



THE FUTURE OF GREEN ADHESIVES AND SEALANTS FOR INDUSTRIAL APPLICATIONS –

MARKET FORECASTS TO 2017



THE FUTURE OF GREEN ADHESIVES AND SEALANTS FOR INDUSTRIAL APPLICATIONS

Price: £3,500, €3,950, \$5,600

REPORT SUMMARY

Green adhesives are products that have environmentally friendly properties, contain low volatile organic compounds and are manufactured in an environmentally friendly process, from sustainable raw materials. In 2007, the total world demand for adhesives and sealants was 26 billion lbs, of which natural adhesives were 1.3 billion lbs. **The Future of Green Adhesives and Sealants for Industrial Applications** provides in-depth analysis of the current and future demand for green adhesives and sealants to 2017. It assesses the latest technologies and the drivers shaping the future of the industry. With market forecasts broken down by adhesive type, end use and geographic region, this report provides the complete guide to green adhesives and sealants.

FIND OUT ABOUT

- The future of green adhesives to 2017
- Green adhesives markets by adhesive type, end use and region
- Major drivers and barriers
- Technology developments in green adhesives

FOR FURTHER INFORMATION

SEE INSIDE, OR CONTACT:

Stephen Hill

T +44 (0)1372 802025

E stephen.hill@pira-international.com



WWW.INTERTECHPIRA.COM
Return address: Pira International Ltd, Cleeve Road,
Leatherhead, Surrey, KT22 7RU, UK



THE FUTURE OF GREEN ADHESIVES AND SEALANTS FOR INDUSTRIAL APPLICATIONS – MARKET FORECASTS TO 2017

METHODOLOGY

The Future of Green Adhesives and Sealants for Industrial Applications is based on an in-depth combination of primary and secondary research. Primary research involved personal interviews conducted with selected experts in the adhesives industry. Secondary research was based on extensive desk research of industry journals and magazines, conference proceedings, information from university, government and corporate agencies, and professional societies.

WHAT DO YOU GET?

- Detailed analysis of the shape of the industry over a ten-year period with forecasts to 2017
- Quantitative and comprehensive market data and forecasts for the global green adhesives industry
- In-depth market analysis broken down by adhesive type, end use and geographic region

HOW WILL THIS MARKET INTELLIGENCE REPORT BENEFIT YOU?

- Keep abreast of the latest technologies and market developments and the opportunities they afford
- Pinpoint growth sectors and identify factors driving change
- Get the complete picture of the shape of the green adhesives industry with forecasts to 2017 to help plan your business strategy

WHO SHOULD BUY THIS REPORT?

- Raw material suppliers
- Adhesives and sealants manufacturers
- Packaging converters
- Adhesives and sealants end-users
- Industry consultants and analysts

WHAT'S INCLUDED IN THE PRICE?

- One hard copy of report couriered to you (see order form for postage costs) on publication date
- CD-Rom with searchable PDF
- Global intranet licence allowing everyone in your organisation electronic access to the study

AUTHOR BIOGRAPHY



Edward M. Petrie is an international authority on adhesives and sealants, and has been active in the formulation and end-use sectors of the industry for over 40 years.

His expertise includes adhesive material and process selection, testing, formulating, substrate preparation and quality control. Major projects consist of problem solving, cost reduction, formulation optimisation, selection of joint design and production processes, and failure

analysis. Mr Petrie has completed many management assignments in business development and led major strategic projects.

Mr Petrie is an associate consultant with Pira International and has also authored the *Ten-Year Forecast of Disruptive Technologies for Consumer Packaging* market report. In addition he has written a number of popular books on adhesives and plastic materials.

