



Accounting for a
Sustainable Future™

APPLIANCE MANUFACTURING

Research Brief

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APPLIANCE MANUFACTURING

Research Brief

SASB's Industry Brief provides evidence for the disclosure topics in the Appliance Manufacturing industry. The brief opens with a summary of the industry, including relevant legislative and regulatory trends and sustainability risks and opportunities. Following this, evidence for each disclosure topic (in the categories of Environment, Social Capital, Human Capital, Business Model and Innovation, and Leadership and Governance) is presented. SASB's Industry Brief can be used to understand the data underlying SASB Sustainability Accounting Standards. For accounting metrics and disclosure guidance, please see SASB's Sustainability Accounting Standards. For information about the legal basis for SASB and SASB's standards development process, please see the Conceptual Framework.

SASB identifies the minimum set of disclosure topics likely to constitute material information for companies within a given industry. However, the final determination of materiality is the onus of the company.

Related Documents

- [Appliance Manufacturing Sustainability Accounting Standards](#)
- [Industry Working Group Participants](#)
- [SASB Conceptual Framework](#)

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SUSTAINABILITY DISCLOSURE TOPICS

SOCIAL CAPITAL

- Product Safety

BUSINESS MODEL AND INNOVATION

- Product Lifecycle Environmental Impacts

WATCH LIST

- Critical Materials for Electronics in Smart Appliances

INTRODUCTION

Household appliances have been a panacea for accomplishing chores with relative ease and speed. Major household appliances, like refrigerators, washing machines, and air conditioners are commonplace in developed economies. In developing economies, the growing middle class is feeding demand for appliances that used to be considered luxuries. Appliances are responsible for significant power and water consumption in homes; thus energy- and water-efficient appliances are helping to lower the carbon and water footprint of households.

Hand and power tools are routinely used in homes and are present in nearly every manufacturing industry. Much like appliances, these tools help users easily perform tasks that otherwise would be difficult or impossible. For both appliance and tool manufacturers, consumer safety is a priority. Product safety regulations govern what kinds of tools can be sold in different markets, and major recalls or known defects have the potential to damage brand reputation.

¹ Industry composition is based on the mapping of the Sustainable Industry Classification System (SICS™) to the Bloomberg Industry

Management (or mismanagement) of certain sustainability issues, therefore, has the potential to affect company valuation through impacts on profits, assets, liabilities, and cost of capital.

Investors would obtain a more holistic and comparable view of performance with appliance manufacturing companies reporting metrics on the material sustainability risks and opportunities that could affect value in the near- and long-term in their regulatory filings. This would include both positive and negative externalities, and the non-financial forms of capital that the industry relies on for value creation.

Specifically, performance on the following sustainability issues will drive competitiveness within the Appliance Manufacturing industry:

- Product safety, as it relates to customer demand, regulatory compliance, and product liabilities; and
- Innovation to manage product lifecycle impacts, as it relates to addressing a product's energy and water usage, as well as ease of recyclability. These actions are driven both by regulation and customer demand.

INDUSTRY SUMMARY

The Appliance Manufacturing industry includes two main segments: companies involved in the design and manufacturing of household appliances and those that design and manufacture hand tools.¹ Household appliances include products such as cooking appliances, refrigerators, and washing machines. Hand tools include items like chain saws, nail guns, drills, hammers, and screwdrivers, which are used both commercially and by hobbyists to manipulate

Classification System (BICS). A list of representative companies appears in Appendix I.

building materials. Hand tools are differentiated by whether they are mechanically or manually powered.

In 2014, the Appliance Manufacturing industry generated revenues of \$263 billion globally. The appliances segment earned \$213 billion in revenue, about four times the tools segment's \$50 billion.¹ Large representative companies headquartered and publicly traded in the U.S. include Whirlpool, Stanley Black & Decker, Snap-on, Blount International, and Libbey Inc. In 2014, these companies generated between \$820 million and \$20 billion in revenue.² Large electronics manufacturers such as Panasonic, LG, Mitsubishi, General Electric (GE), and Sharp generate significant revenues from their appliance segments.³

Companies in this industry typically sell their products through distribution channels into retail stores as well as through independent or company-owned dealers.⁴ A typical large company in this industry operates globally and generates revenue from multiple regions. For example, Whirlpool Corporation generates roughly 51 percent of its revenue from North America, 27 percent from Latin America, 18 percent from Europe, the Middle East, and Africa, and 5 percent from Asia.⁵ Stanley Black & Decker has a similar geographical segmentation. The company generates most of its revenue from North America (54 percent) and Europe (31 percent), followed by Asia (7 percent).⁶

For domestic appliance manufacturers, exports generally make up around 19 percent of industry revenue, with the majority of appliances shipped to Canada, Mexico, Saudi Arabia, and Germany. Revenue from exports is dependent on the strength of the U.S. dollar.⁷ However, in the domestic power tools segment, about 62 percent of revenue comes from exports, with extensive

sales to Canada and Mexico, as well as developing economies such as China.⁸

The Appliance Manufacturing industry is highly cyclical, and demand is largely depending on the overall health of the economy. Key drivers of financial performance in the appliance segment of the industry include new housing and business construction, disposable income, prices of raw materials, and product pricing.⁹ For power tools, innovation, investment, and disposable income drive demand. Innovation leads to more compact and efficient tools and investment drives construction activities.¹⁰

The industry earns relatively low profit margins. In 2014, the industry median gross margin was 33 percent, and net income margin was 5 percent.¹¹ For many large companies, margins have risen steadily since the recession of 2008. For example, Snap-on, a large toolmaker had net income margins of 5.5 percent in 2009; by fiscal year 2014, it had doubled to 12.1 percent.¹² Whirlpool Corporation generated net margins of 1.9 percent in 2009, and 3.3 percent in 2014.¹³

Domestically, purchases are the largest cost segment in this industry. Purchases consist mainly of raw materials and account for approximately half of revenue on average. Wage costs range from 10 percent of revenue for the appliances sector, which is only slightly below average for the manufacturing sector, to 20 percent for the power tools segment. Labor costs have been decreasing slightly, a trend that is expected to continue as certain manufacturing practices become more automated and more manufacturing is moved to places outside of the U.S., where costs are lower. Leading firms in this industry also spend 2 percent or more of revenues on research and development.¹⁴

