



The AIChE Sustainability Index: The Factors in Detail

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The AIChE Sustainability Index provides practical benchmarks along a number of well-defined metrics.

Sustainability has become a driver for innovation in the chemical industry. Innovations such as light-weight plastics for transportation, affordable water-filtration technology for the developing world, and products and technologies for CO₂ capture exemplify the contributions of the chemical industry to sustainability.

The AIChE Sustainability Index (SI) uses publicly available data to assess the sustainability performance of representative companies in the chemical industry with respect to strategic commitment, sustainability innovation, environmental performance, safety performance, product stewardship, social responsibility, and value chain management. The development of the AIChE SI was discussed in the November 2007 issue of *CEP* (p. 13). Other issues covered the impact of company size on the index (Jan. 2008, p. 20) and the strategic commitment factor (Feb. 2008, p. 18), but those elements are summarized here for the reader's convenience.

This article discusses the seven factors that make up the AIChE Sustainability Index. Figures 1–7 illustrate the performance of the 11 major chemical companies* included in the inaugural analysis of AIChE SI with respect to each of the factors. The bars indicate the ranges of the companies' scores, and the asterisks represent their average scores. The assessment criteria included in each factor are scored on a scale of 0 to 7, with 7 representing the "ideal" or best practice. An overall score is also shown for each factor, representing the weighted average of the criteria sub-scores.

* The following companies are included in the analysis for this issue of the AIChE SI: Air Products, Akzo Nobel, Ashland, BASF, Celanese, Dow, DuPont, Eastman, Lyondell, Praxair, and Rohm & Haas.

Strategic Commitment to Sustainability

Strategic commitment (Figure 1) includes the following assessment criteria:

- *Stated Commitment* — public commitment to excellence in environmental and social performance throughout a company's value chain
- *Commitment to Voluntary Codes* — public commitment to voluntary codes and standards, including Responsible Care, Global Compact, and others
- *Sustainability Reporting* — timely and comprehensive public reporting of sustainability performance
- *Sustainability Goals and Programs* — a comprehensive set of goals and programs that are specific and challenging
- *Third-Party Ratings* — respected agencies' ratings on company-wide sustainability management and reporting.

On average, the companies received high marks on stated commitment and commitment to voluntary codes, and lower scores on sustainability reporting and sustainability goals and programs. They also scored somewhat poorly on third-party ratings (such as the Dow Jones Sustainability Index and FTSE4Good). The ranges, however, show considerable gaps between the top and bottom performers for each criterion.

All of the major chemical companies in this analysis have made public commitments to some aspects of sustainability, and nine of the 11 have extended these commitments beyond internal environmental, health and safety (EHS) performance and product safety to include resource efficiency, product environmental performance, and supplier performance. Nevertheless, commitments need to be supported by systems



in place, including accountability through public reporting and clear targets and initiatives. Although a few of the companies have published well-respected, award-winning sustainability reports, many remain limited to reporting internal EHS performance and anecdotal success stories. Only a handful of chemical companies have developed clear and comprehensive sustainability targets.

Sustainability Innovation

Sustainability innovation (Figure 2) considers:

- *General R&D Commitment* — corporate commitment to research and development, as evident in the amount of R&D expenditure per net sales
- *Sustainable Products and Processes* — development of products and processes with superior environmental, social and economic performance
- *Sustainability Approaches in R&D* — use of sustainability considerations and decision-support tools in R&D and innovation processes
- *R&D Effectiveness* — results of the R&D investment, as reflected in the number of patents issued and commercialization of new products that enhance environmental and social sustainability.