CONTENTS

EXECUTIVE SUMMARY

INTRODUCTION AND METHODOLOGY

- Objective
- Scope
- Definitions
- Methodology
- Report Outline

FUNDAMENTALS OF THE ADHESIVE INDUSTRY

- The Overall Adhesives and Sealants Market
- Adhesive Formulation

THE GREENING OF THE ADHESIVES INDUSTRY

- Value propositions to going green
 - Prevention of pollution
 - Consumption of energy
 - Efficient use of resources
 - Meeting regulations and standards
- Multiple greenways are possible
- Expanding market for synthetic petroleum
- The “new” concept for green chemistry
- Adhesives produced from renewable raw materials
- Indirect environmental impact of adhesives

NATURAL ORIGIN OF ADHESIVES

- Production methods – the biorefinery
- Common natural adhesives
- Resurgence of interest
- A short history of natural adhesives
- Production of natural polymers and adhesives: current and forecast
 - Naturally occurring adhesives as a hedge against petroleum-based products
 - Adhesive demand
 - Regional supply factor: availability of feedstock
 - Regional supply factor: intellectual property

STARCH DERIVATIVES

- Pure and modified starch
 - Source
 - Processing
 - Properties
 - Markets
- Dextrin
 - Source and processing
 - Properties
 - Markets
- Advances in starch-derived adhesives

CELLULOSIC DERIVATIVES

- Source and processing
- Properties and type
- Markets
- Cellulose adhesive development

OTHER PLANT DERIVATIVES

- Proteins
 - Soy-based adhesives – a centre of attention
 - Developments of other protein-based adhesives
- Oils
 - Vegetable oil as polymer building blocks
 - Bioderived polyurethanes
 - Other polymers derived from plant oil
- Natural gum adhesives

TREE RESINS AND BY-PRODUCTS

- Lignin
 - Markets
 - Developments
- Tannin
 - Markets
 - Developments

NATURAL RUBBER

- Source
- Processing
- Properties
- Markets
- Development activity

ADVANCED BIOPOLYMERS – FUTURE ADHESIVES FROM FERMENTATION AND MICROBIAL PROCESSES

- Is biopolymer development for plastics a precursor to their development as adhesives?
- Polylactic acid
 - Adhesive development
 - Market development
- Bacterial polyesters
- 3-Hydroxypropionic acid (3-HP)
- Other bacterial polymers for adhesives

ADDITIVES FOR ADHESIVES

- Reduction in VOCs and other harmful components
 - Industrial solvent market
 - Maximising solvent efficiency
 - Bio-based solvents
- Plasticisers
- Tackifiers
- Waxes
- Fillers and viscosity modifiers
 - Cellulose fibres
 - Rheology modifiers for waterborne adhesives
- The use of additives to improve the properties of biopolymer-based adhesives
- Air as an additive

OTHER GREEN ADHESIVE STRATEGIES

- Compostable or biodegradable adhesives
 - Starch-based biodegradable adhesives

- Biodegradable polyesters
- Other biodegradable polymers
- Adhesives that release on command
 - Removable adhesives for non-structural applications
 - Removable structural adhesives
- Product design
 - Weight reduction
 - Alternative energy products

MARKETS: CURRENT AND FUTURE

- Overall global and regional markets
- Markets for green adhesives
- Markets by type of product
- Opportunities by end-use sector
 - Packaging
 - Building and construction
 - Woodworking
 - Other sectors

TECHNOLOGY FORECAST

- Conventional green adhesives
 - Improvements in waterborne adhesives
 - Improvements in hot melt adhesives
- Advanced bio-based adhesives
 - Raw material suppliers' responsibility
 - Adhesive formulators' responsibility
 - Companies and stakeholders
 - Future scenario studies
 - Biopolymer adhesive market conclusions

TABLES AND FIGURES

- Market sectors considered in the report
- Adhesive and sealant demand in North America and Europe by country
- Growth rates in adhesive and sealants demand by region, 2007–17 (billion lbs)
- Distribution of the global adhesive and sealant industry by end-use sector and product group
- Principles of green chemistry
- Adhesive sources based on natural products
- Properties of natural organic adhesives from renewable plant feedstock
- Estimated EU potential of major renewable raw material-based products
- Global status for use of natural-based adhesives
- Typical uses and features of established natural adhesives
- Starch-based adhesive characteristics
- Principal end uses of starch and dextrin adhesives
- Description of common dextrin adhesives
- Cellulose-based adhesive characteristics
- Characteristics of other plant derivatives
- Soybean potential as a binder and adhesive in wood composites
- Major ingredients in polyurethane adhesives and sealants

CONTENTS CONT.