Steel prices affect profitability and are especially important for both major segments of this

industry. Increases in steel prices are usually reflected in product prices, as manufacturers cannot afford to absorb the higher costs themselves.¹⁵ Aluminum is used in many products in the hand tools segment, while plastic material and resins are integral to household appliances.¹⁶

The market for appliances is highly competitive. According to Whirlpool, industry participants compete “upon a wide variety of factors, including selling price, product features and design, performance, innovation, energy efficiency, quality, cost, distribution and financial incentives.”¹⁷ Because many of these features, such as performance and quality, are hard to demonstrate to consumers, brand reputation is highly important in this industry. This makes major recalls or any other type of negative publicity especially harmful; consumers could change brand preferences, since many goods in this industry, like refrigerators, are relatively substitutable.¹⁸

Despite the competition, the appliance manufacturing segment is highly concentrated, with the top four companies that produce appliances—Whirlpool Corporation, AB Electrolux, GE, and LG Electronics—accounting for 80 percent of the U.S. market. The largest of these companies is Whirlpool, which represents more than 40 percent of the market.¹⁹ Domestic appliance manufacturers also face competition from foreign imports, particularly established brands like AB Electrolux, LG, Philips, and Siemens. Imports into the U.S. are growing as manufacturers are taking advantage of cheap labor outside the U.S. Imports now account for roughly 47 percent of all appliances sold in U.S. markets. Mexico is the largest exporter due to its proximity to the U.S. and its lower wages. Mexico, China, Korea, and Canada account for around 34 percent, 27 percent, 16 percent, and 7 percent of

total imports into the U.S., respectively.²⁰ Barriers to entry in the appliances segment remain relatively high as new entrants may struggle to build relationships with suppliers and retail outlets while lacking brand recognition.²¹

Since there is weak product differentiation, industry players focus on brand value, energy efficiency, and technological innovation.²² Therefore, new trends in innovation are re-shaping the competitive landscape for the household appliances segment. Part of this trend has included a move toward “smart appliances,” which can save consumers money on their energy bills by linking with the electricity grid so that appliances run more often during off-peak hours, when electricity is cheaper.²³ There is also a movement toward integrating computers and smartphones with appliances, increasing consumer convenience, as well as control over and knowledge of individual products’ energy use.²⁴

Analysts use traditional methods to value companies in the industry, such as ratios and discounted cash flow models. The most common ratios used are price to earnings, price to sales, enterprise value (EV) to sales, and EV to EBITDA[¶]. Company earnings are directly linked to the amount of product units they ship. To forecast earnings beyond the macroeconomic factors mentioned before, analysts also evaluate a company’s ability to innovate and deliver a product superior to their competitors. As utility costs increase over time, consumers will see an opportunity to derive cost savings from using energy and water efficient appliances. Therefore, companies that are able to develop household appliances that maximize user savings are likely to increase their sales, improve their cash flows, and

[¶] Earnings Before Interest, Tax, Depreciation, and Amortization

appear more favorable as an investment based on valuation models.²⁵

LEGISLATIVE AND REGULATORY TRENDS IN THE APPLIANCE MANUFACTURING INDUSTRY

Regulations in the U.S. and abroad represent the formal boundaries of companies' operations, and are often designed to address the social and environmental externalities that businesses can create. Beyond formal regulation, industry practices and self-regulatory efforts act as quasi-regulation and also form part of the social contract between business and society. In this section, SASB provides a brief summary of key regulations and legislative efforts related to this industry, focusing on social and environmental factors. SASB also describes self-regulatory efforts on the part of the industry, which could serve to pre-empt further regulation.^{III}

The regulatory environment surrounding the Appliance Manufacturing industry is evolving, particularly legislation and initiatives regarding use-phase water and energy efficiency and product recyclability. Product safety is a priority for industry players, who are involved in voluntary initiatives to ensure customer safety.

The Appliance Manufacturing industry must contend with government regulations around the world that deal with the use of ozone-depleting chemicals commonly used in refrigeration. The U.S. Environmental Protection Agency's (EPA) Significant New Alternative Policy (SNAP) was created to evaluate substitutes for, and eventually phase out, harmful ozone-depleting chemicals under provisions of the Clean Air Act (CAA). Section 612(c) of the CAA allows the EPA to

"identify and publish lists of acceptable and unacceptable substitutes for class I or class II ozone-depleting substances."²⁶

The Montreal Protocol, a binding international agreement, was established in 1987 to phase out chlorofluorocarbons (CFCs), and hydrochlorofluorocarbons (HCFCs).²⁷ Hydrofluorocarbons (HFCs) were used to replace CFCs and HCFCs.²⁸ By 2030, all production, consumption, and importation of HCFCs will have ended, while the CFC phase-out was complete as of 1996.²⁹ Companies have already begun phasing out HCFCs,³⁰ and management of the refrigerant is now more a matter of proper recycling and disposal.

Through the Responsible Appliance Disposal (RAD) program, the EPA serves as a technical clearinghouse on all matters related to the safe disposal of appliances.³¹ Safe disposal of appliances is required by law, and involves the recovery of all refrigerant prior to dismantling or disposal. It also requires universal waste (e.g., mercury), used oil, and PCBs^{IV} be properly managed and stored.³² RAD partners include utilities, retailers, local governments, and manufacturers. These entities enable and encourage customers to safely dispose of old appliances³³ and can benefit from increased sales (manufacturers) and better energy management (utilities).

In the U.S., Extended Producer Responsibility (EPR) laws are mostly enacted at the local or state level. These laws move some of the responsibility for recycling goods from consumers and governmental agencies to the producer of the good. Some states are considering legislation that would make appliance manufacturers responsible for the end-of-life disposal of large appliances

^{III} This section does not purport to contain a comprehensive review of all regulations related to this industry, but is intended to

highlight some ways in which regulatory trends are impacting the industry.

