World Flat Glass

Industry Study with Forecasts for 2016 & 2021

Study #2970  January 2013  $6400  374 pages
# Table of Contents

## EXECUTIVE SUMMARY

## MARKET ENVIRONMENT

- General ................................. 4
- Global Macroeconomic Environment ........ 4
- Recent Historical Trends ............... 5
- World Economic Outlook ............... 6
- World Demographic Outlook .......... 10
- World Building Construction Expenditures .12
- Residential Building ................. 14
- Nonresidential Building .............. 16
- World Manufacturing Outlook ....... 17
- World Motor Vehicle Outlook ....... 18
- Motor Vehicle Production Trends .... 19
- Motor Vehicles in Use ............... 21
- Environmental & Regulatory Considerations ... 23

## WORLD FLAT GLASS OVERVIEW

- General ................................. 27
- Industry Flowchart .................... 28
- Float Glass Production Capacity by Year .32
- Float Glass Utilization & Capacity .38
- Expansion Activity .................... 35
- Flat Glass Production by Region .... 37
- Global Trade Flows in Flat Glass .38
- Flat Glass Demand by Region ....... 40

## DEMAND BY MARKET

- General .................................... 42
- Building Construction Markets .... 45
- Product Developments .............. 47
- Nonresidential Construction ....... 50
- Residential Construction .......... 52
- Motor Vehicle Market ............... 55
- OEM Motor Vehicle Market ....... 57
- Automotive Replacement Market ... 60
- Other Markets .......................... 63

## NORTH AMERICA

- General .................................... 67
- Flat Glass Demand by Market ....... 69
- Suppliers & Capacity ................. 71
- United States .......................... 72
- Canada .................................. 79
- Mexico .................................. 83

## WESTERN EUROPE

- General .................................... 89
- Flat Glass Demand by Market ....... 91
- Suppliers & Capacity ................. 94
- France .................................. 96
- Germany ................................. 101
- Italy .................................... 108
- Spain .................................... 113
- United Kingdom ....................... 118
- Other Western Europe ............... 123

## ASIA/PACIFIC

- General .................................... 129
- Flat Glass Demand by Market ....... 132
- Suppliers & Capacity ................. 133
- Australia ............................... 135
- China .................................... 140
- India ...................................... 147
- Indonesia ............................... 153
- Japan ...................................... 158
- South Korea ........................... 165
- Thailand ................................. 171
- Vietnam .................................. 175
- Other Asia/Pacific ..................... 181

## OTHER REGIONS

- Central & South America ............ 188
- General ................................... 188
- Flat Glass Demand by Market ....... 190
- Suppliers & Capacity ................. 192
- Brazil ...................................... 193
- Other Central & South America .... 198
- Eastern Europe ......................... 204
- General ................................... 204
- Flat Glass Demand by Market ....... 207
- Suppliers & Capacity ................. 208
- Poland .................................... 209
- Russia .................................... 213
- Other Eastern Europe ................ 218
- Africa/Mideast ......................... 224
- General ................................... 224
- Flat Glass Demand by Market ....... 227
- Suppliers & Capacity ................. 229
- Iran ....................................... 230
- Turkey .................................... 234
- Other Africa/Mideast ................. 238

## INDUSTRY STRUCTURE

- General .................................... 246
- Suppliers & Market Share ............ 247
- World Float Glass Capacity by Company .251
- Acquisitions, Divestitures, & Industry Restructuring ... 252
- Distribution ............................ 254
- Marketing Trends & Production Technology ... 256
- Competitive Strategies ............ 258
- Marketing Strategies ............... 260
- Cooperative Agreements ............ 262

