

Rating Methodology by Sector

Glass

1. Business base

Glass is mainly categorized into architectural glass, automotive glass, and glass for displays. Because each product sector and each sales area features different market trends and business structures, it is important to understand the leading products and sales areas of the subject glass manufacturers.

(1) Characteristics of the industry

(i) Market overview

Architectural glass is principally used for residential houses, condominiums, commercial facilities, and offices. As a result, its demand is affected by trends in demand from the building market. The building market itself is highly susceptible to economic trends and policies. The building market in Japan and other advanced countries is mature, and so is unlikely to experience significant medium- to long-term growth. However, demand for architectural glass has been consistently strong in markets in Asia, Latin America, and other emerging economies, driven by rising populations and changes in housing conditions.

In automotive glass, because auto manufacturers in Japan enjoy strong global brands and sales capabilities, the export ratio of their products is high. As a result, compared to the market for architectural glass, the automotive glass market is not as heavily influenced by trends in the domestic economy. However, auto manufacturers in Japan have been gradually shifting their production overseas, driven by unfavorable costs and exchange rates. As a result, the automotive glass market in Japan is weakening. Globally, demand for automobiles in developed countries is mostly affected by economic trends and the level of replacement demand. On the other hand, demand for automobiles in emerging markets is strong, given the progress of motorization. Given trends in demand for automobiles in these countries, glass manufacturers are striving to adjust their production capacity in developed countries, while increasing it in emerging countries.

Glass for displays is used for liquid crystal displays, Organic EL panels as their main materials. Due to expansion of demand for smartphones and replacement demand for TVs along with trends toward larger models and improved qualities, the dimension-based market size has expanded. However, price-based market-size has shrunk since previous time as unit prices declined.

The market for solar energy glass has also expanded from a viewpoint of cutting down of greenhouse gas emissions recently. Demand for fiberglass, which is kneaded and mixed with resin to reduce weight and increase strength of automotive, has also expanded.

(ii) Competitive situation

Three major companies (AGC, Nippon Sheet Glass and Central Glass) account for almost 90% of the sheet glass market in Japan. However, as demand has weakened, competition is severe. Also facing severe price competition, these companies are struggling in a situation in which even the extra costs incurred from higher raw material and fuel prices cannot be transferred to product prices.

In the global sheet glass market, even though the top-ranked companies' market share is not large. It is assumed that a large number of Chinese manufactures account for more than half of the market share. Architectural glass, which account for majority of the market in terms of quantity, is manufactured primarily by many local manufacturers, and sales competition is severe. General-purpose products tend to face severe price competition; large manufacturers have been increasing the share of value-added products in their product lineups.

The global glass market for liquid crystal displays is an oligopoly, dominated by three large companies (Corning Group, AGC and Nippon Electric Glass). Due to improved production efficiency, volume of supply has increased; thereby the situation continues that supply and demand likely become out of balance.

(iii) Cost structure

Glass production involves two main steps: the furnace step (heat melting) and the processing step (shaping). Because it is difficult to make production adjustments once furnace processing has started, the manufacturers are required to secure customers, processing plants, and other steady consumers.

Being an apparatus industry, the burden of fixed costs, such as depreciation and amortization, is significant. With respect to the costs of raw materials and fuels, the effects of fuel costs, particularly prices of heavy oil, are noticeable. Transferring higher costs to product prices is not straightforward, as the industry deals with many customers with a powerful ability to negotiate prices, such as major general construction companies and global auto manufacturers. Consequently, when energy costs surge, the industry's earnings are often suppressed.

(2) Important factors in market position and competitiveness

(i) Market position and sales areas

In the architectural glass market, because market trends differ in each country, it is important to identify the main sales areas of the subject companies for rating, and understand trends in demand for construction and price characteristics in the relevant sale areas.

In the automotive glass market, performance is affected by the sales abilities of customers, namely auto manufacturers. For this reason, we focus on the control of shares of customers in the market. In particular, because the auto market in emerging countries is expected to grow, we confirm whether or not the companies to be rated have operations and customers in these countries.

The market for glass used in liquid crystal displays, strengthening sales to China, where the largest demand, is important to maintain and increase the status in the market.

(ii) Technical strength

The technical strength creates an added value, and makes significant contributions to earnings. The key point in analyzing product lineups is the constitution ratio of high-value added products in the overall product lineups.

As general purpose architectural glass is often subject to price competition, manufacturers of architectural glass need to transform their operations to produce more technologically advanced, value-added products. The manufacturers are, in fact, striving to secure earnings by bolstering sales of value-added products, such as the Low-E (low reflective) glass and cover glass for photovoltaic generation.