- Potential penetration of soy polyol in conventional polyol markets
- Developmental bio-based polyols for adhesive and sealant applications
- Applications for natural gums
- Types of gums used in adhesives
- Characteristics of tree-derived products used in adhesives
- Results of laboratory and industrial particleboards bonded with mimosa tannin extract
- Characteristics of natural rubber used in adhesives
- Factors influencing the future market for bio-based adhesives
- Projected global markets of chemical sectors, 2000–25 (\$ billion)
- Market projections of bio-based chemicals
- Key biochemical industry trends
- Performance attributes of PLA and comparisons to other common polymer materials
- Characteristics of PLA biopolymer
- Characteristics of PHAs
- Commonly used formulation compounds in the adhesives industry
- Factors important in selecting a solvent
- Physical properties of green solvents produced from renewable resources
- Solvent property and performance attributes
- Adhesive properties can be significantly changed by the addition of a plasticiser
- Common plasticisers used in adhesive and sealant formulations
- Fillers commonly used in adhesive and sealants systems
- Typical benefits of foamed hot melt adhesives
- Laminating with foam adhesives
- Examples of biodegradable polymers that can be used as adhesives
- Characteristics of starch-based biodegradable polymers
- Commercially available polycaprolactone polymers
- Alternative energy technologies and associated structural material issues
- Growth rates in adhesive and sealants demand by region, 2007–17 (billion lbs)
- Annual percent change in gross domestic product for selected country groups
- Global status of natural-based adhesives by source
- Regional distribution of natural adhesives: current and forecast
- Global status of natural-based adhesives by geographic region
- Distribution of natural adhesives by product type: current and forecast
- Global status of natural-based adhesives by type
- Global end-use market segments
- Global status of natural-based adhesives by end-use sector
- Adhesives based on natural products make up the majority of those used in packaging applications
- Evolution of packaging adhesives (1980s to 2000s)
- Examples of sub-sectors of the overall construction market for adhesives and sealants
- Key property considerations of major woodworking adhesives
- Degradation reactions which occur when bio-based resources are exposed to nature
- Resources for environmental lifecycle analysis
- Increase in green trademarks 2007–08
- Green considerations upstream and downstream to the adhesive formulator
- Global adhesive and sealant industry by region, 2007 share of total demand (26 billion lbs)
- Replacement of solvent containing adhesives for flooring installation in Germany 1985–2003
- Possible future label will disclose all material used in a formulation
- Raw materials basis of chemical industry in historical perspective
- Growth of various types of adhesives, 2003–06
- Ideal closed-loop lifecycle of biodegradable products
- Crude oil prices through 2008
- Bio-based polymers
- Flowchart of industrial soybean oil extraction process
- Total global production of adhesive and sealants including share of natural-based components
- Factors affecting the growth of natural adhesives are related to supply and demand
- Technical potentials and biomass use as indicated by energy consumption
- International patent applications by country of origin
- Amount of raw materials for starch production in the EU in 2008 and consumption of starch-based products by sector in 2008
- Viscosity of VIT starch-based hot melts
- Particle size measurement for oil-derived synthetic latexes compared with natural corn starch granules and biolatex
- Preparing a polyurethane from starch
- Global soybean production, 2007
- Distribution of global fat and oil production
- Process of producing polymer building blocks from vegetable oils
- Performance of bioderived polyol in urethane elastomeric adhesives
- Natural rubber market
- Vulcanisation of natural rubber with sulphur to form rubber
- The biorefinery platform
- PHA is produced from micro-organisms
- Chemical structures of PHAs
- Cargill's bio-based 3HP chemical platform
- Adhesive 'legs' produced by the addition of tackifiers serve to distribute stress over larger areas
- Distribution of rosin markets
- Pressure-sensitive adhesives are used to manufacture removable advertising
- Electrically debonding epoxy adhesive
- Average annual global growth rates of various energy sources, 2001–06
- Percent demand for adhesives and sealants by geographic market
- Adhesives use per capita (kilogram)
- Growth of various types of adhesives, 2003–06
- Sub-sectors expected to have the greenest building activity
- Most common types of woodworking adhesives
- Historical use of adhesives in footwear
- Comparison of surfactant distribution
- Top 10 adhesive and sealants companies based on 2007 performance
- Market potentials of bio-based bulk chemicals in the EU-25 for the three scenarios for the years 2010–50



