

solutions

+ Getting Ahead of the Curve:

Corporate Strategies

That Address Climate Change

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by

Andrew J. Hoffman

THE UNIVERSITY OF MICHIGAN



PEW CENTER

ON

Global CLIMATE CHANGE

Weaving Climate Change into the Business Case

Alcoa*

What do you do about climate change when energy comprises a major portion of the total cost to manufacture your product? That is the dilemma that faces Alcoa, a company that spent over two billion dollars on energy last year. Consequently, locating and securing reliable, low-cost energy sources has always been among the company's most pressing strategic concerns. According to Jake Siewert, Vice President, EHS, Global Communications and Public Strategy, "the biggest differentiator in primary metals is long-term energy supply; 20 to 40 plus years." With global energy prices continuing to rise and climate change assuming a more prominent role in international policy discussions, energy intensive companies such as Alcoa are facing increased scrutiny by foreign governments, as well as stiffer competition from other companies and industries for the remaining sources of abundant, inexpensive energy.

But, by leveraging its strong history of environmental leadership and responsibility, Alcoa is striving to transform this potential source of vulnerability into a competitive advantage. The company has already managed to reduce its direct greenhouse gas (GHG) emissions by 25 percent below 1990 levels and is being recognized for its progress: Alcoa was named one of the Top Green Companies in the world by *Business Week* magazine¹³⁹ in 2005 and *Ceres* in 2006.¹⁴⁰ But despite such praise, the company is looking toward two key developments that could result in further dramatic reductions: the development of a new aluminum smelting process and a vigorous effort on recycling and automobile light-weighting. When you combine what Alcoa has accomplished with the potential that lies ahead, Alcoa "is in a unique position and one that is very positive, given the attributes of the products we make," says Randy Overbey, President of Primary Metals Development.

Company Profile

Headquartered in Pittsburgh, Pennsylvania, Alcoa is the world's leading producer of primary aluminum, fabricated aluminum, and alumina. The company employs approximately 129,000 "Alcoans" (a term that employees use to refer to themselves) in 43 countries. The company earned revenues of \$26.2 billion in 2005 by producing approximately 11 percent of primary aluminum in the world. Customer segments include aerospace;

Table 11

Alcoa's Footprint (2005)

Headquarters:	Pittsburgh, PA
Revenues:	\$26.2 billion
Employees:	129,000
Percentage of Emissions In Kyoto-Ratified Countries:	16 percent
Direct CO ₂ e Emissions*:	34.4 MMtons**
Indirect CO ₂ e Emissions***:	27.0 MMtons
Aggregate CO ₂ e Emissions:	61.4 MMtons
Target:	25 percent below 1990 levels (achieved and maintained since 2001)
Year Target Set:	1998

* 100 percent of the direct emissions from facilities managed by Alcoa.

** Million metric tons.

*** 100 percent of the indirect emissions associated with purchased electricity from facilities managed by Alcoa based on estimates of the sources of generation used by suppliers.

* We would like to thank Pat Atkins, Ken Martchek, Richard Notte, Randy Overbey, Jake Siewert, and Vince Van Son for their contributions to this case study.

automotive; packaging, building and construction; and commercial transportation. Alcoa also produces and markets consumer brands including Reynolds Wrap®, Alcoa® wheels, and Baco® household wraps. Among its other businesses are vinyl siding, closures, fastening systems, precision castings, and electrical distribution systems for cars and trucks.

Because energy is so critical to Alcoa, the company generates approximately 25 percent of its own electricity needs. Overall, its energy supply portfolio consists of hydropower (35 percent), coal (36 percent), natural gas (18 percent), and oil (9 percent). Total direct GHG emissions from company managed facilities in 2005 were approximately 34.4 million metric tons of CO₂ equivalents (CO₂e), coming primarily from its smelting operations, power generation facilities, and refineries. In 1998, Alcoa set a target to reduce its direct GHG emissions from managed facilities 25 percent below 1990 levels, an ambitious goal when compared to other *Fortune* 500 companies actively pursuing GHG reduction strategies. Much like DuPont, Alcoa has a history of setting and attaining far-reaching targets, particularly in the environmental arena. The company achieved its GHG reduction goal in 2001 and has maintained that level ever since.

Climate Change Program Implementation

When asked about the impetus for its climate change strategy, Ken Martchek, Manager of Life Cycle and Environmental Sustainability, states that: “Sustainability is a primary driver since Alcoa defines sustainability as financial success, environmental excellence, and social responsibility. Our climate strategy is an essential part of our sustainability efforts given Alcoa’s level of energy consumption particularly in an increasingly carbon-constrained world.” But it is even more than that, according to Pat Atkins, Alcoa’s Director of Energy Innovation. Reducing environmental impacts is smart business too. “Why wait for irreparable harm from climate change or policy requirements to make strategic and operational changes if the business case is already there? Alcoa is vulnerable because of our high energy demands and our need to grow to supply the market demands for our products. If we become part of the solution rather than part of the problem, we have a much better chance of continuing to contribute in the future. Many businesses tend to focus on the next quarter or next year, not their fourth century. Alcoa has operated in three consecutive centuries so far, and if we don’t focus on climate change, we may not make it to our fourth century. Our products need to be sustainable in the broadest sense.”