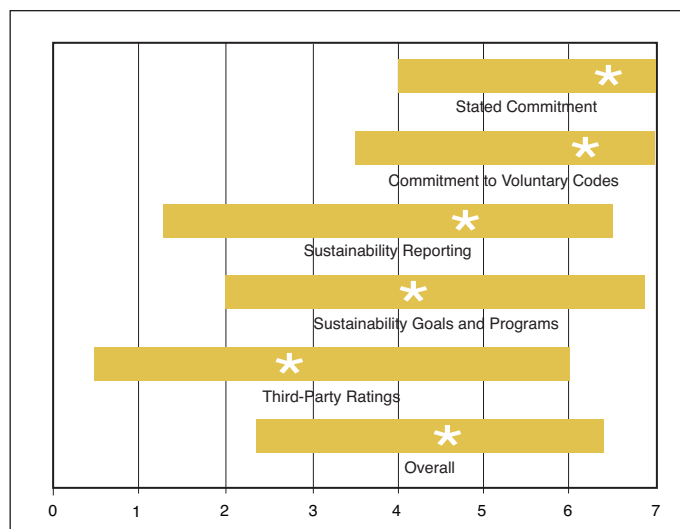
The wide ranges of the innovation sub-scores reflect the diversity of the chemical industry — from those applying established technologies for the efficient production of commodity materials to those relying on innovative products. Companies engaged in developing sustainable products and processes have largely focused on environmental performance over a product's lifecycle, especially in terms of the environmental impacts of customer use of the product. Reducing greenhouse gases and improving energy efficiency are the main drivers. A few firms are also engaged in improving customers safety and developing innovations around critical social needs, such as affordable healthcare and clean water for the developing world.

Furthermore, several companies have also integrated the use of sustainability approaches into their operations. This includes tools such as sustainability decision checklists, life-cycle assessment, total cost assessment, and others. These tools, however, are not yet widely used; although most of the major chemical companies evaluated have experience with them, only three of the 11 have integrated them into their formal R&D and design processes.

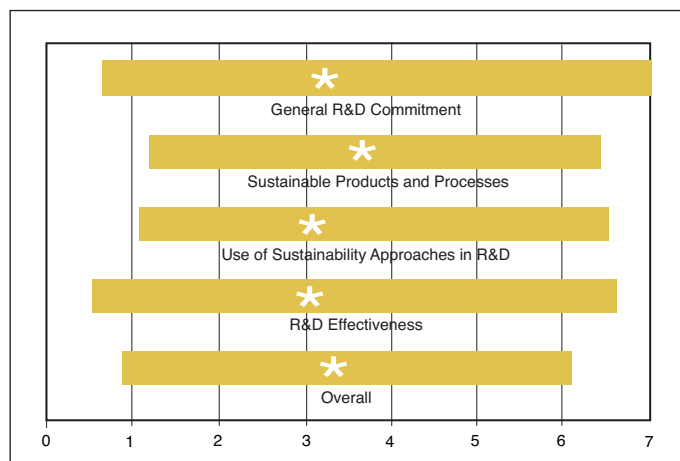
Environmental Performance

Environment performance (Figure 3) is based on:

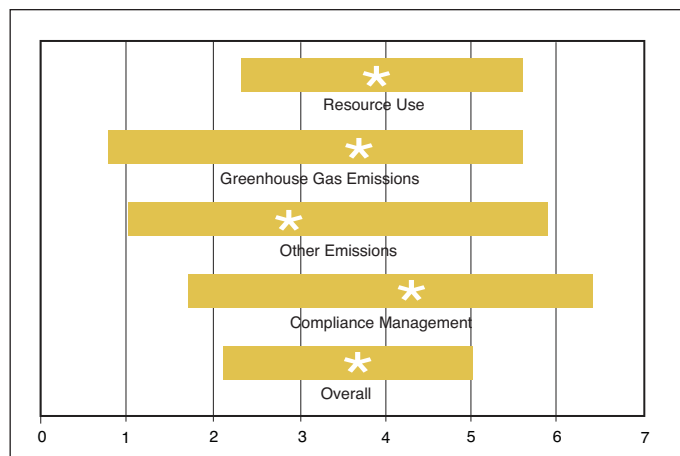
- *Resource Use* — intensity of energy, material and water consumption, and use of renewable sources of energy and materials



■ Figure 1. Strategic commitment to sustainability.



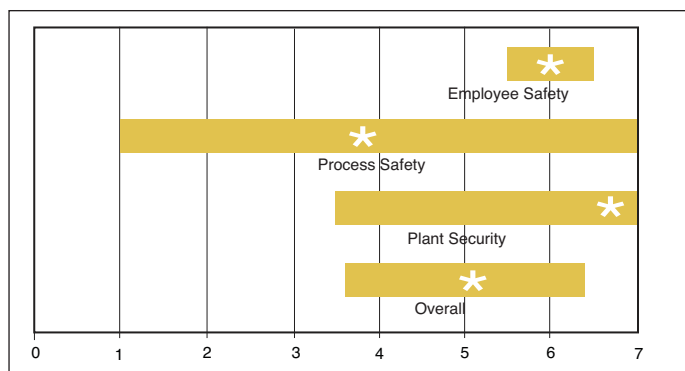
■ Figure 2. Sustainability innovation.



