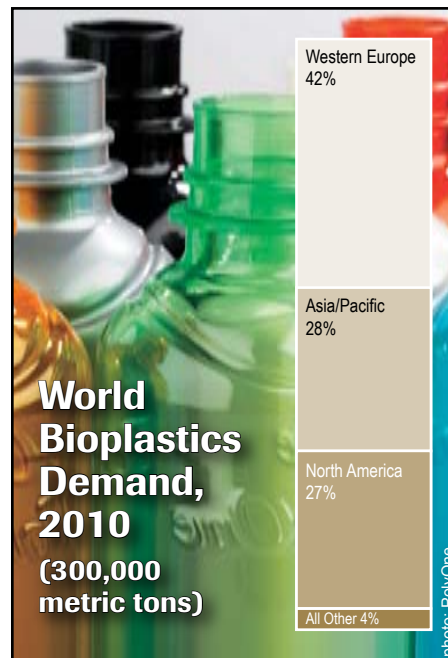
\$6100

World demand to reach \$2.9 billion in 2015

Global demand for biodegradable and bio-based plastics will more than triple to over one million metric tons in 2015, valued at \$2.9 billion. Bioplastics have moved past the initial phase of market introduction and are now experiencing robust increases in demand in virtually all parts of the world. Gains are being fueled by a number of factors, including consumer preferences for environmentally sustainable materials, improved performance of bioplastic resins with respect to traditional plastics, and the introduction of commodity plastics produced from bio-based sources. Ultimately, however, price considerations will be the main driver of bioplastic market success, and rising petroleum costs may allow some bioplastic resins to achieve price parity with conventional plastics by the end of the decade.

Starch-based resins, PLA to pace biodegradables

Biodegradable plastics accounted for 90 percent of the world bioplastics market in 2010. Excellent growth is forecast for the two leading biodegradable plastics, starch-based resins and polylactic acid (PLA), both of which will more than double in demand through 2015. More rapid growth is expected for PLA, which will benefit from advancements in compounding polymerization technology, as well as its relatively low cost compared to other bioplastics. Fastest gains for biodegradable plastics, however, will be seen for polyhydroxy-alkanoate (PHA) resins, which are just beginning to enter the commercial market.



Bio-based polyethylene to offer best opportunities

Despite the strong advances for biodegradable resins, non-biodegradable bio-based resins will be the primary driver of bioplastics demand through 2015 and beyond. Gains will be stimulated by the availability of commercial quantities of bio-based polyethylene from Braskem's 200,000 metric ton per year plant in Brazil, which opened in late 2010. Two other bio-based polyethylene plants, as well as bio-based polypropylene and PVC facilities, are expected to open around 2015. Additionally, industrial production of fully bio-based PET is forecast to become a reality by the end of the decade.

Asia/Pacific region to be fastest-growing market; Brazil to become leading producer

Western Europe was the leading consumer of bioplastics in 2010, as the region's environmentally conscious consumers have been the quickest to accept bio-based and biodegradable products. Starch-based resins used in biodegradable bags are particularly popular in the region. North America was another major market for bioplastics in 2010, with PLA accounting for the majority of demand. However, the fastest gains in bioplastics demand through 2015 will be seen for the Asia/Pacific region, driven by robust growth in Japan and China.

Currently, world bioplastics production is heavily concentrated in the US and Western Europe. This will change dramatically by 2015, as production of bio-based polyethylene ramps up in Brazil, making the country the world's leading producer of bioplastics. Furthermore, China and Thailand plan to open over 100,000 metric tons of new bioplastics capacity by 2020, making these countries major players in the global market.

Study coverage

This new Freedonia industry study, *World Bioplastics*, is priced at \$6100. It presents historical demand data (2000, 2005, 2010) and forecasts for 2015 and 2020 by product, market, world region and for 16 major countries. The study also considers market environment factors, evaluates company market share and profiles 38 industry competitors.

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#2823 - World Bioplastics

Introduction

EXECUTIVE SUMMARY

- 1 Summary Table

MARKET ENVIRONMENT

- General
- World Economic Overview
 - Recent Historical Trends
 - World Economic Outlook
- World Population Outlook
- World Manufacturing Outlook
- World Agricultural Outlook
 - Maize
 - Sugar Crops
- World Plastics Overview
 - Plastics Demand
 - Plastics Production
 - Pricing Trends
- World Packaging Outlook
- Regulatory & Environmental Considerations
 - Degradability Standards & Certification
 - Composting & Recycling
 - Legislation
 - Food Versus Industrial Crop Use

LIST OF TABLES & CHARTS:

- 1 World Gross Domestic Product by Region
- 2 World Population by Region
- 3 World Manufacturing Value Added by Region
- Cht World Maize Production by Region, 2010
- Cht World Sugar Crop Production by Region, 2010
- 4 World Agricultural Value Added by Region
- 5 World Plastic Resin Demand by Region
- Cht World Plastic Resin Demand by Region, 2010
- 6 World Plastic Resin Production by Region
- 7 Plastic Resin Pricing
- Cht Plastic Resin Pricing, 2000-2020
- 8 World Packaging Demand by Region

WORLD BIOPLASTICS OVERVIEW

- General
- Product Overview
 - Biodegradable
 - Starch-Based Resins
 - Polylactic Acid
 - Polyester Bioplastics
 - PHAs
 - Other
 - Non-Biodegradable
- Market Overview
 - Packaging
 - Packaging Film
 - Containers
 - Loose-Fill & Other
 - Nonpackaging
 - Bags
 - Foodservice Disposables
 - Automotive & Electronics
 - Agricultural Films
 - Other
- Regional Overview
 - Demand
 - Production
 - Trade Flows

LIST OF TABLES & CHARTS:

- 1 World Bioplastics Demand by Type
- 2 World Biodegradable Plastics Demand by Type
- Cht World Biodegradable Plastics Demand by Type, 2000-2020
- 3 World Starch-Based Resin Demand by Region & Market
- 4 World Polylactic Acid Demand by Region & Market
- 5 World Polyester Bioplastic Demand by Region & Market

- 6 World PHA Resin Demand by Region & Market
- 7 World Other Biodegradable Plastic Resin Demand by Region & Market
- 8 World Non-Biodegradable Bioplastics Demand by Type
- Cht World Non-Biodegradable Bioplastics Demand by Type, 2000-2020
- 9 World Bio-Based Polyethylene Demand by Region & Market
- 10 World Bio-Based Polyamide Demand by Region & Market
- 11 World Other Non-Biodegradable Bioplastics Demand by Region & Market
- 12 World Bioplastics Demand by Market
- 13 World Packaging Demand for Bioplastics by Application & Region
- Cht World Packaging Demand for Bioplastics by Application, 2010
- 14 World Nonpackaging Demand for Bioplastics by Application & Region
- Cht World Nonpackaging Demand for Bioplastics by Application, 2010
- 15 World Bioplastics Demand by Region
- Cht World Bioplastics Demand by Region, 2000-2020
- 16 World Bioplastics Production by Region
- Cht World Bioplastics Production by Region, 2000-2020
- 17 World Bioplastics Net Exports by Region

NORTH AMERICA

- General
- Bioplastics Demand
- United States
- Canada
- Mexico

LIST OF TABLES & CHARTS:

- 1 North America -- Bioplastics Supply & Demand
- 2 North America -- Bioplastics Demand by Type & Market
- Cht North America Bioplastics Demand by Country, 2010
- 3 United States -- Bioplastics Supply & Demand
- 4 United States -- Bioplastics Demand by Type
- 5 United States -- Bioplastics Demand by Market
- 6 Canada -- Bioplastics Supply & Demand
- 7 Canada -- Bioplastics Demand by Type
- 8 Canada -- Bioplastics Demand by Market
- 9 Mexico -- Bioplastics Supply & Demand
- 10 Mexico -- Bioplastics Demand by Type
- 11 Mexico -- Bioplastics Demand by Market

WESTERN EUROPE

- General
- Bioplastics Demand
- Germany
- Italy
- United Kingdom
- France
- Netherlands
- Other Western Europe
 - Belgium
 - Norway
 - All Other

LIST OF TABLES & CHARTS:

- 1 Western Europe -- Bioplastics Supply & Demand
- 2 Western Europe -- Bioplastics Demand by Type & Market
- Cht Western Europe Bioplastics Demand by Country, 2010
- 3 Germany -- Bioplastics Supply & Demand
- 4 Germany -- Bioplastics Demand by Type
- 5 Germany -- Bioplastics Demand by Market
- 6 Italy -- Bioplastics Supply & Demand
- 7 Italy -- Bioplastics Demand by Type
- 8 Italy -- Bioplastics Demand by Market

- 9 United Kingdom -- Bioplastics Supply & Demand
- 10 United Kingdom -- Bioplastics Demand by Type
- 11 United Kingdom -- Bioplastics Demand by Market
- 12 France -- Bioplastics Supply & Demand
- 13 France -- Bioplastics Demand by Type
- 14 France -- Bioplastics Demand by Market
- 15 Netherlands -- Bioplastics Supply & Demand
- 16 Netherlands -- Bioplastics Demand by Type
- 17 Netherlands -- Bioplastics Demand by Market
- 18 Other Western Europe -- Bioplastics Supply & Demand
- 19 Other Western Europe -- Bioplastics Demand by Country & Type
- 20 Other Western Europe -- Bioplastics Demand by Market