## COMPANY PROFILES

- Apogee Enterprises .................... 271
- Asahi Glass ............................. 274
- Cardinal Glass Industries .......... 280
- Central Glass ........................... 282
- China Glass ............................. 285
- China Luyeang Float Glass ....... 290
- Corning Incorporated ................. 291
- CRH plc ................................. 293
- CSG Holding Company .............. 296
- Euroglas GmbH ......................... 299
- Farun Group ............................ 301
- FLAEG Holding ......................... 302
- Fuyao Group Glass .................... 304
- Ghazvin Glass ......................... 307
- Guangdong Fu Rui Industrial Development ... 308
- Guardian Industries ................. 310
- Gurind Group ......................... 313
- HanGlas Corporation ................. 315
- Interpane Glas Industrie ............. 318
- Jinling Group .......................... 320
- Kaveh Glass ......................... 322
- KCC Corporation ..................... 323
- Lamiver Incorporated ................. 325
- Magna International ................. 326
- Nippon Sheet Glass ................. 328
- PG Group .................................. 337
- PPG Industries ......................... 340
- PT Mulla Industrindo .................. 344
- Saint-Gobain ......................... 345
- Sangalli Group ......................... 355
- SCHOTT AG ............................ 357
- Taiwan Glass ......................... 360
- Triveni Glass ........................... 364
- Türkiye ie ve Cam Fabrikalari A .......... 365
- Vigeclera Corporation ............... 367
- Vitro SAB .................................. 369
- Xinyi Glass ............................ 371

## List of Tables/Charts

### EXECUTIVE SUMMARY

- 1 Summary Table .................................. 3

### MARKET ENVIRONMENT

- 1 World Gross Domestic Product by Region ... 10
- 2 World Population by Region ............... 12
- 3 World Building Construction Expenditures by Region & Sector ....... 14
- 4 World Manufacturing Value Added by Region .................. 18
- 5 World Motor Vehicle Production by Region 21
- 6 World Motor Vehicles in Use by Region .... 23

### WORLD FLAT GLASS OVERVIEW

- 1 World Flat Glass Supply & Demand ...... 28
- 2 World Float Glass Production Capacity by Region, Year-End 2011 ....... 35
- 3 World Flat Glass Production by Region .... 38
- 4 World Flat Glass Exports by Region ....... 39
- 5 World Flat Glass Demand by Region ...... 41

### DEMAND BY MARKET

- 1 World Flat Glass Demand by Market ....... 44

(continued on following page)
List of Tables/Charts

(continued from previous page)

2 World Building Construction
Markets for Flat Glass ................................47
3 World Nonresidential Building Construction
Market for Flat Glass ................................52
4 World Residential Building Construction
Market for Flat Glass ................................55
5 World Motor Vehicle Market for Flat Glass .57
6 World OEM Motor Vehicle
Market for Flat Glass ..................................60
7 World Automotive Replacement
Glass Markets ............................................63
8 Other World Markets for Flat Glass ..............66

NORTH AMERICA

1 North America: Flat Glass
Supply & Demand ......................................69
2 North America: Flat Glass
Demand by Market ....................................71
3 North America: Float Glass Production
Capacity by Country, Year-End 2011 ...........72
4 United States: Flat Glass
Supply & Demand ......................................74
5 United States: Flat Glass
Demand by Market ....................................76
6 United States: Float Glass Production
Capacity by Company, Year-End 2011 .......79
7 Canada: Flat Glass Supply & Demand ..........81
8 Canada: Flat Glass Demand by Market .......82
9 Mexico: Flat Glass Supply & Demand ..........85
10 Mexico: Flat Glass Demand by Market ......87
11 Mexico: Float Glass Production Capacity
by Company, Year-End 2011 .....................88