This attention to the long term goes to the top of the organization, an aspect not lost on those responsible for managing Alcoa’s climate-related strategies. “On a scale of one to ten, senior level support is an eleven,” says Atkins. “Climate change is generally not chosen as a priority unless it is supported by those at the top.” While a systematic focus on energy efficiency has enabled Alcoa to reduce the amount of energy required to refine bauxite into alumina, reduce alumina into aluminum in its smelters, and fabricate aluminum into value-adding products, the primary focus of Alcoa’s GHG reduction efforts thus far rests in reducing perfluorocarbon (PFC) emissions through anode effects and increasing the use of recycled materials.

The Anode Effect. In 1992, then CEO Paul O’Neill, an industrial engineer turned economist (and former Treasury Secretary), asked Alcoa’s engineers why the company did not eliminate the anode effect from operations

(see “Anode Effect: An Overview” on this page).

Believing that stable operations reduced waste, O’Neill challenged the company’s engineers to eliminate the need for the anode effect by devising an alternative method for managing the aluminum smelting system. The engineers responded with skepticism, claiming the solution would be cost prohibitive, requiring thousands of new, more accurate alumina feeders, as well as better algorithms in the company’s computer programs. And after all, scheduling anode effects as part of the process control scheme was the way that aluminum smelters had been run for many years. Undaunted, O’Neill continued to challenge engineers to minimize the number of anode effects, and after numerous iterations engineers discovered that new feeders were not always needed. Instead, they found that what was needed were new advanced cell control algorithms to manage the feed of alumina into the cell without having anode effects. At the same time, Alcoa signed a voluntary agreement with the EPA to reduce anode effects. With every iteration of the algorithm, control engineers noticed both a reduction of anode effects and an improvement in cell efficiency and alumina quality.

Alcoa no longer schedules anode effects. Although they still occur periodically, the company has reduced the anode effect frequency in its best plants from approximately one or more anode effects per cell per day to one anode effect per cell every 10 to 30 days. This reduction in frequency, coupled with reductions in anode effect duration, has reduced PFC emissions by over 75 percent since 1990. To continue to improve performance,

Alcoa has company and plant-specific goals for minimizing the frequency and duration of anode effects. At some locations, a portion of each employee’s annual incentive payment is tied to anode effect performance.

According to Overbey, even though Alcoa was considering the anode effect before the arrival of O’Neill, it was his leadership that made it clear that the company was ready to move beyond the climate change debate and take real action. The company needed someone to ask the right questions, help the employees overcome some in-house biases, and think about operations from a different perspective. O’Neill was that person.

Anode Effect: An Overview

The aluminum smelting process is a highly energy intensive electrolytic reduction process used to break the atomic bond between oxygen and aluminum in alumina (aluminum oxide, Al_2O_3). The smelting process uses consumable carbon anodes to reduce the alumina creating aluminum and CO_2 .

A critical aspect of the aluminum manufacturing process is maintaining the proper concentration of alumina in the electrolytic bath solution. If the alumina concentration is too high, undissolved alumina falls to the bottom of the cell causing inefficiencies and potential damage to the cell lining. If the alumina concentration is too low, the electrical current starts to break down other chemical components in the bath (namely aluminum fluoride) necessary to continue making aluminum. This reaction creates the perfluorocarbon (PFC) gases CF_4 and C_2F_6 which form beneath the anode and increase the cell resistance. When the increasing resistance causes the cell voltage to exceed a threshold, the cell is said to be on “anode effect.” The anode effect is not extinguished until the alumina concentration has been increased and the voltage is reduced. Anode effects have three primary drawbacks: they disrupt the stability of the continuous electrolytic process, consume excess energy, and create PFC emissions.

In the past, the level of alumina concentration in the process was routinely determined by purposefully scheduling anode effects by underfeeding alumina. This practice had provided an easy and reliable means of determining the amount of alumina in solution. The anode effect would give the plant manager an exact point of reference as to the amount of alumina in solution and helps avoid the risks and consequences of over-feeding alumina into the cell.

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Today, Alcoa is working to develop a new smelting technology based on an inert anode, which would eliminate consumable carbon anodes and related CO₂ emissions from the aluminum smelting process, and also eliminate all PFC emissions.

Recycling Initiatives. In a 2002 speech to the U.S. Aluminum Association, John Pizzey, then Group VP for Primary Products, argued that it was his fundamental responsibility to effectively manage climate change, energy reduction, and water quality issues. He then pledged that 50 percent of Alcoa's products, other than raw ingot sold to others, would come from recycled aluminum by 2020. According to Overbey, "recycling is not only the right environmental choice; it can be the right economic choice for Alcoa." Considering that aluminum produced from recycled materials requires only five percent of the energy needed to make primary aluminum and that energy prices will likely continue to rise, increasing recycling rates is among the more significant long-term strategic opportunities for the company. Almost 70 percent of the aluminum ever produced is still in use today, totaling approximately 480 million metric tons. The amount of aluminum recycled in 2004 equaled the total amount of primary aluminum produced in 1974.