^{IV} Polychlorinated biphenyls

such as refrigerators, washing machines, and dishwashers, policies similar to E.U. Waste Electrical and Electronic Equipment (WEEE) legislation.³⁴ In July 2014, New York City passed the first—and currently only—U.S. appliance EPR law addressing refrigerant-containing appliances. Both the refrigerant and appliance must be properly recycled or disposed of to ensure that the refrigerant is not released into the environment.³⁵ While the New York City ordinance is the only appliance-specific EPR law, there is precedent for the expansion of this type of legislation in the U.S., as EPR laws for electronic waste exist in many states.³⁶

New laws and regulations are encouraging the use and production of energy-efficient appliances. While companies in the industry must comply with regional environmental regulations, many voluntary standards are also setting industry benchmarks. In 2007, Congress passed the U.S. Energy Independence and Security Act, which set stricter energy standards for residential home appliances. In 2008, the Emergency Economic Stabilization Act allowed appliance manufacturers to receive tax credits for improving the energy efficiency of their washers, refrigerators, and dishwashers.³⁷ In the U.S., voluntary programs like the EPA's Energy Star are setting standards and driving demand for energy-efficient products.³⁸ Between 2009 and 2012, the American Recovery and Reinvestment Act provided funds for state-based rebates, which were paid out to customers who purchased appliances that were Energy Star certified.³⁹

In addition to energy efficiency requirements, Energy Star also has minimum requirements for water efficiency.⁴⁰ Products can earn the Energy Star label by meeting the efficiency requirements set forth for individual product specifications, which are based on the following guiding principles: there should be significant contribution

to nationwide energy and water saving; efficiency claims must be verified through testing; price premium should be offset by savings in a reasonable amount of time; and there should be labeling to distinguish these products from others.⁴¹

Legislation related to energy-efficiency is also prevalent outside the U.S., and some regions have more stringent regulatory mandates for the sale of energy-efficient products. For example, the E.U.'s Ecodesign Directive, which covers major appliances, could affect sales by establishing minimum energy efficiency standards for products produced and marketed in the E.U.⁴² In Brazil, labels indicating energy efficiency that were initially voluntary are now mandatory.⁴³

Additionally, green building certifications like Leadership in Energy and Environmental Design (LEED)⁴⁴ and Building Research Establishment Environmental Assessment Methodology (BREEAM)⁴⁵ are driving demand for energy and water efficient appliances, since the appliances contribute to the overall energy and water use in buildings.

Because these legislative reforms and voluntary standards drive customer demand or otherwise provide incentives to companies, the industry has begun to focus its product innovation on improving the energy and water efficiency of major home appliances.⁴⁶

The industry is forward-looking and uses many voluntary standards, including those created by the Association of Home Appliance Manufacturers (AHAM). AHAM is actively involved in creating voluntary sustainability standards for products throughout all lifecycle phases.⁴⁷

As for product safety, the U.S. Consumer Product Safety Commission (CPSC), which was created in 1972 by the Consumer Product Safety Act (CPSA),

has the authority to recall products and ban products that its research finds to be dangerous.⁴⁸ The CPSC collaborates with voluntary standards organizations to develop safety standards for many household appliances, including clothes dryers, gas ranges, electric heaters, and mowers.⁴⁹ AHAM recommends that all appliances manufactured or marketed in the United States be submitted to an appropriate independent testing laboratory to ensure that they conform to domestic safety standards.⁵⁰

Companies in the industry are subject to various safety standards in the many markets in which they operate. Countries usually have their own consumer safety authorities, for example, the Netherlands Food and Consumer Product Safety Authority⁵¹ and the Irish Competition and Consumer Protection Commission.⁵² Certifications like the EU's CE mark, which ensures that a given product has met all E.U. health, safety, and environmental requirements, is required for certain products, including appliances and tools. Once a product has earned the CE mark, it can be freely transported and sold within the E.U.⁵³

In the U.S., appliance manufacturers are also subject to the conflict minerals disclosure regulation instituted by the Dodd-Frank Wall Street Reform and Consumer Protection Act.⁵⁴ Under the Dodd-Frank Act, companies are required to publicly disclose their use of "conflict minerals" if those materials are "necessary to the functionality or production of a product" that the company manufactures, or contracts to be manufactured. These minerals include tantalum, tin, gold, and tungsten originating in the Democratic Republic of Congo or neighboring countries.⁵⁵

SUSTAINABILITY-RELATED RISKS AND OPPORTUNITIES

Industry drivers and recent regulations suggest that traditional value drivers will continue to impact financial performance. However, intangible assets such as social, human, and environmental capitals, company leadership and governance, and the company's ability to innovate to address these issues are likely to increasingly contribute to financial and business value.

Broad industry trends and characteristics are driving the importance of sustainability performance in the Appliance Manufacturing industry:

- **Resource efficiency in product lifecycles:** The industry is increasingly addressing the environmental externalities of its products' lifecycles through business model innovation, and by integrating energy and water efficiency and end-of-life treatment and recycling into the design process. Customer demand, regulation, and company sustainability agendas are driving the focus on resource efficiency.
- **Managing social externalities:** As a consumer-facing industry, and with every household having a number of appliances and hand tools, product safety is of utmost importance. Products with potential hazards can present risk of serious injury, death, or property damage for customers, leading to liability and reputation harm for brands.

As described above, the regulatory and legislative environment surrounding the Appliance Manufacturing industry emphasizes the importance of sustainability management and performance. Specifically, recent trends suggest a

regulatory emphasis on resource efficiency and customer protection, which will serve to align the interests of society with those of investors.

The following section provides a brief description of each sustainability issue that is likely to have material financial implications for companies in the Appliance Manufacturing industry. This includes an explanation of how the issue could impact valuation and evidence of actual financial impact. Further information on the nature of the value impact, based on SASB's research and analysis, is provided in Appendix IIA and IIB.

Appendix IIA also provides a summary of the evidence of investor interest in the issues. This is based on a systematic analysis of companies' 10-K and 20-F filings, shareholder resolutions, and other public documents, which highlights the frequency with which each topic is discussed in these documents. The evidence of interest is also based on the results of consultation with experts participating in an industry working group (IWG) convened by SASB. The IWG results represent the perspective of a balanced group of stakeholders, including corporations, investors or market participants, and public interest intermediaries.

The industry-specific sustainability disclosure topics and metrics identified in this brief are the result of a year-long standards development process, which takes into account the aforementioned evidence of interest, evidence of financial impact discussed in detail in this brief, inputs from a 90-day public comment period, and additional inputs from conversations with industry or issue experts.

A summary of the recommended disclosure framework and accounting metrics appears in Appendix III. The complete SASB standards for the industry, including technical protocols, can be downloaded from www.sasb.org. Finally, Appendix IV provides an analysis of the quality of

current disclosure on these issues in SEC filings by the leading companies in the industry.

SOCIAL CAPITAL

Social capital relates to the perceived role of business in society, or the expectation of business contribution to society in return for its license to operate. It addresses the management of relationships with key outside stakeholders, such as customers, local communities, the public, and the government.