WESTERN EUROPE

1 Western Europe: Flat Glass
Supply & Demand ......................................91
2 Western Europe: Flat Glass
Demand by Market ....................................94
3 Western Europe: Float Glass Production
Capacity by Country, Year-End 2011 ..........96
4 France: Flat Glass Supply & Demand ..........98
5 France: Flat Glass Demand by Market ......99
6 France: Float Glass Production Capacity
by Company, Year-End 2011 ......................101
7 Germany: Flat Glass Supply & Demand .....103
8 Germany: Flat Glass Demand by Market ...105
9 Germany: Float Glass Production Capacity
by Company, Year-End 2011 ......................107
10 Italy: Flat Glass Supply & Demand ..........110
11 Italy: Flat Glass Demand by Market .......111
12 Italy: Float Glass Production Capacity
by Company, Year-End 2011 ......................113
13 Spain: Flat Glass Supply & Demand .......115
14 Spain: Flat Glass Demand by Market ......117
15 Spain: Float Glass Production Capacity
by Company, Year-End 2011 ......................118
16 United Kingdom: Flat Glass
Supply & Demand .....................................120
17 United Kingdom: Flat Glass
Demand by Market ...................................121
18 United Kingdom: Float Glass Production
Capacity by Company, Year-End 2011 .123
19 Other Western Europe: Flat Glass
Supply & Demand ......................................125
20 Other Western Europe: Flat Glass
Demand by Market ....................................126
21 Other Western Europe: Float Glass
Production Capacity by Company, Year-End 2011 ..........128

ASIA/PACIFIC

1 Asia/Pacific: Flat Glass
Supply & Demand ......................................131
2 Asia/Pacific: Flat Glass
Demand by Market ....................................133
3 Asia/Pacific: Float Glass Production
Capacity by Country, Year-End 2011 .136
4 Australia: Flat Glass Supply & Demand ....137
5 Australia: Flat Glass Demand by Market ...139
6 China: Flat Glass Supply & Demand ..........142
7 China: Flat Glass Demand by Market .......144
8 China: Float Glass Production Capacity
by Company, Year-End 2011 .....................147
9 India: Flat Glass Supply & Demand ..........149
10 India: Flat Glass Demand by Market ......151
11 India: Float Glass Production Capacity
by Company, Year-End 2011 .....................153
12 Indonesia: Flat Glass Supply & Demand ..155
13 Indonesia: Flat Glass Demand by Market .157
14 Indonesia: Float Glass Production
Capacity by Company, Year-End 2011 .158
15 Japan: Flat Glass Supply & Demand .......161
16 Japan: Flat Glass Demand by Market ......163
17 Japan: Float Glass Production Capacity
by Company, Year-End 2011 .....................165
18 South Korea: Flat Glass
Supply & Demand .....................................168
19 South Korea: Flat Glass
Demand by Market ...................................169
20 South Korea: Float Glass Production
Capacity by Company, Year-End 2011 .170
21 Thailand: Flat Glass Supply & Demand ...173
22 Thailand: Flat Glass Demand by Market ...174
23 Thailand: Float Glass Production Capacity
by Company, Year-End 2011 .....................175
24 Vietnam: Flat Glass Supply & Demand .....177
25 Vietnam: Flat Glass Demand by Market ...179
26 Vietnam: Float Glass Production Capacity
by Company, Year-End 2011 .....................180
27 Other Asia/Pacific: Flat Glass
Supply & Demand .....................................183
28 Other Asia/Pacific: Flat Glass
Demand by Market ...................................185
29 Other Asia/Pacific: Float Glass Production
Capacity by Company, Year-End 2011 .187

