AGC Asahi Glass
Solutions for Energy Conservation and Creation

October 30, 2013

Shuichiro Sugimoto
Environment & Chemical safety
CSR office
AGC Asahi Glass Co., LTD.
1. Corporate overview
2. Introduction of Products for energy solution
   ✓ Architectural Energy Saving Glass
   ✓ Glass Integrated Photo Voltaic
   ✓ Cool roof(SUNBARRIER™)
   ✓ Cool Pavement(TOUGH COORE™)
3. Contact person
### Corporate Data

**As of the end of December 2012**

- **Name**: Asahi Glass Co., Ltd.
  (Global brand: AGC)
- **Head Office**: 1-5-1, Marunouchi, Chiyoda-ku, Tokyo 100-8405 JAPAN
- **Founded**: September 8, 1907
- **Incorporated**: June 1, 1950
- **Capital**: 90,873 million yen
- **Outstanding stock**: 1,186,705,905 shares
- **Employees**: 49,961 (consolidated), 6,374 (non-consolidated)
- **Consolidated Group companies**: 202 (165 overseas)

### Sales and Sales Ratio by Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Net sales (billion yen)</th>
<th>Sales Ratio (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>83.6</td>
<td>7%</td>
</tr>
<tr>
<td>Europe</td>
<td>229.0</td>
<td>19%</td>
</tr>
<tr>
<td>Japan/Asia</td>
<td>911.1</td>
<td>74%</td>
</tr>
</tbody>
</table>
AGC belongs to MITSUBISHI Group

Foundation

1st Mitsubishi president
Mr. Yataro Iwasaki

2nd Mitsubishi president
Mr. Yanosuke Iwasaki

September 8th, 1907
AsahiGlass

Mr. Toshiya Iwasaki

AGC

Chemical/materials

Banking

Trading

Mitsubishi Corporation

Mitsubishi Heavy Industries

Mitsubishi Electronic Corp.

Automotive

Electronics

Other B2C companies

- Nikon (Precision Machinery)
- Kirin Holdings (Food)
- Nihon Yusen (Logistics)
- Nippon Oil corp. (Oil)
- Tokio Marine (Insurance)
- Other 18 companies
AGC Group (Net sales 1,190.0 billion yen, Operating Income 92.9 billion yen)

**Glass**
Sales 564.6 bn yen (47%)
OP ▲4.0 bn yen

- Float flat glass
- Figured glass, Polished wired glass
- Low-E glass
- Fabricated glass for architectural use (Heat Insulating/shielding glass, Safety glass, Fire-resistant glass, Security glass)
- Glass for solar power system
- Fabricated glass for industrial use
- Decorative glass, etc.

**Electronics**
Sales 344.1 bn yen (29%)
OP 81.3 bn yen

- Glass substrate for display devices
- Specialty glass for display applications
- Display related materials

**Chemicals**
Sales 257.3 bn yen (21%)
OP 14.5 bn yen

- Fluorinated resins
- Water and oil repellents
- Pharmaceutical and agrochemical intermediates
- Iodine-related materials
- Battery materials

**Ceramics/Other**
Sales 87.0 bn yen (3%)
OP 1.5 bn yen

- Ceramic products
- Logistics and financial services, etc.

※ Sales composition is calculated without inter-segment sales/transfers.
※ Sales and operating income by segment are before eliminations; therefore, the total amounts of sales and operating income for geographic areas do not agree with total sales and operating income of the AGC Group.
Market Position in Global

Flat Glass

No. 1 **AGC** Group
No. 1 Saint-Gobain + Central Glass
No. 1 Nippon Sheet Glass Group
No. 4 Guardian

**65%**

*Exclude China*

Automotive Glass

No. 1 **AGC** Group
No. 1 Saint-Gobain + Central Glass
No. 1 Nippon Sheet Glass Group

**65%**

Glass Substrate for TFT-LCD

No. 1 Corning
No. 2 **AGC** Group
No. 3 Nippon Electric Glass

Glass Substrate for PDP

No. 1 **AGC** Group
No. 2 Nippon Electric Glass

※FY2012 company estimates
Global Operation

Results of FY2012

Net sales: 1,190.0 billion yen  OP: 92.9 billion yen  Group Employees: 50,000

The Americas
Sales: 83.6 bn yen (6%)
OP: ▲3.7 bn yen
Employees: 3,900
-Flat Glass
-Automotive Glass
-Electronic Materials
-Chemicals

Europe
Sales: 229.0 bn yen (19%)
OP: ▲5.4 bn yen
Employees: 14,900
-Flat Glass
-Automotive Glass

Japan / Asia
Sales: 911.1 bn yen (75%)
OP: 133.9 bn yen
Employees: 31,100
-Flat Glass
-Automotive Glass
-Display Glass
-Electronic Materials
-Chemicals
-Ceramics