ASIA/PACIFIC

- General
- Bioplastics Demand
- Japan
- China
- Taiwan
- South Korea
- Other Asia/Pacific
 - Australia
 - All Other

LIST OF TABLES & CHARTS:

- 1 Asia/Pacific -- Bioplastics Supply & Demand
- 2 Asia/Pacific -- Bioplastics Demand by Type & Market
- Cht Asia/Pacific Bioplastics Demand by Country, 2010
- 3 Japan -- Bioplastics Supply & Demand
- 4 Japan -- Bioplastics Demand by Type
- 5 Japan -- Bioplastics Demand by Market
- 6 China -- Bioplastics Supply & Demand
- 7 China -- Bioplastics Demand by Type
- 8 China -- Bioplastics Demand by Market
- 9 Taiwan -- Bioplastics Supply & Demand
- 10 Taiwan -- Bioplastics Demand by Type
- 11 Taiwan -- Bioplastics Demand by Market
- 12 South Korea -- Bioplastics Supply & Demand
- 13 South Korea -- Bioplastics Demand by Type
- 14 South Korea -- Bioplastics Demand by Market
- 15 Other Asia/Pacific -- Bioplastics Supply & Demand
- 16 Other Asia/Pacific -- Bioplastics Demand by Country & Type
- 17 Other Asia/Pacific -- Bioplastics Demand by Market

OTHER REGIONS

- Central & South America: General
- Bioplastics Demand
- Brazil
- Other Central & South America
- Eastern Europe
- Africa/Mideast

LIST OF TABLES & CHARTS:

- 1 Central & South America -- Bioplastics Supply & Demand
- 2 Central & South America -- Bioplastics Demand by Type & Market
- 3 Brazil -- Bioplastics Supply & Demand
- 4 Brazil -- Bioplastics Demand by Type
- 5 Brazil -- Bioplastics Demand by Market
- 6 Other Central & South America -- Bioplastics Supply & Demand
- 7 Other Central & South America -- Bioplastics Demand by Type
- 8 Other Central & South America -- Bioplastics Demand by Market
- 9 Eastern Europe -- Bioplastics Supply & Demand
- 10 Eastern Europe -- Bioplastics Demand by Country & Type
- 11 Eastern Europe -- Bioplastics Demand by Market
- 12 Africa/Mideast -- Bioplastics Supply & Demand

INDUSTRY MARKET RESEARCH: BUSINESS INTELLIGENCE FOR BUSINESS LEADERS, STRATEGISTS, DECISION MAKERS

- 13 Africa/Mideast -- Bioplastics Demand by Type
- 14 Africa/Mideast -- Bioplastics Demand by Market

INDUSTRY STRUCTURE

- General
- Market Share
- Mergers & Acquisitions
- Manufacturing Requirements
- Research & Development
- Marketing Strategies
- Channels of Distribution
- Competitive Strategies
- Cooperative Agreements

LIST OF TABLES & CHARTS:

- 1 Bioplastics Sales by Company, 2010
- 2 World Bioplastics Market Share, 2010
- 2 Selected Acquisitions & Divestitures
- 3 Selected Cooperative Agreements

Company Profiles

COMPANY PROFILES
 Profiles 38 global players such as Arkema, NatureWorks, Metabolix, BASF, Innovia Films, Novamont and Rodenburg Biopolymers

WORLD BIOPLASTICS OVERVIEW

Polylactic Acid

SAMPLE TEXT
 Explanations to support each table's data and forecasts

percent yearly through... ins will be driven by... mpounding, greater... k in many parts of the... numerous capacity... es and benefit market... acceptance. Restraining further advances will be the limited biodegradability of PLA (which only degrades in high-temperature industrial compost environments) versus other bioplastics, as well as difficulty in recycling the resin, both of which limit the positive environmental profile of PLA to some extent.

Polylactic acid, a linear aliphatic polyester, is produced by the polymerization of lactic acid, which is made by the fermentation of sugars obtained from renewable resources such as maize and sugar crops. This material has a low moisture vapor transmission rate, high clarity and good strength. PLA is a thermoplastic material that can be processed by a number of techniques such as injection molding, blow molding, extrusion and thermoforming. PLA can be made into flexible or rigid products and is inherently clear, but can be processed to be opaque (but the resin is compostable, although only in high-temperature composting processes). The material can also be spun into fibers. The main drawback to PLA is its low thermal stability, which prevents usage at temperatures higher than 50 degrees Celsius. PLA also has poor carbon dioxide barrier -- making it unsuitable for carbonated drink bottles -- and low impact resistance.