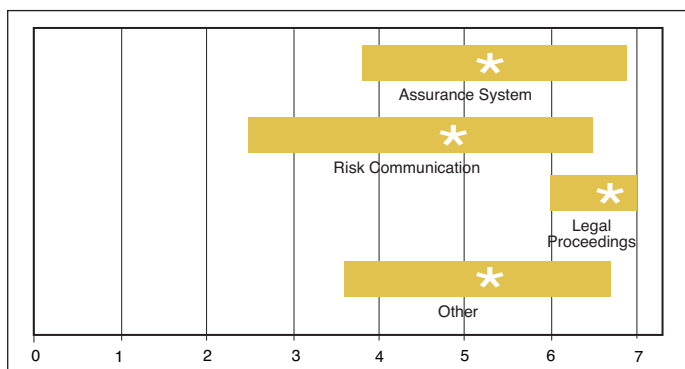
■ Figure 3. Environmental performance.



Sustainability



■ Figure 4. Safety performance.



■ Figure 5. Product stewardship.

- *Greenhouse Gas Emissions* — intensity of greenhouse gas emissions
- *Other Emissions* — air emissions, wastewater, and hazardous waste releases
- *Compliance Management* — environmental liability, fines and penalties, and environmental capital investment.

The chemical industry in general has made considerable progress on environmental performance over the past few decades. The recent performance of the 11 companies included in this analysis also indicates continuous improvements — for a variety of emissions, there is a clear downward trend, despite increasing production.

Companies that report energy use and greenhouse gas emissions have also experienced reductions, again in spite of increasing production. Six of the 11 companies have made efforts to increase energy use from clean and renewable sources. In addressing energy efficiency and greenhouse gas emissions, some companies are inherently disadvantaged because of the energy-intensive nature of the processes required to make their products. Nevertheless, these same companies are among the strongest in terms of energy-efficient products and carbon management innovations — receiving external awards and praise despite their inherently carbon-intensive operations.

Safety Performance

Safety performance (Figure 4) encompasses:

- *Employee Safety* — recordable and days-away-from-work injury rates
- *Process Safety* — number and trend of process safety incidents, normalized by number of employees, and occurrence of major safety incidents
- *Plant Security* — presence of an adequate plant security management system, represented by completion of a Responsible Care plant security audit.

Regarding employee safety, the chemical industry continues to be among the best in the manufacturing sector. Behavior-based safety processes are becoming more widely adopted. Process safety performance sub-scores, however, cover a wide range. Based on companies' self-reported data and trends, the number of process safety incidents per 1,000 employees for the 11 firms assessed is generally decreasing. However, three of the companies have experienced a significant increase in process safety incidents, based on a three-year trend. Responsible Care plant security audits have been completed by almost all (10 out of 11) of the companies reviewed.

Product Stewardship

Product stewardship (Figure 5) includes:

- *Assurance System* — product stewardship policies and goals, incorporation of a Responsible Care product safety process, and engagement of value-chain partners to assure product safety
- *Risk Communication* — risk communication policies and goals, incorporation of a Responsible Care risk communication process, and preparation to meet REACH requirements
- *Legal Proceedings* — involvement in major legal proceedings related to product safety, risk and toxicity.

All of the 11 chemical companies assessed have implemented Responsible Care product safety and risk communication processes or equivalents. Some have also implemented more-proactive standards than required by Responsible Care, which helps to explain the ranges in scores. Such programs include value-chain engagement, education, and partnership efforts to identify and manage product safety and environmental risks. Furthermore, all of the participating companies are engaged in preparation for REACH compliance. As expected, companies with a strong European presence appear to be better prepared.

Although some of the 11 companies are experiencing legal challenges related to past environmental and safety performance, these actions do not appear to have significant effects on business performance.



Social Responsibility

Social responsibility (Figure 6) consists of:

- *Stakeholder Partnerships* — extent of stakeholder engagement and partnership programs at the project, facility and corporate levels
- *Social Investment* — contributions through employment, philanthropy and community development projects
- *Image in the Community* — company image as indicated by reputable awards and recognition programs, including “most admired” and “best employer” ratings.

