

Safe & Sustainable Chemicals Report

GREEN BUILDING MATERIALS

by
T. Adrian Gaitan, with Eric Linak

SRI Consulting reports on Safe & Sustainable Chemicals cover emerging markets, technologies and issues confronting the chemical industry in the twenty-first century. These reports analyze the impact of new energy sources, regulations and other factors on consumption of chemicals and materials now and throughout the immediate future.

For additional information about these reports, contact Bob Davenport:

Telephone: 650 384-4350

E-mail: rdavenport@sriconsulting.com

The information provided in this publication has been obtained from a variety of sources, which SRI Consulting believes to be reliable. SRI Consulting makes no warranties as to the accuracy, completeness or correctness of the information in this publication. Consequently, SRI Consulting will not be liable for any technical inaccuracies, typographical errors or omissions contained in this publication. This publication is provided without warranties of any kind, either express or implied, including but not limited to, implied warranties of merchantability, fitness for a particular purpose, or non-infringement.

IN NO EVENT WILL SRI CONSULTING BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR INDIRECT DAMAGES (INCLUDING BUT NOT LIMITED TO DAMAGES FOR LOSS OF PROFITS, BUSINESS INTERRUPTION, OR THE LIKE) ARISING OUT OF THE USE OF THIS PUBLICATION, EVEN IF IT WAS NOTIFIED ABOUT THE POSSIBILITY OF SUCH DAMAGES. BECAUSE SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, THE ABOVE LIMITATION MAY NOT APPLY TO YOU. IN SUCH STATES SRI CONSULTING'S LIABILITY IS LIMITED TO THE MAXIMUM EXTENT PERMITTED BY SUCH LAW.

Certain statements in this publication are projections or other forward-looking statements. Any such statements contained herein are based upon SRI Consulting's current knowledge and assumptions about future events, including, without limitation, anticipated levels of global demand and supply, expected costs, trade patterns, and general economic, political, and marketing conditions. Although SRI Consulting believes that the expectations reflected in the forward-looking statements are reasonable, it cannot, and does not, guarantee, without limitation, future results, levels of activity, performance or achievements. Readers should verify through independent third-party sources any estimates, projections or other forward-looking statements or data contained herein before reaching any conclusions or making any investment decisions. SRI Consulting is not responsible for the Reader's use of any information in this publication.

The absence of a specific trademark designation within this publication does not mean that proprietary rights may not exist in a particular name. No listing, description or designation in this publication is to be construed as affecting the scope, validity, or ownership of any trademark rights that may exist therein. SRI Consulting makes no warranties as to the accuracy of any such listing, description or designation, nor to the validity or ownership of any trademark.

TABLE OF CONTENTS

Summary..... 4

Introduction..... 6

 Goals/Objectives..... 8

 Intended Audience and Scope 8

 History of Green Building Materials 9

 Kyoto Protocol..... 10

 Consumers and Green Buildings 10

 Green Versus Sustainable Building 13

 Environmental Benefits 14

 Economic Benefits 17

 Life Cycle Analysis 18

Green Building Materials..... 19

 Green Building Organizations 19

 International Groups 19

 USGBC vs. GBI 21

 Structural Materials 22

 Wood 23

 Glu-Lam Beams 26

 I-Joists..... 28

 Oriented Strandboard..... 29

 Composite Wood-Plastic Lumber 30

 Applications..... 34

 Engineered Wood Complications 35

 Alternative Wood Composite Adhesives..... 35

 Wall Systems 36

 Structural Sheathing..... 36

 Drawbacks 37

 Recycled wastepaper sheathing 38

 Fiberboard..... 38

 Oriented strandboard 38

 Fiber cement panels 38

 Global Market Analysis 39

 Structural Insulating Panels 40

 Drawbacks 41

 Construction Process 43

 Global Market Analysis 43

 Lighting 45

 Current Market..... 45

 Green movement..... 47

 Current legislation 47

 CFL..... 49

 LED..... 52

 Global Market Analysis 53

 Insulation 55

 Insulation Materials 56

TABLE OF CONTENTS

(continued)

Discontinued insulation materials	56
Advantages and disadvantages of today's insulation materials.....	57
Choosing Green Insulators	59
VOCs/ozone depleting insulators	59
Efficiency of insulation (R-values).....	61
Energy.....	63
Solar Energy	63
The Photovoltaic Cell	65
Photovoltaic Chemicals	65
Chemicals used	65
Silicon.....	66
Polysilicon producers	66
Consumption.....	67
Other silicon.....	68
Wind Power	69
Green Coatings for Buildings.....	70
Introduction.....	70
Flat and Nonflat Coatings	71
Composition of Latex Coatings	71
Emulsion polymers used for architectural coatings.....	72
Emulsion polymer technology.....	75
Technology to reduce VOC levels.....	77
New Regulations Affecting the Architectural Coatings Industry.....	78
Varnishes	81
Cool Roofs	88
Conclusions.....	95