※Sales composition is calculated without inter-segment sales/transfers.
※Sales and operating income by region are before eliminations and cross regional expenses, therefore, the total amounts of sales and operating income for business segments do not agree with total sales and operating income of the AGC Group.
1907 Asahi Glass Co., Ltd. established

Europe & America

Europe & America

Entry into Asia through JV

Expansion into Europe & America

Globalization

2013 Start flat/automotive glass operation in Brazil

2006 Started AGC Automotive Hungary

2005 Started Glaverbel Klin (Russia)

2002 Wholly owned Glaverbel through TOB

1999 Acquired ICI's PTFE business in the USA and UK

1998 Glaverbel acquired PPG's flat glass operation in Europe

1997 Glaverbel acquired Bor Glassworks (Russia)

1992 Acquired AFG Industries (USA)

1991 Glaverbel acquired Glavunion (Czech)

1985 Established AP Technoglass (USA)

1981 Invested in Glaverbel (Belgium) and Maas Glass (Netherlands) --- entry into Europe

1974 Established Thai Safety Glass (Thailand)

1972 Established Asahimas Flat Glass (Indonesia)

1965 Established THASCO Chemical (Thailand)

1964 Established Thai Asahi Glass

1956 Established The Indo-Asahi Glass (India)

2001 Asahi Glass Philippines Inc. (Philippines)

2000 Established Asahi Glass Fine Techno (Taiwan) and wholly owned the 3 Thai affiliates

1995 Established Qinhuangdao Haiyan Safety Glass (China) and started producing automotive glass in China

1992 Established Dalian Float Glass (full-scale entry into China)

1998 Glaverbel acquired PPG's flat glass operation in Europe

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2004 Established Asahi Glass Fine Techno Korea (South Korea)

2003 Established Hanwook Techno Glass (S. Korea)

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A New Mid-Term Management Plan

Projected Sales Ratio in 2015

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<thead>
<tr>
<th></th>
<th>2009</th>
<th>2012</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio of sales in emerging markets</td>
<td>14%</td>
<td>20%</td>
<td>25%</td>
<td>30%</td>
</tr>
<tr>
<td>Ratio of environment-related sales</td>
<td>13%</td>
<td>17%</td>
<td>19%</td>
<td>30%</td>
</tr>
<tr>
<td>Ratio of sales of new products</td>
<td>4%</td>
<td>11%</td>
<td>18%</td>
<td>30%</td>
</tr>
</tbody>
</table>
Solutions for Building and Construction

Existing sash

Existing glass

GIPV

Glass X Chemicals X Ceramics = Variety of solutions

ATTOCH

11

Architectural glass

ETFE Film
(Tetra fluoroethylene - ethylene copolymer)

Fluoropolymer resin for coating

Ceramic color aggregate
Solution for Saving Energy & Creating Energy

- Architectural Energy Saving Glass (Low-E Double Glazing)
- GIPV
- Cool roof
- Cool pavement
Energy Consumption in the world

Energy Consumption in the Buildings

About 30% by air-conditioners

http://www.eccj.or.jp/office_bldg/01.html
Single glazing windows in warm area

Source: Japan Construction Material & Housing Equipment Industries Federation
In warm/hot regions:

In summer, effectively shields solar radiation and heat from the outside (solar control effect), reducing air conditioning use.

Half cut of heat by Sun shine

1/2 Heat gain

<Single Glazing>  <Low-E Double Glazing>

http://www.ecoglass.jp/s_about/can.html
Glass Integrated Photo Voltaiс

Shade

Wall

Roof
High performance Fluoropolymer resin for coating
Bonnfleon Sunbarrier™

Sun heat reflection

Before

Reflection 18%
Absorption 82%

After

Reflection 60%
Absorption 40%
Example of collective housing

屋上表面の対策箇所と未対策箇所の温度測定

マンション屋上に
「ポンフロン サンバリア®」を
施工（RC造7階建て）
色:N-7 グレー

検証結果

<table>
<thead>
<tr>
<th></th>
<th>AM6:00</th>
<th>PM2:00</th>
<th>ΔT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>24.2℃</td>
<td>54.2℃</td>
<td>30.0℃</td>
</tr>
<tr>
<td>After</td>
<td>25.6℃</td>
<td>43.8℃</td>
<td>18.2℃</td>
</tr>
</tbody>
</table>
Cool pavement

Source: Tokyo Metropolitan (Chuo-ku)
Ceramics (ZrO$_2$) are used as heat-blocking materials to enhance durability.
Effective of Cool pavement

http://www.coolhosouken.com/
Characteristics of TOUGH COORE: High Durability

Abrasions test

25% TOUGH COORE  Normal cool pavement
Introduction of Products for energy solution

- Architectural Energy Saving Glass (Low-e)
- Glass Integrated Photo Voltaic
- Cool roof (SUNBARRIER™)
- Cool Pavement (TOUGH COORE™)
• Name: Hiroyuki Hirai
• E-mail: hiroyuki-hirai@agc.com

Thank you for your attention.