All chemical companies have stakeholder engagement and partnership programs, although their scope varies considerably. All of the 11 evaluated have facility-level Community Advisory Panels (CAPs), and some have also established partnerships with nongovernmental and community organizations to address specific issues. A few have also established programs with community and opinion leaders to stay informed about emerging issues and concerns.

The chemical industry continues to be a source of employment and economic development. The extent of employment varies, from 0.5 to almost 4 employees per million dollars in net sales, with specialty materials and industrial gas producers leading in the normalized employment figures. Furthermore, the companies reviewed contribute 0.03% to 0.13% of their net revenues for various philanthropic and community development projects — many with emphasis on science and technology education. The image of chemical companies in the community also varies widely, based on third-party recognitions.

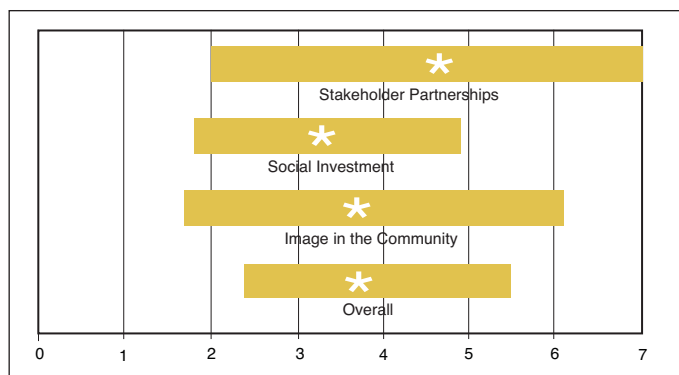
Value-Chain Management

Value-chain management (Figure 7) relates to:

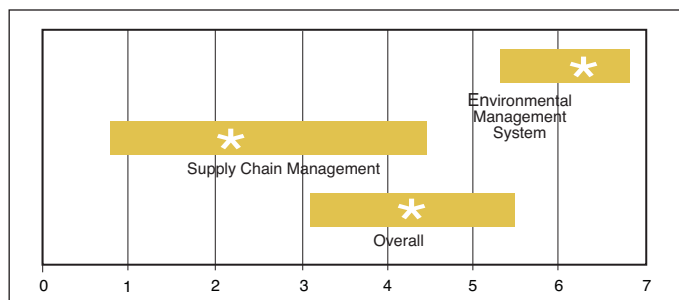
- *Environmental Management Systems* — presence of an environmental management system (EMS) at the corporate and facility levels
- *Supply Chain Management* — policies and procedures related to suppliers’ sustainability, presence of sustainability evaluation and audits for first-tier suppliers, and management of second- and higher-tier suppliers.

The Responsible Care Management System (RCMS) and RC14001, which combines elements of RCMS and ISO 14001, are becoming the new standards for environmental management in the chemical industry. All major chemical companies have implemented RCMS or RC14001 at the corporate level and are making progress, to varying degrees, on implementing an EMS in all major facilities.

Most of the companies reviewed have supplier policies related to EHS and sustainability. Five require supplier environmental and/or safety evaluations, and two require such evaluations for suppliers to earn a “preferred” designation.



■ Figure 6. Social responsibility.



■ Figure 7. Value chain management.

Effects of company size

The first analysis of the AIChE SI includes only representative major chemical companies. However, there are differences in the perceived sustainability performance of larger companies versus smaller organizations.

The largest companies (those with revenues greater than \$10 billion) lead in most of the categories. Most of these firms have committed to aggressive sustainability goals and targets and produce comprehensive sustainability reports — giving them higher scores for strategic commitment.

The largest difference is seen for sustainability innovation. Sustainability has become a driver of innovation for most of the largest chemical companies, and these organizations have the most experience in using sustainability tools in their R&D and design activities.

The largest companies also lead on aspects of environmental performance and social responsibility. They have made significant progress on reducing resource use and emissions. And while companies of all sizes are engaged with their communities, the largest are more involved in strategic stakeholder-engagement activities designed to address issues around their products’ value chains.

CEP

The AIChE SI is developed by the AIChE Institute for Sustainability (IfS), with the support of Golder Associates. An update of the index will be released in early 2009. Companies can subscribe to the indexing service to learn how they compare with their peers by contacting ifs@aiche.org.