OTHER REGIONS

1 Central & South America: Flat Glass
Supply & Demand .....................................190
2 Central & South America: Flat Glass
Demand by Market ...................................192
3 Central & South America: Float Glass
Production Capacity by Country, Year-End 2011 ..........193
4 Brazil: Flat Glass Supply & Demand ..........195
5 Brazil: Flat Glass Demand by Market .......197
6 Brazil: Float Glass Production Capacity
by Company, Year-End 2011 .....................198
7 Other Central & South America:
Flat Glass Supply & Demand ......................200
8 Other Central & South America:
Flat Glass Demand by Market ....................202
9 Other Central & South America:
Float Glass Production Capacity by Company, Year-End 2011 ..........204
10 Eastern Europe: Flat Glass
Supply & Demand .....................................206
11 Eastern Europe: Flat Glass
Demand by Market ...................................208
12 Eastern Europe: Float Glass Production
Capacity by Country, Year-End 2011 .......209
13 Poland: Flat Glass Supply & Demand ......211
14 Poland: Flat Glass Demand by Market ......212
15 Poland: Float Glass Production Capacity
by Company, Year-End 2011 .....................213
16 Russia: Flat Glass Supply & Demand ......216
17 Russia: Float Glass Demand by Market ....217
18 Other Eastern Europe: Flat Glass
Supply & Demand .....................................220
19 Other Eastern Europe: Flat Glass
Demand by Market ...................................222
20 Other Eastern Europe: Float Glass Production
Capacity by Company, Year-End 2011 .......224
21 Africa/Mideast: Flat Glass
Supply & Demand .....................................227
22 Africa/Mideast: Flat Glass
Demand by Market ...................................229
23 Africa/Mideast: Float Glass Production
Capacity by Country, Year-End 2011 .......230
24 Iran: Flat Glass Supply & Demand ..........232
25 Iran: Flat Glass Demand by Market .......233
26 Iran: Float Glass Production Capacity
by Company, Year-End 2011 .....................234
27 Turkey: Flat Glass Supply & Demand ......236
28 Turkey: Flat Glass Demand by Market ....237
29 Other Africa/Mideast: Flat Glass
Supply & Demand .....................................240
30 Other Africa/Mideast: Flat Glass
Demand by Market ...................................242
31 Other Africa/Mideast: Float Glass Production
Capacity by Company, Year-End 2011 .......245

INDUSTRY STRUCTURE

1 World Flat Glass Sales
by Company, 2011 ..................................248
2 Chint World Flat Glass Market Share, 2011 ....249
3 World Float Glass Production Capacity
by Company, Year-End 2011 .....................252
4 Selected Acquisitions & Divestitures ..........254
5 Selected Cooperative Agreements ..........264
World Flat Glass Demand, 2016
($90.2 billion)

Asia/Pacific 56%
Western Europe 17%
North America 16%
Other Regions 11%

Demand will continue to outpace real (i.e., inflation-adjusted) gains in the global economy, with the dominant building construction market driven by growth in building construction activity.

World demand to rise 7.1% annually through 2016

World demand for flat glass is forecast to rise 7.1 percent per year through 2016 to 9.2 billion square meters. In a continuation of the trend seen overall the last couple of decades, demand will easily outpace real (i.e., inflation-adjusted) gains in the global economy. Gains in the dominant building construction market will be driven by a significant acceleration in building construction activity. The global market value of flat glass is forecast to exceed $90 billion in 2016.

Asia/Pacific to remain fastest growing market

The Asia/Pacific region, which accounted for 60 percent of global flat glass demand (on a square meter basis) in 2011, will continue to post the fastest gains through 2016. Gains in China, the region’s dominant national market, will slow in comparison to the pace of the 2006-2011 period, but remain well above the world average. Demand in Japan will improve significantly, based on recovering domestic building construction and motor vehicle markets.

The US market for flat glass will recover strongly based on a healthy rebound in the country’s building construction sector. Building construction spending in the US in 2011 was just a little over one-half of levels seen in 2006. Despite positive economic growth in 2010 and 2011 after a major recession, US building witnessed further declines in both those years. However, some recovery occurred in 2012, and it appears that the worst is over.

Demand for flat glass in Western Europe will experience modest gains. A slow growing population, combined with a stagnant motor vehicle industry, will limit growth. A number of float glass plants in the region closed in 2012, suggesting that major glassmakers are shifting focus elsewhere.

Energy efficient products to benefit fabricated glass

Fabricated flat glass demand will benefit from rapid growth in sales of energy efficient products such as solar control, insulation, and low-E glass. The solar energy market, which was hurt by recent global economic weaknesses, will take off briskly once again. It should be noted, however, that demand for flat glass used in solar energy applications totaled just around 120 million square meters in 2011, so this is a niche market.