As household appliances and tools have become commonplace in homes around the globe, managing product safety is a priority for manufacturers. Appliance manufacturers aim to minimize risks to human health and property damage from the use of their products. Product malfunctions and large-scale safety recalls can affect a company's social license to operate, impact sales, and expose the company to potential legal liabilities.

Product Safety

Product safety is of utmost importance to appliance and tool manufacturers. When an appliance malfunctions, it can result in fires or other hazards that damage property and cause injury or even death. Every year, there are several instances of voluntary recalls due to safety hazards. The potential for product malfunction and its sometimes serious consequences opens up firms to risk related to litigation and negative consumer sentiment, which can affect brand value. Failure to report known product safety hazards to relevant authorities can result in civil penalties.

Companies that dedicate appropriate resources to quality control, testing, and product safety design can minimize the possibility of a product

malfunction or recall. Furthermore, companies that effectively address known hazards for products on the market can lower negative financial impacts. Company performance in this area can be analyzed in a cost-beneficial way through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Number of recalls and total units recalled; and
- Amount of legal and regulatory fines and settlements associated with product safety.

Evidence

According to CPSC data, major consumer appliances are responsible for more than 150,000 residential fires every year, which account for an estimated 3,670 injuries, 150 deaths, and more than \$547 million in property damage. While some of these incidents are due to consumer error, nearly half are the result of product malfunctions, according to a study by the product safety advocacy nonprofit Consumer Reports.⁵⁶ In the U.S., the CPSC's National Electronic Injury Surveillance System collects sample data of emergency room visits for injuries associated with consumer products. According to its 2014 estimates, accidents involving general household appliances resulted in 276,000 visits to the emergency room, and home workshop equipment and yard & garden equipment, which include many power and manual tools, led to 742,000 visits.^{v, 57} In Europe in 2011, there were 244 recalls of electrical appliances and tools. Seven percent of those recalls involved kitchen & cooking aids, 7 percent involved heating &

cooling appliances, and 1 percent involved Tools.⁵⁸

Product malfunctions have the potential to significantly harm industry manufacturers through recalls and product liability risks. In the U.S., there are several examples of large-scale recalls of appliances by major manufacturers. One of the largest recalls mentioned in the Consumer Reports study came in 2007, when GE recalled 2.5 million dishwashers linked with 191 reports of overheating and 12 fires that spread beyond the appliance.⁵⁹ In that recall, GE offered free in-home repair, or rebates of \$150 or \$300 for purchase of new GE dishwashers.⁶⁰ Even if consumers opted for repair, cheaper than the rebate at an estimated \$100,⁶¹ the cost of the recall could still be upwards of \$200 million,⁶² not to mention damage to GE's brand reputation.

Several companies recognize the risk and potential impacts of voluntary and mandatory recalls and product defects in their Form 10-K filings. For example, Jarden Corp. states in its FY2014 Form 10-K that "Any repurchase or recall of our products could be costly to us and could damage our reputation. If we were required to remove, or we voluntarily removed, our products from the market, our reputation could be tarnished and we might have large quantities of finished products that we could not sell."⁶³ Whirlpool states that "We are subject to the risk of exposure to product liability and product recall claims if any of our products are alleged to have resulted in injury to persons or damage to property. In the event that any of our products prove to be defective, we may need to recall and/or redesign such products."⁶⁴

In 2012, Harbor Freight Tools recalled its Cordless Drill over its tendency to overheat and cause

product groups, leading to some double counting in these estimates.

^v This is the sum of estimates for different product categories. The data system allows for reporting of up to two products for each person's injury, so a person's injury may be counted in two

minor injury to the user. The company recalled all 108,000 faulty drills that were sold between 2008 and 2012 and offered to replace them with new ones.⁶⁵ After 68 reports of burns and cuts from a potentially faulty handle, the CPSC issued a recall in 2012 for 159,000 Stanley Black & Decker coffeemakers. Consumers were offered a full refund of between \$50 and \$80 per coffeemaker.⁶⁶ Although the ultimate cost to the company is unknown, refunds likely totaled between \$8 and \$13 million,⁶⁷ a significant impact on company financial performance. In its FY2015 10-K, Stanley Black & Decker discloses that a “recall could increase costs and adversely impact the Company’s reputation.”⁶⁸

Between 2011 and 2014, Whirlpool faced more than 90 product liability lawsuits related to personal injury and damage to property.⁶⁹ Some of these suits have received class action status, and though Whirlpool states that these suits are without merit in the company’s FY2013 Form 10-K, it discloses that the company “cannot reasonably estimate a possible range of loss (...) the resolution of one or more of these matters could have a material adverse effect on our Consolidated Financial Statements.”⁷⁰ Tools manufacturers also face product liability lawsuits due to the dangerous nature their products. Although most personal injury lawsuits tend to be settled out of court,⁷¹ in 2010, a jury awarded \$1.5 million to a man who had lost his fingers in a table saw accident. The plaintiff accused the manufacturer of negligence for failing to include a flesh detection technology that would have prevented the injury.⁷² These examples highlight the potential risk to company value from actual or perceived defects in products that result in injury or property damage. Reputation for product quality and safety is therefore an important concern for companies in the industry.

U.S. federal law requires companies to immediately inform the CPSC about consumer products defects that present risk of serious injury or death. In July 2015, LG agreed to pay a maximum civil penalty of \$1.83 million to settle allegations that the company failed to promptly report known product safety hazards to the CPSC. The associated recall involved 795,000 humidifiers with a defect that could cause them to catch fire. By the time the humidifiers were recalled, the company was aware of 107 related incidents and \$7 million in property damage.⁷³

Within the first two quarters of 2015, two other major appliance manufacturers settled allegations of violating federal reporting requirements. Stanley Black & Decker agreed to pay \$1.6 million and maintain an internal compliance program to settle allegations of failure to report defective lawn mowers.⁷⁴ GE agreed to a \$3.5 million civil penalty settling charges that the company failed to report an unreasonable risk of serious injury from two models of ranges and various models of dishwashers.⁷⁵ Companies that are proactive in ensuring customer safety by effectively managing recalls and promptly reporting safety incidents to authorities can avoid frequent civil penalties.