Automotive glass has higher added value than architectural glass, because manufacturers are required to have sophisticated processing technologies to achieve a broad array of designs, in addition to ensuring product strength. Each glass used in the front, side, and rear of cars has different processing levels. Products with a high processing level, such as front glass, generate higher earnings. It is necessary to determine whether or not the companies to be rated are able to deal with diverse needs, mainly by examining transactions with auto manufacturers.

In the market for glass for liquid crystal displays, glass manufactures are also required high technical and development capabilities to meet diversification of panel types and technical advancement. Degree of responding to the trend toward thinner screen with high precision, etc. is important item to check as it will significantly influence the sales volume.

(iii) Production structure and streamlining capacity

It is difficult to flexibly stop and restart furnace processing, once it has started operating. While the manufacturers can secure steady production, it is difficult for them to adjust supply to meet demand in the short-term. As a result, they need to carefully make decisions on the closure or construction of plants by taking into account long-term demand. In areas and products whose markets are mature, we pay attention to the ability to reduce production levels. In areas or products that enjoy strong demand, in contrast, we focus on whether or not the companies to be rated are making appropriate capital investments in tandem with growth in the market, and whether they are effectively carrying out regular repairs and work to strengthen their production capacities.

(iv) Customers

Demand for automotive glass is influenced by the sales capabilities of customers, namely auto manufacturers. Therefore, transaction volumes with strong auto manufacturers are a key factor. It is also necessary to take into account the diversification of transactions from the perspective of risk

concentration. Sales areas of the relevant auto manufacturers are other important factors. In particular, because the automobile market in emerging countries is expected to grow going forward, we will monitor the development of operations and customers in these countries.

When analyzing glass for liquid crystal displays, once transactions start, the counterpart will likely become a stable customer due to liquid crystal displays' compatibility with glass. Yet, a company will also be susceptible to sales trend of the display manufacturer, to which the company sells glass. It is necessary to check the company's degree of diversification in its customer base as well as its customers' activities.

(v) Portfolio of businesses and areas

When analyzing glass manufacturers producing glass fiber, electronic components, chemical-related products, etc. other than sheet glass, it is important to pay attention to the earnings trends of other businesses. Because the earnings characteristics of architectural and automotive glass and glass for liquid crystal displays are all different, it is necessary to take into account the earnings structure of companies to be rated. In addition, if the subject companies have overseas operations, the earnings characteristics, and the weighting of each area will be confirmed. The portfolio of these businesses and areas are important preconditions for determining rates.

2. Financial base

(1) Earnings strength

Because the glass market is mature and sales growth is likely to be limited in Japan and other developed countries, it is essential for manufacturers to improve profitability. We monitor earnings improvement measures, such as the streamlining of production and the appropriate transfer of higher costs to product prices at times when prices of raw materials and fuels surge. Meanwhile, because demand for some value-added products including solar energy glass is increasing and markets in emerging countries are expected to grow, we will focus on investment trends and profit contribution of these businesses .

Key financial indicators:

- Operating income
- Operating income on sales
- ROA

(2) Cash flow

As an apparatus industry, the glass industry requires significant capital investment, exposed to a heavy burden of depreciation and amortization. There are certain cases when a high level of amortization of goodwill is recorded, as a result of M&A and other corporate activities. There are many

cases when the ability to generate cash flow is strong despite low profitability. However, the industry has relatively strong demand for financing, because reasonable investment will be needed to be made to maintain and update existing facilities, and capital investment in products and areas with growth potential in demand will continue to be needed in the future. We examine free cash flows of the subject companies to be rated, and confirm how they balance cutting interest-bearing debt as an initiative to improve their financial situation and make new capital investments to respond to strong demand.

Key financial indicators:

- EBITDA
- Ratio of interest-bearing debt to EBITDA

(3) Safety

Each company has different financial structures, because of their business portfolio, past M&A, and other factors. Therefore, it is important to focus on investments and financial policies that are based on each company's financial structure. We also closely examine the impact on the financial situation of each company over the medium to long term from the policies described above. When the level of interest-bearing debt is high, we confirm the situation of transactions with financial institutions and repayment schedules, among other matters. Moreover, because companies in the industry have a number of large-scale facilities, and opportunities for restructuring are constantly present, it is important to check the financial ability of the companies to absorb impairment and other extraordinary losses.

Key financial indicators:

- Shareholders' equity
- Debt equity ratio
- Equity ratio
- Interest coverage ratio

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