Production of flat glass is projected to reach 75.4 million metric tons in 2016, of which close to 70 million metric tons will be high-quality float glass. The remainder will consist of low-quality float glass produced primarily in China, as well as sheet glass and rolled glass.
ASIA/PACIFIC

India: Flat Glass Demand by Market

Despite having already multiplied fourfold between 2001 and 2011, India’s market for fabricated flat glass is projected to grow nearly 12 percent per year through 2016. The country’s massive rural population will continue to urbanize, while the existing urban population will increasingly be able to afford larger residences, cars, electronics, and other glass-consuming products.

Architectural glass sales in India are projected to advance 11.7 percent per year through 2016 to $1.5 billion, fueled by a healthy building construction fixed investment environment. Demand for glass in residential structures will benefit from efforts by the government to alleviate India’s acute housing shortage, as well as rising incomes among the country’s rapidly expanding middle and working classes. Demand for glass in commercial structures will benefit from the rapid industrialization occurring throughout India. The replacement of basic float glass with higher-value tempered, laminated, and insulated glass products will also accelerate.

Demand for automotive glass is projected to advance nearly 12 percent per year to $1.1 billion in 2016. Besides benefiting from a booming auto industry, the shift to higher-value glass in vehicles will promote value gains. The greater development of an automotive replacement glass market in India has been hindered by the country’s low vehicle utilization rates, which stood at just 19 vehicles per thousand persons in 2011, among the lowest levels in the world. Nonetheless, vehicle sales in the country have expanded substantially over the past decade, resulting in a significant replacement market for windshields and side windows. Unlike China, India has not become a global manufacturing hub, despite its similarly low-cost abundant labor supply. Consequently, demand for glass from other markets in India is limited by local market conditions.

### TABLE VII-10

**INDIA: FLAT GLASS DEMAND BY MARKET**

<table>
<thead>
<tr>
<th>Item</th>
<th>2001</th>
<th>2006</th>
<th>2011</th>
<th>2016</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Construction Expend (bil 2010$)</td>
<td>210.5</td>
<td>361.7</td>
<td>512.5</td>
<td>737.0</td>
<td>1037.0</td>
</tr>
<tr>
<td>$ bldg constr glass/000$ bldg constr</td>
<td>1.0</td>
<td>1.3</td>
<td>1.7</td>
<td>2.1</td>
<td>2.5</td>
</tr>
<tr>
<td>Motor Vehicle Production (000 units)</td>
<td>850</td>
<td>1960</td>
<td>3935</td>
<td>5970</td>
<td>8840</td>
</tr>
<tr>
<td>$ MV glass/motor vehicle</td>
<td>124</td>
<td>143</td>
<td>164</td>
<td>189</td>
<td>217</td>
</tr>
<tr>
<td>Manufacturing Value Added (bil 2010$)</td>
<td>280</td>
<td>428</td>
<td>610</td>
<td>900</td>
<td>1280</td>
</tr>
<tr>
<td>$ other flat glass/000$ MVA</td>
<td>0.54</td>
<td>0.61</td>
<td>0.70</td>
<td>0.81</td>
<td>0.93</td>
</tr>
<tr>
<td>Fabricated Flat Glass Demand (mil $)</td>
<td>465</td>
<td>1020</td>
<td>1950</td>
<td>3390</td>
<td>5690</td>
</tr>
<tr>
<td>Building Construction</td>
<td>210</td>
<td>480</td>
<td>880</td>
<td>1530</td>
<td>2580</td>
</tr>
<tr>
<td>Motor Vehicle</td>
<td>105</td>
<td>280</td>
<td>645</td>
<td>1130</td>
<td>1920</td>
</tr>
<tr>
<td>Other Markets</td>
<td>150</td>
<td>260</td>
<td>425</td>
<td>730</td>
<td>1190</td>
</tr>
<tr>
<td>$ fabricated/square meter</td>
<td>4.7</td>
<td>5.8</td>
<td>7.2</td>
<td>8.2</td>
<td>9.6</td>
</tr>
</tbody>
</table>

**CHART IX-1**

**WORLD FLAT GLASS MARKET SHARE**

($58.6 billion, 2011)

Other 56.9%
Sample Profile, Table & Forecast

COMPANY PROFILES

Euroglas GmbH
Dammühlten weg 60
39340 Haldensleben
Germany
49-3904-638-0
http://www.euroglas.com

Annual Sales: $100 million (estimated)
Employment: 920 (as reported by company, 6/12)

Key Products: float, laminated safety, coated solar control, antireflection, and fire resistant glass

Euroglas is a manufacturer of float and other glass products. The Company is owned by Glas Trösch Holding AG (Switzerland).