Value Impact

Product malfunction concerns may lead to costly recalls, penalties, and litigation that can place a burden on company Selling, General, and Administrative (SG&A) resources. Frequent product malfunctions or recalls could impact a company’s cost structure over time. There may be additional research and development (R&D) expenditures to design products with reduced safety hazards. Companies that fail to notify the CPSC and other relevant authorities of known hazards may be required to implement additional compliance measures. Litigation and recalls can lead to increased contingent liabilities on a firm’s balance sheet, and also negatively affect a

company's brand value, which can ultimately harm revenue growth. As there is relatively low differentiation within many major product segments, a company's reputation for product safety is integral to maintaining or growing market share.

Number of recalls is proportional to amount of product liability and related costs. Preemptive or prompt recalls could indicate a conservative approach to limiting potential liability. Fines and settlements could be an indicator of governance concerns and high amounts could affect future cost of capital.

BUSINESS MODEL AND INNOVATION

This dimension of sustainability is concerned with the impact of environmental and social factors on innovation and business models. It addresses the integration of environmental and social factors in the value-creation process of companies, including resource efficiency and other innovation in the production process. It also includes product innovation and efficiency and responsibility in the design, use-phase, and disposal of products. It includes management of environmental and social impacts on tangible and financial assets—either a company's own or those it manages as the fiduciary for others.

Appliances and tools can have significant environmental impacts throughout their lifecycles, particularly in the use phase and end-of-life stage. New sustainability certifications and standards are driving companies to start addressing their products' lifecycle environmental performance, particularly in relation to energy and water consumption and end-of-life disposal practices. These actions can help the industry capture customer demand for sustainable products and comply with evolving disposal regulation.

Product Lifecycle Environmental Impacts

This issue involves a company's ability to design products that minimize environmental impacts during their use phase and at the end of life.

For the use phase, one main concern is energy efficiency of appliances, which can account for a significant proportion of a home's energy usage and utility bills. Increasing home energy use increases demand for electricity generation. Emissions attributed to electricity use in the residential sector account for a significant share of total GHG emissions in the economy.⁷⁶ As regulations related to GHG emissions and other sustainability factors begin to influence the operations of utilities, consumers are expected to face rising electricity prices.

Another focus of the use phase is water efficiency, which is of particular importance domestically in places like California that are experiencing droughts, and in other water-stressed countries such as China, where an extreme water shortage has led to political pressure to consider raising water prices.⁷⁷ Climate change is expected to exacerbate water stress in many regions of the world, increasing the importance of water efficiency and raising the likelihood of continued increases in water prices.

Products manufactured to recognized certifications like Energy Star can help to satisfy customers' desires for lower energy costs and reduced water consumption (assuming no "rebound effect" in usage), which can drive a company's competitive advantage. Firms that innovate to manufacture products that surpass established standards, further lowering a product's total cost of ownership for a consumer, can achieve greater product differentiation and potential market-share gains. As energy and

water prices continue to increase and impact utility bills, consumers will be turning to more efficient appliances to reduce costs.

Companies may be able to further reduce a product's lifecycle environmental impacts by using recycled or renewable materials that have a lower environmental impact than virgin materials, in the design and production stages, and by offering methods for appropriate disposal of old products.

Every year, a large volume of appliances is disposed of in the U.S. and other countries. Proper disposal of these appliances, particularly refrigerators and air conditioning units, is important in order to prevent the release of ozone-depleting substances and GHG, as well as other harmful substances such as PCBs and mercury. At a minimum, federal law in the U.S. requires the recovery of refrigerants prior to disposal or dismantling of products, as well as proper management of universal waste such as mercury, used oil, and PCBs. Many states have additional guidelines, including for the recycling of some appliance materials.⁷⁸

While appliance manufacturers in the U.S. are not currently affected by extended producer responsibility (EPR), they may face regulation in the future. In other markets such as the E.U., manufacturers are already responsible for product take-back under EPR laws. Take-back programs, as well as innovation at the design stage to manage appliance end-of-life effectively, can therefore help companies mitigate regulatory risk. These programs can also potentially provide companies with opportunities to improve revenues by establishing a relationship with their customers for the replacement of old appliances.

Company performance in this area can be analyzed in a cost-beneficial way through the following direct or indirect performance metrics

(see Appendix III for metrics with their full detail):

- Percentage of eligible products certified to an Energy Star standard;
- Percentage of eligible products certified to an AHAM sustainability standard; and
- Description of efforts to manage products' end-of-life impacts.

Evidence

Appliances account for a significant amount of home energy use: an average of about 13 percent in the U.S.⁷⁹ Appliances also account for a substantial amount of indoor water use. Washing machines, for example, account for 22 percent of indoor water use.⁸⁰ Installing water-efficient appliances could reduce annual water use by three trillion gallons.⁸¹

Increasing energy prices may noticeably impact household electricity bills, which, on average, amounted to \$111 per month in 2013.⁸² In the U.S., electricity bills represent approximately 2.5 percent of the median annual household income,⁸³ which was \$52,250 in 2013.⁸⁴ Using the EIA's 2014 *Annual Energy Outlook*, Bloomberg New Energy Finance forecasts that by 2035 retail electricity prices for residential use will increase from \$127 to \$142 per megawatt-hour.⁸⁵

Increased water stress can reduce the supply and elevate water prices. Water shortages are likely to increase in the future due to climate change. Increases in water prices will likely outpace those of electricity. Between 2010 and 2015, combined water, sewer, and storm water prices for households in 30 major U.S. cities increased by 41 percent. In April 2015, a monthly bill for a family of four using 100 gallons per person per day ranged from \$49 in Fresno, CA to \$326 in Atlanta, GA.⁸⁶

Energy- and water-efficient appliances may fulfill new demand as consumers replacing old appliances look to reduce their utility bills. According to an EPA study, nearly 91 percent of customer purchasing decisions for home appliances are influenced by certifications such as Energy Star.⁸⁷ This label is an effective marketing tool because it verifies the energy efficiency—and, in some cases, water efficiency—of products, serving as a point of product differentiation for consumers.