STEPHEN HILL

For more information on **The Future of Green Adhesives and Sealants for Industrial Applications** and other market reports contact Stephen on:

T +44 (0)1372 802025
E stephen.hill@pira-international.com



ORDER FORM

TO ORDER, CONTACT US DIRECT OR SIMPLY COMPLETE THE ORDER FORM BELOW



POST Pira International, Publications Dept., Cleeve Road, Leatherhead, Surrey, KT22 7RU, UK

IntertechPira, Publications Dept., 19 Northbrook Drive, Portland, Maine 04105, US

T (UK) +44 (0)1372 802080 T (US) +1 207 781 9612 E publications@pira-international.com
F (UK) +44 (0)1372 802079 F (US) +1 207 781 2150 W www.intertechpira.com

Qty	Title	Unit price	Total (£/€/ \$)
<input type="text"/>	THE FUTURE OF GREEN ADHESIVES AND SEALANTS FOR INDUSTRIAL APPLICATIONS	£3,500, €3,950, \$5,600	<input type="text"/>
		Less member discount* if applicable	<input type="text"/>
		plus p&p**	<input type="text"/>
		TOTAL (please include £/€/ \$)	<input type="text"/>

* All Pira members receive a 5% discount

** Post and packing will be: £10/€13/\$20 per report (UK) £20/€25/\$40 (rest of world)

Please contact me about my information requirements

YOUR DETAILS

Mr/Mrs/Dr/Other (please specify) _____

First Name _____ Initial _____

Surname _____

Your job title _____

Company _____

Department _____

Address _____

Town/city _____

Country/state _____

Postcode/zip code _____

Country _____

Tel _____

Fax _____

Your email _____

Company website _____

PAYMENT DETAILS (please tick as appropriate)

I enclose a cheque for £/€/ \$ _____ made payable to Pira International Ltd

Please charge to my credit card Please complete the details below.

Please invoice me (only orders accompanied by an official company purchase order or purchase order reference can be invoiced)

PO number _____

CREDIT CARD DETAILS (please tick as appropriate)

Amex Visa Mastercard

Card no.

3-digit security code

Credit card expiry date (mm/yy) _____

Signature _____

Date (dd/mm/yy) _____

Please note that advertised € and \$ prices are subject to exchange rate fluctuations. Credit card payments will be charged and invoiced in £ Sterling only.

THANK YOU FOR YOUR ORDER

BUSINESS INTELLIGENCE

BETTER DECISIONS, FASTER.



NEED BESPOKE CONSULTANCY? As well as publishing over 50 market reports every year, Pira International's business intelligence group also provides hundreds of clients with expert bespoke consultancy.

WHAT CAN WE PROVIDE?

Pira International is an expert in market sizing, forecasting and assessing the impact of technology and trends. Critically, by understanding your business we can give you a genuinely bespoke interpretation of research.

Our portfolio of projects includes:

- Competitor benchmarking
- Consumer attitude surveys
- Customer/supplier awareness and satisfaction surveys
- Evaluating niche market opportunities
- Impact of emerging technologies
- Market entry studies
- Market sizing and forecasting
- Merger and acquisition studies
- Process optimisation
- Product positioning surveys
- Supplier identification and evaluation

WHO DO WE SERVE?

Pira International conducts bespoke projects for every type of company, many of our repeat clients include:

- Brand owners and packers/fillers
- Data management services
- Financial institutions
- Packaging converters and machinery suppliers
- Paper manufacturers
- Prepress and press manufacturers
- Printers
- Raw materials suppliers
- Retailers

WHY USE PIRA INTERNATIONAL FOR BESPOKE PROJECTS?

Pira International has an extensive global network of industry-leading consultants and researchers in over 50 countries worldwide. With a presence in every major and emerging economy, we are well placed to exceed your requirements. All our work is conducted in the strictest confidence and can be backed by Non-Disclosure Agreements as required.

HOW MUCH DOES IT COST?

The price of bespoke projects depends on the scope of your requirements. We utilise our expertise, long-term research projects and agreements to give you cost-effective solutions, fast.

HOW CAN I FIND OUT MORE?

STEPHEN HILL

Head of Global Business Development

Business Intelligence

+44(0)1372 802025

stephen.hill@pira-international.com