Euroglas is involved in the world flat glass industry via the production of float, laminated safety, coated solar control, antireflection, and fire resistant glass. The Company’s float glass is sold under the EUROFLOAT and EUROWHITE brand names. EUROFLOAT is available in thicknesses of three to 12 millimeters (mm) and EUROWHITE is an extra white variety that provides high transparency in decorative and photovoltaic end uses. The Company produces laminated safety glass under the EUROLAMEX brand name. This glass features a polyvinyl butyral interlayer between two glass panes and is used in residential building applications.

Coated solar control glass produced by Euroglas comprises the SILVERSTAR product line. Specifically, Euroglas manufactures the SILVERSTAR COMBI high performance types that feature super thin coatings to reduce solar energy transmittance while providing high light transmission; SILVERSTAR SUNSTOP T temperable glass; and

TABLE VII-9

INDIA:
FLAT GLASS SUPPLY & DEMAND

<table>
<thead>
<tr>
<th>Item</th>
<th>2001</th>
<th>2006</th>
<th>2011</th>
<th>2016</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (million persons)</td>
<td>1046</td>
<td>1130</td>
<td>1212</td>
<td>1291</td>
<td>1368</td>
</tr>
<tr>
<td>GDP per capita</td>
<td>1990</td>
<td>2640</td>
<td>3630</td>
<td>4880</td>
<td>6440</td>
</tr>
<tr>
<td>Gross Domestic Product (bil 2010$)</td>
<td>2078</td>
<td>2982</td>
<td>4404</td>
<td>6295</td>
<td>8810</td>
</tr>
<tr>
<td>square meters flat glass/capita</td>
<td>0.10</td>
<td>0.15</td>
<td>0.22</td>
<td>0.32</td>
<td>0.43</td>
</tr>
<tr>
<td>square meters flat glass/mil $ GDP</td>
<td>48.1</td>
<td>58.7</td>
<td>61.3</td>
<td>65.9</td>
<td>67.5</td>
</tr>
<tr>
<td>Flat Glass Demand (mil square meters)</td>
<td>100</td>
<td>175</td>
<td>270</td>
<td>415</td>
<td>595</td>
</tr>
<tr>
<td>net exports</td>
<td>-15</td>
<td>-45</td>
<td>-50</td>
<td>-75</td>
<td>-85</td>
</tr>
<tr>
<td>Flat Glass Production (mil square meters)</td>
<td>85</td>
<td>130</td>
<td>220</td>
<td>340</td>
<td>510</td>
</tr>
<tr>
<td>square meters/metric ton</td>
<td>106</td>
<td>110</td>
<td>118</td>
<td>121</td>
<td>122</td>
</tr>
<tr>
<td>Flat Glass Production (000 metric tons)</td>
<td>800</td>
<td>1180</td>
<td>1860</td>
<td>2800</td>
<td>4180</td>
</tr>
</tbody>
</table>

“Demand for flat glass in India totaled 270 million square meters in 2011, which represented per capita demand of just 0.22 square meters. This level is among the lowest in the world, and reflects India’s underdeveloped economy and low per capita income rates in spite of over a decade of robust economic growth. While flat glass demand in India continues to rise at rates well in excess of the global average, the country’s flat glass market will remain underdeveloped by global standards over the short term. Moreover, …”

--Section VII, pg. 149
**Orders Outside of the US**

Checks must be made payable in US funds, drawn against a US bank and mailed directly to The Freedonia Group. For wire transfers please contact our customer service department at info@freedoniagroup.com. Credit cards accepted.