Ten percent of all refrigerators and freezers are secondary units, appliances that consumers have kept in addition to a more recent purchase. These often significantly older models are particularly inefficient, using an average of about 1,200 kilowatt-hours (kWh) per year with an average utility bill of \$120. Replacing them with newer models could save households \$70 per year.⁸⁸ Depending on the type of refrigerator, the savings could be significantly greater: An average 20-year-old 22 cubic feet side-by-side refrigerator uses approximately 1,620 kWh/year and costs \$227 in energy use, while its new counterpart consumes only 672 kWh/year and costs \$94 in utility bills.⁸⁹

High-efficiency washing machines can help consumers cut their water use significantly: They use only 18 to 25 gallons per load versus the 40 gallons used by traditional washers. As an average family uses approximately 66,000 gallons of water per year, high-efficiency washers significantly contribute to water conservation. Moreover, these washing machines also require 30 to 73 percent less detergent and use half the energy, providing more savings to consumers.⁹⁰

The EPA estimates that if all U.S. households installed water-efficient appliances, they would save more than three trillion gallons of water and more than \$18 billion dollars on utility bills per

year.⁹¹ Consumers that switch from a dishwasher made before 1994 to a new model certified to the minimum Energy Star standard would save \$40 a year, and an average of 1,300 gallons of water over the product's lifetime.⁹²

In addition to the cost savings generated by using energy- and water-efficient appliances, there are often regional rebates for purchasing certified products, which are offered through utility companies that partner with the Energy Star program. There are also schemes that offer free pickup of old appliances with the purchase of Energy Star goods, further incentivizing customers to buy new and more efficient appliances.⁹³

In certain regions, minimum efficiency standards—like the E.U.'s Ecodesign directive—can exclude non-compliant products from the market.⁹⁴ On the other hand, firms that invest in high-efficiency products can gain a competitive advantage by being first to market with the highest efficiency standard in a product class. The fact that these appliances are infrequently replaced helps make this advantage more pronounced. For example, in June of 2014, Whirlpool manufactured the first Energy Star clothes dryer.⁹⁵ The EPA's new Energy Star label for clothes dryers, announced in May 2014, recognizes a selection of dryers that use about 20 percent less energy than the 2015 minimum energy efficiency standards. This label could be an effective differentiator for these products, as dryers account for roughly six percent of total household energy use.⁹⁶

In an industry that has relatively little product differentiation, firms that have invested in developing water- and energy-efficient products will likely gain market share. The International Energy Agency predicts that energy efficiency markets will grow across regions in the medium term, principally driven by price and policy.

According to the agency's 2013 Energy Efficiency Market Report, new U.S. efficiency standards for appliances will lead to more than 80 terawatt-hours (TWh) of annual electricity savings by 2020.⁹⁷

Through the installation of energy- and water-efficient appliances, buildings can earn points toward LEED and Energy Star certifications. For example, the indoor water use credit, a prerequisite credit for obtaining LEED certification, stipulates that all residential clothes washers be certified as Energy Star or a performance equivalent.⁹⁸ According to homebuilder KB Home's sustainability report, in 2013 the company installed nearly 9,700 Energy Star-certified appliances at more than 7,100 new homes.⁹⁹ The market for residential green homes, many of which are LEED certified, is expected to experience a five-fold increase, from \$17 billion in 2011 to \$87-\$114 billion by 2016, 29 to 38 percent of the total market.¹⁰⁰ Appliance companies that can manufacture products that appeal to this emerging market can position themselves to gain market share and raise revenue.

Recently, a combined effort by the industry group AHAM, a standards-setting nonprofit called the CSA Group, and the safety-science company UL, came up with the first set of voluntary sustainability standards for household refrigeration appliances, household portable and floor care appliances, and household clothes-washing appliances.¹⁰¹ Manufacturers' use of these standards may not only aid their development of products with lower lifecycle environmental impacts, but also serve as a branding mechanism, signaling the positive impacts and potential cost savings of their products to retailers and consumers.

Lifecycle environmental impacts of appliances

include the leaching of harmful chemicals into the environment after disposal. Reuse or recycling of materials used in appliances can help reduce the need for virgin materials like steel and aluminum, thereby reducing upstream environmental and social impacts from mining. Various standards and regulations have emerged in different regions in order to address these impacts. In Whirlpool Corporation's FY 2013 10-K filing, the company stated that it is subject to various environmental standard including "mandated recycling of (...) products at the end of their useful lives. Compliance with these various standards, as they become effective, will require some product redesign." While Whirlpool states that the company is in compliance with current regulations, new regulations could lead to material impacts.¹⁰²

Large home appliances such as refrigerators, washing machines, and dishwashers are subject to the E.U.'s WEEE directive. Large household appliances make up more than 40 percent of total WEEE volume in the U.K. While these appliances are replaced infrequently, the products are quite bulky, containing more raw materials than goods in many other industries.¹⁰³

The WEEE directive makes product manufacturers responsible for financing end-of-life take-back programs. The directive aims to prevent harmful chemicals from entering the environment, as well as, to ensure collection and transportation of WEEE in a way that optimizes reuse and recycling of equipment or its components. Producers can choose to finance WEEE management either individually or in conjunction with other producers. Producers must be responsible for financing proper recycling of all products sold after 2005 and ensure that the cost does not fall on society or other producers. These products must be marked with a crossed-out garbage can to indicate that they should not be disposed of in

the normal waste stream.¹⁰⁴ As noted in the regulatory trends section, some end-of-life appliances are classified as hazardous or special waste—refrigerators, for example—as they contain ozone-depleting substances. Under WEEE, manufacturers responsible for disposing of these appliances must ensure their treatment at facilities authorized to accept hazardous waste.¹⁰⁵

In France, companies that fail to comply with WEEE regulations may be subject to penalties, including criminal fines of up to €450 per device. Fines may be levied for selling appliances without required marking and logos or failing to inform consumers of their plans for managing product end-of-life. Moreover, appliance manufacturers may be liable for up to €1,500 in fines per product for selling equipment not in compliance with material use requirements.¹⁰⁶

Regulation is the biggest driver of take-back and recycling programs and partnerships. Over time, though, it could also facilitate new revenue opportunities. Many of the goods in this industry are replaced infrequently, as large appliances last an average of 14 years.¹⁰⁷ But due to advancements in technology, they are far less efficient than newer models. Corporate programs that facilitate disposal of older appliances are integral to cutting down on use-phase environmental impacts, as well as generating demand for new products, which results in higher revenues.