Prior to the early 1990s, PLA was too expensive to be commercially feasible for large-scale applications, so its use was limited largely to specialized applications like biomedical devices, sutures and surgical implants. However, as a result of advancing biotechnology and rising conventional plastic prices, PLA has become cost-competitive with conventional polyolefin and polyester resins. PLA is frequently blended with starch, although blends tend to be brittle and

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ASIA/PACIFIC

Gains in bioplastics demand will benefit from rising incomes among China's urban consumers, concerns over solid waste disposal and pollution issues, and nascent government efforts to promote environmental sustainability, including bio-based and bio-plastic-containing products to the US or Western Europe, resins in China. Among bio-plastics are the leading products in China demand. Other products such as PHA is expected to see strong growth in demand through 2015, particularly as the resin becomes more widely available in China, as domestic production capacity is expected to rapidly increase. PHA resins will also see healthy gains in demand in China. The most rapid growth, however, will be for non-biodegradable bioplastics, particularly bio-based polyethylene and PVC, but also bio-based polyamides to a lesser extent.

SAMPLE TEXT
 Data illustrated with the aid of over 100 tables and charts

TABLE VI-7
CHINA -- BIOPLASTICS DEMAND BY TYPE
 (thousand metric tons)

Item	2000	2005	2010	2015	2020
Plastic Resin Demand kg bioplastic/ton plastic					
Bioplastics Demand					
Biodegradable:					
Starch-Based Resins					
Polylactic Acid					
Other Biodegradable					
Non-Biodegradable:					
Bio-Based Polyamide					
Bio-Based Polyethylene					
Other Non-Biodegradable					

SAMPLE TABLE
 Presents historical data for 2000, 2005 and 2010 plus Freedonia forecasts for 2015 and 2020

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World Thermoplastic Elastomers

Global demand for thermoplastic elastomers (TPEs) will rise 6.3 percent annually through 2015. Gains will be driven by rebounding motor vehicle production in the US and Western Europe. Advances will also be fueled by the rising use of TPEs in the developing countries, where these materials are continuing to penetrate new applications. This study analyzes the 4.1 million metric ton world TPE industry, with forecasts for 2015 and 2020 by market, product, world region and for 15 countries. The study also evaluates company market share and profiles industry players.

#2803..... *September 2011* \$6400

World Silicones

World demand for silicones will rise 6.2 percent annually through 2015. The Asia/Pacific region will remain the largest and fastest-growing market. Electrical and electronic products will continue to be the leading outlet, bolstered by high-growth applications such as components for LEDs and solar energy products. This study examines the \$12.4 billion world market for silicones, with forecasts for 2015 and 2020 by market, product, world region and for 15 countries. The study also evaluates company market share and profiles industry participants.

#2779..... *July 2011* \$5900

World Emulsion Polymers

Global demand for emulsion polymers will rise 5.2 percent annually through 2014, driven by rising demand for latex polymers used in the production of water-based paints, coatings and adhesives. Acrylics will remain the leading emulsion polymer type and grow the fastest. This study analyzes the 9.9 million metric ton world emulsion polymer industry, with forecasts for 2014 and 2019 by market, product, world region and for 14 major countries. It also evaluates company market share and profiles industry players.

#2686..... *October 2010* \$5700

Degradable Plastics

US demand for degradable plastics is forecast to rise 16.6 percent annually through 2014, driven by interest in environmentally friendly products. Polylactic acid (PLA) and starch-based plastics will remain the dominant types and see strong growth. Polyhydroxyalkanoate (PHA) will be the fastest growing type, from a small base. This study analyzes the 151 million pound US degradable plastic industry, with forecasts for 2014 and 2019 by type, product and market. It also evaluates company market share and profiles industry players.

#2648..... *August 2010* \$4800

Silicones

US demand for silicones is forecast to rise 5.3 percent annually through 2014. Consumer goods such as cosmetics and toiletries will remain a fast growing market, as will medical products. Silicone gels will be the fastest growing type, driven by robust growth in demand for gel encapsulants in LED and photovoltaic applications. This study analyzes the \$2.8 billion US silicone industry, with forecasts for 2014 and 2019 by product, market and application. It also evaluates company market share and profiles industry players.

#2665..... *July 2010* \$4700

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