**Credit Card Orders**

For convenience, Freedonia accepts American Express, MasterCard or Visa. Credit card purchases must include account number, expiration date and authorized signature.

**Save 15%**

If you order three (3) different titles at the same time, you can receive a 15% discount. If your order is accompanied by a check or wire transfer, you may take a 5% cash discount (discounts do not apply to Corporate Use Licenses).

---

**Corporate Use License**

Now every decision maker in your organization can act on the key intelligence found in all Freedonia studies. For an additional $2600, companies receive unlimited use of an electronic version (PDF) of the study. Place it on your intranet, e-mail it to coworkers around the world, or print it as many times as you like.

---

**Order Form**

**World Flat Glass** ............................................................ $6400

☐ Corporate Use License (add to study price) * + $2600

☐ Enclosed is my check (5% discount) drawn on a US bank and payable to The Freedonia Group, Inc., in US funds (Ohio residents add 7.75% sales tax)

☐ Bill my company ☐ American Express ☐ MasterCard ☐ Visa

MM YY

☐ Additional Print Copies @ $600 each *

Total (including selected option) $______

Street (No PO Box please)

City/State/Zip

Country

Phone ☐ Fax

Email

**Individual Use License Agreement**

The undersigned hereby represents that the above captioned study will be used by only __individual(s) who are employees of the company and that the study will not be loaded on a network for multiple users. In the event that usage of the study changes, the Company will promptly notify Freedonia of such change and will pay to Freedonia the appropriate fee based on Freedonia’s standard fee schedule then in effect. Note: Entire company corporate use license, add $2600; one additional user, add $600; two additional users, add $1200; three additional users, add $1800.

---

Signature

**Corporate Use License Agreement**

The above captioned study may be stored on the company’s intranet or shared directory, available to company employees. Copies of the study may be made, but the undersigned represents that distribution of the study will be limited to employees of the company.

Signature

---

The Freedonia Group, Inc. 767 Beta Drive • Cleveland, OH • 44143-2326 • USA • Web site: www.freedoniagroup.com

Tel US: 800.927.5900 or +1 440.684.9600 • Fax: +1 440.646.0484 • e-mail: info@freedoniagroup.com

Page 7
INDUSTRY MARKET RESEARCH FOR BUSINESS LEADERS, STRATEGISTS, DECISION MAKERS

About The Freedonia Group

The Freedonia Group, Inc., is a leading international industry market research company that provides its clients with information and analysis needed to make informed strategic decisions for their businesses. Studies help clients identify business opportunities, develop strategies, make investment decisions and evaluate opportunities and threats. Freedonia research is designed to deliver unbiased views and reliable outlooks to assist clients in making the right decisions. Freedonia capitalizes on the resources of its proprietary in-house research team of experienced economists, professional analysts, industry researchers and editorial groups. Freedonia covers a diverse group of industries throughout the United States, the emerging China market, and other world markets. Industries analyzed by Freedonia include:

- Chemicals
- Plastics
- Life Sciences
- Packaging
- Building Materials
- Security & Electronics
- Industrial Components & Equipment
- Automotive & Transportation Equipment
- Household Goods
- Energy/Power Equipment

Freedonia Custom Research

Freedonia Custom Research delivers the same high quality, thorough and unbiased assessment of an industry or market as an industry study. Since the research initiative is based upon a company’s specific needs, companies harness Freedonia’s research capabilities and resources to answer unique questions. When you leverage the results of a Freedonia Custom Research engagement, you are able to obtain important answers to specific questions and issues associated with: mergers and acquisitions, new product launches/development, geographic expansion, entry into new markets, strategic business planning, and investment and funding decisions.

Freedonia Custom Research is ideal for companies seeking to make a strategic difference in the status quo and focus on future business growth. Working side by side with clients, Freedonia’s team is able to define a research project that is custom-tailored to answer specific questions and provide the basis from which a company can make informed business decisions.

Click here to learn more about Freedonia

Click here to learn more about Custom Research

Click here for complete title list

Click here to visit freedoniagroup.com