Leading industry players are actively designing for recyclability and recoverability of components and raw materials. LG Electronics offers a customized e-waste take back and recycling service in countries with and without e-waste regulations. The company is working towards improving recyclability of its products at the design stage. While LG Electronics has not recognized the monetary benefits from collective recycling

schemes, the company continues to support Individual Producer Responsibility (IPR) for future wastes with the hope that technically and economically feasible solutions will become available in the near future.¹⁰⁸

There are cost-saving opportunities that come with recycling schemes as well: Large appliances are typically 60 percent steel and recycled steel is cheaper than virgin steel. So firms in this industry can lower their long-term costs by encouraging a higher level of appliance recycling.¹⁰⁹ Moreover, Morgan Stanley estimates a 29 percent increase in aluminum prices by 2018, as demand from industries like automobile manufacturing is likely to outstrip supply.¹¹⁰ Appliance manufacturers could work to increase recyclability through design improvements to ease disassembly, and set up take-back and recycling programs. This will better protect them from increasing or volatile raw materials prices. As noted in the Industry Summary, raw materials purchases are the main cost component for companies in this industry. These actions could ensure a more stable supply of these materials while providing significant environmental benefits. Recycling aluminum requires 95 percent less energy than producing it from virgin materials.¹¹¹

According to a 2013 survey by Bridgestone Americas and Bridgestone Retail Operations, consumers found large appliances to be the most difficult items to recycle, after mattresses. More than half of consumers stated that refrigerators, washers, dryers, stoves, and microwaves were either "difficult" or "very difficult" to recycle. This same survey found that 92 percent of respondents factored a manufacturer's operational sustainability or a product's sustainability attributes into their purchasing decisions.¹¹² Thus, firms have an opportunity to gain market share if they facilitate the take-back and recycling processes and take these concerns into consideration in the design and

manufacturing phase. For example, companies can improve the recyclability of components, and increase the amount of reused components and recycled materials.

According to the Steel Recycling Institute, in 2011, 90 percent of end-of-life appliances and more than 2.9 million net tons of steel were recycled in North America.¹¹³ While metal components of appliances have very high recycling rates, other materials, such as foam, often end up in landfills. GE has partnered with the U.S. EPA's Responsible Appliance Disposal (RAD) program to help develop more efficient recycling technologies, which can have impressive environmental benefits. The new technologies would allow recovery of approximately 95 percent of the insulating foam in refrigerators, reducing landfill waste. If all of the nine million refrigerators disposed of annually in the U.S. were recycled to these standards, it would achieve a reduction in CO₂ emissions equivalent to taking more than 2.4 million cars off the road.¹¹⁴ Successfully conveying these types of benefits may help encourage consumers to recycle their old products.

Value Impact

Obtaining or surpassing industry sustainability standards and certifications, particularly those related to energy and water efficiency, can help companies capture demand from sustainability- and cost-conscious consumers and provide a source of competitive advantage for industry leaders. These efforts can help to improve revenues in the medium to long term. Companies that are unable to keep pace with changing energy and water efficiency regulations could face a reduction of market share.

Additionally, addressing product end-of-life impacts can help firms in this industry comply with governmental take-back and disposal

regulations and help reduce the risk of fines or liabilities. Although such regulations could impose additional operating costs on companies in the near term, in the longer term, take-back programs can generate opportunities to build brand equity and facilitate new sales. Furthermore, take-back and recycling programs, and R&D expenditures to improve recyclability of appliances and their component materials, could help companies lower their cost structure and ensure a stable supply of inputs.

The probability and magnitude of these effects are likely to increase over time with higher energy and water costs, increasing resource scarcity, and growth in demand for sustainable products.

More certified products could indicate enhanced access to new markets and related revenue growth potential. Disclosure can provide insight into management's approach to managing product end-of-life and how well the company is positioned to deal with changing regulations.

SASB INDUSTRY WATCH LIST

The following section provides a brief description of sustainability disclosure topics that are not likely to constitute material information at present, but could be in the future.

Critical Materials for Electronics in Smart Appliances: Research suggests that the smart appliance industry could grow from a \$613 million dollar industry in 2012 to a \$35 billion-dollar industry in 2020.¹¹⁵ "Smart" appliances can communicate with the energy grid to help customers reduce their electricity bills by making products' use phases as energy-efficient as possible. However, the semiconductors required to make these goods, as well as materials used in other technologies like touch screens, which are increasingly used by the industry, often contain

rare earth or “conflict” minerals and metals. Such inputs are susceptible to supply chain disruptions and price increases or volatility due to sustainability and broader geopolitical factors (see SASB’s Semiconductors industry research brief). Companies with products containing such materials, particularly conflict minerals, are also susceptible to damage to brand reputation as well as regulatory risks associated with the Dodd-Frank Act. Annual growth in the home appliance semiconductor market doubled from 6.8 percent in 2012 to 12 percent in 2013. Global revenue for home appliance semiconductors reached an estimated \$2.6 billion in 2013 and it has been projected to hit to \$3.8 billion by 2017.¹¹⁶

Currently, purchases from semiconductors manufacturers account for 0.38 percent of Whirlpool’s costs of goods sold (COGS).¹¹⁷ As these technologies become more widespread, the industry will be more exposed to the increasing regulatory and input-pricing risks. In addition, the low substitution ratio¹¹⁸ of some necessary components for these smart devices could cause production shortages in the future.¹¹⁹

APPENDIX I

FIVE REPRESENTATIVE APPLIANCE MANUFACTURING COMPANIES^{vi}

| COMPANY NAME (TICKER SYMBOL) |
|------------------------------|
| Whirlpool Corporation (WHR) |
| Stanley Black & Decker (SWK) |
| Snap-On Inc. (SNA) |
| NACCO Industries (NC) |
| iRobot Corporation (IRBT) |

^{vi} This list includes five companies representative of the Appliance Manufacturing industry and its activities. This includes only companies for which the Appliance Manufacturing industry is the primary industry, companies that are U.S.-listed but are not primarily traded over the counter, and for which at least 20 percent of revenue is generated by activities in this industry, according to the latest information available on Bloomberg Professional Services. Retrieved on June 30, 2015.

APPENDIX IIA: Evidence for Sustainability Disclosure Topics

| Sustainability Disclosure Topics | EVIDENCE OF INTEREST | | | | EVIDENCE OF FINANCIAL IMPACT | | | | FORWARD-LOOKING IMPACT | | |
|---|----------------------|------|----------|------|------------------------------|---------------------|-----------------|------|-------------------------|---------------|-----|
| | HM (1-100) | IWGs | | EI | Revenue & Cost | Asset & Liabilities | Cost of Capital | EFI | Probability & Magnitude | Externalities | FLI |
| | | % | Priority | | | | | | | | |
| Product Safety | 20 | 100 | 1 | High | • | • | | High | | | No |
| Product Lifecycle Environmental Impacts | 65* | 93 | 2 | High | • | • | | High | • | • | Yes |

HM: Heat Map, a score out of 100 indicating the relative importance of the topic among SASB's initial list of 43 generic sustainability issues; asterisks indicate "top issues." The score is based on the frequency of relevant keywords in documents (i.e., 10-Ks, 20-Fs, shareholder resolutions, legal news, news articles, and corporate sustainability reports) that are available on the Bloomberg terminal for the industry's publicly-listed companies; issues for which keyword frequency is in the top quartile are "top issues."

IWGs: SASB Industry Working Groups

%: The percentage of IWG participants that found the disclosure topic to likely constitute material information for companies in the industry. (-) denotes that the issue was added after the IWG was convened.

Priority: Average ranking of the issue in terms of importance. One denotes the most important issue. (-) denotes that the issue was added after the IWG was convened.

EI: Evidence of Interest, a subjective assessment based on quantitative and qualitative findings.

EFI: Evidence of Financial Impact, a subjective assessment based on quantitative and qualitative findings.

FLI: Forward Looking Impact, a subjective assessment on the presence of a material forward-looking impact.

APPENDIX IIB: Evidence of Financial Impact for Sustainability Disclosure Topics

| Evidence of Financial Impact | REVENUE & EXPENSES | | | | | | | ASSETS & LIABILITIES | | | | RISK PROFILE | |
|---|--------------------|-------------|---------------|--------------------|-----|------------------------|-------------------------|----------------------|-------------------|-------------------------------------|-----------------------------|-----------------|--------------------------|
| | Revenue | | | Operating Expenses | | Non-operating Expenses | | Assets | | Liabilities | | Cost of Capital | Industry Divestment Risk |
| | Market Share | New Markets | Pricing Power | Cost of Revenue | R&D | CapEx | Extra-ordinary Expenses | Tangible Assets | Intangible Assets | Contingent Liabilities & Provisions | Pension & Other Liabilities | | |
| Product Safety | • | | | | • | | • | | • | • | | | |
| Product Lifecycle Environmental Impacts | • | • | • | • | • | | • | | • | | | | |

MEDIUM IMPACT
 HIGH IMPACT

APPENDIX III: Sustainability Accounting Metrics | Appliance Manufacturing

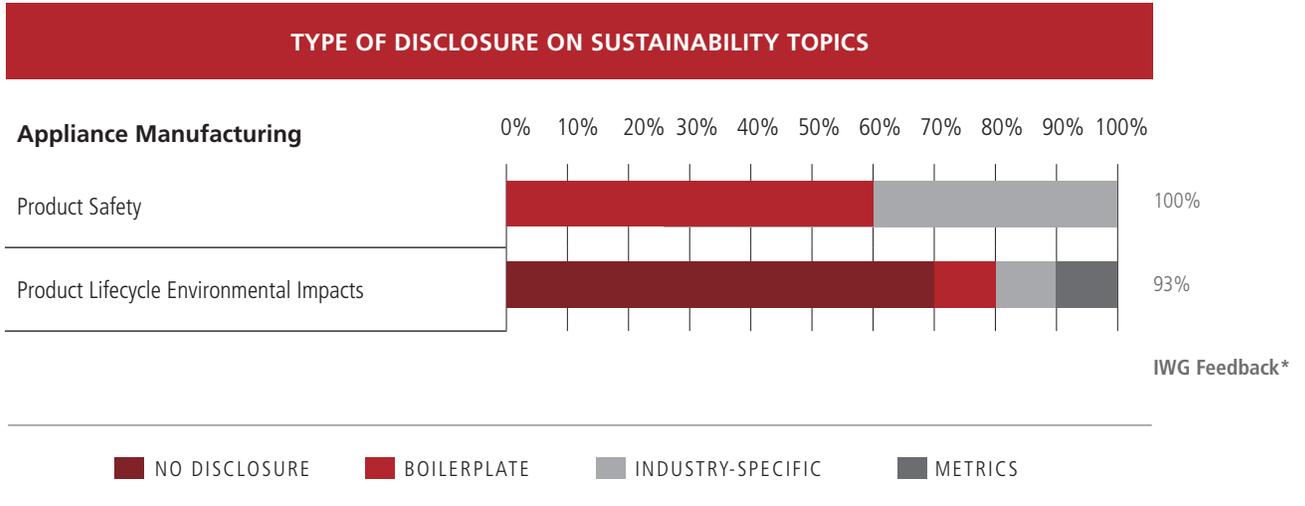
| TOPIC | ACCOUNTING METRIC | CATEGORY | UNIT OF MEASURE | CODE |
|---|--|-------------------------|---------------------------|-----------|
| Product Safety | Number of recalls and total units recalled* | Quantitative | Number | CN0601-01 |
| | Amount of legal and regulatory fines and settlements associated with product safety** | Quantitative | U.S. Dollars (\$) | CN0601-02 |
| Product Lifecycle Environmental Impacts | Percentage of eligible products certified to a U.S. EPA ENERGY STAR® standard | Quantitative | Percentage (%) by revenue | CN0601-03 |
| | Percentage of eligible products certified to an Association of Home Appliance Manufacturers (AHAM) sustainability standard | Quantitative | Percentage (%) by revenue | CN0601-04 |
| | Description of efforts to manage products' end-of-life impacts | Discussion and Analysis | n/a | CN0601-05 |

* Note to **CN0601-01**—The registrant shall discuss notable recalls such as those that affected a significant number of units of one product or those related to serious injury or fatality.

** Note to **CN0601-02**—Disclosure shall include a description of fines and settlements and corrective actions implemented in response to events.

APPENDIX IV: Analysis of SEC Disclosures | Appliance Manufacturing

The following graph demonstrates an aggregate assessment of how representative U.S.-listed Appliance Manufacturing companies are currently reporting on sustainability topics in their SEC annual filings.



*Percentage of IWG participants that agreed topic was likely to constitute material information for companies in the industry.

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- ² Data from *Bloomberg Professional* service accessed on June 30, 2015, using the EQS <GO> command.
- ³ Data from *Bloomberg Professional* service accessed on August 12, 2015, using the BICS <GO> command. The data represents revenues for major public companies participating in the Appliance Manufacturing industry.
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