To meet its target for higher recycled content, Alcoa will have to overcome some of the challenges that have traditionally undermined recycling initiatives. In addition to resolving some metallurgy issues associated with recycling, Alcoa will need to devise innovative strategies for collecting large quantities of metal and ensuring that it satisfies the company's quality standards. Further, it will have to engage with external groups to increase aluminum can recycling rates, which in the United States have declined from well over 60 percent to 50 percent in the last few years. The company is currently reevaluating how to engage these customers by focusing on the long-term financial benefits offered by elevated recycling rates.

Organizational Integration

Alcoa relies on three dedicated teams to further its climate change and energy efficiency goals: Corporate Climate Change Strategy Team, Greenhouse Gas Network and Energy Efficiency Network. These teams complement each other under the umbrella of Alcoa's values and drive to share best practices across the company. And, although the company has a long standing culture of technology and best practice transfer, employee engagement is crucial. According to Vince Van Son, Manager of Environmental Finance and Business Development, "Our people link our systems and our success. The best technology only gets you so far. Employees will devise innovative ways to achieve clearly stated goals when they understand the linkage with the company's vision and values." Similarly, according to Atkins, Alcoa's managers are becoming more aware of the importance of the company's strategy because they understand how climate change impacts their respective business units. They realize that, "if you want to build a new plant, having Alcoa's reputation helps."

In 1997, Alcoa launched the Corporate Climate Change Strategy Team. Traditionally directed by some of Alcoa's top-level executives, the team is comprised of eleven diverse members, including professional representation from operations, government affairs, technology, communications and finance and geographic representation from the

United States, Canada, Australia, Europe, and Brazil. The team is responsible for evaluating the impacts of climate change on Alcoa's business interests and disseminating the company's goals and progress to internal and external audiences. According to Overbey, the current director, the secret to the success of the team is its multi-functional membership. "The members may not always agree with each other, but having such diverse representation increases the robustness of our results." The team meets face-to-face at least twice each year and conducts conference calls between meetings.

To build on the success of reaching its goal of reducing GHG emissions 25 percent below 1990 levels, Alcoa launched the Greenhouse Gas Network in 2004 to help further reduce GHGs among locations involved in power generation, refining, and smelting—which collectively account for approximately 90 percent of Alcoa's total emissions. The network works with global process technology teams and various regional GHG teams across the world to coordinate and share information and best practices.

One of the most important projects of the Greenhouse Gas Network is the recent launch of an internal web-based GHG information system. Alcoa has systematically collected GHG data for all operations worldwide since 1998 through its environmental data system. This system makes it easier for locations to monitor their performance through time and compare it relative to internal and external benchmarks. By increasing overall transparency, the information system provides underperforming plants with a stronger incentive to improve efficiency and to lower GHG emissions. Centralizing GHG emissions accounting also promotes consistency with protocols and enables locations to focus resources on making reductions. Alcoa also relies on the system to facilitate global networking among the participants and help stimulate sharing of best practices.

The new GHG information system currently includes detailed process and energy consumption information for 41 facilities worldwide, including four power generation facilities, nine alumina refineries, and 26 smelters. The system uses the methodology of the E.U. ETS to calculate emissions and sweeps databases each evening to pull process and production data directly. Designated individuals at each plant are responsible for manually entering energy consumption data on a monthly basis. Reminders to update monthly energy data are issued automatically to help ensure a comprehensive overview of the performance of all facilities is available as soon as possible after the end of each month.

One example of leadership and sponsorship for GHG emission reduction is a global PFC reduction "challenge." Each plant has been challenged with closing the gap between its 2004 average anode effect (and thus PFC emissions) performance and its best monthly performance on record. Each month, a global scorecard is published comparing smelters to themselves and others in terms of CO₂e emissions, CO₂e emissions per ton of aluminum, and anode effect performance. As the scorecard is a highly visible way to track the leaders and laggards, it fosters healthy competition on GHG reduction progress as plant managers strive to have their facilities be leaders. But, the company also encourages cooperation and cohesion by mandating that each facility disclose barriers to meeting its targets, as well as the actions they are taking to overcome them and reach their targets. By emphasizing transparency and the sharing of best practices, the company ensures the focus on meeting targets is sustained. Some of the plants making the greatest

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amount of improvement to date have done so in part by sending employees to smelters that have lower emissions to learn first-hand of the latest changes they have made to cell operating, maintenance and control practices.

Similar to Shell's Energise program, Alcoa launched the Energy Efficiency Network (EEN) in 2002. The EEN consists of more than 450 Alcoans worldwide. Individual teams are comprised of high-level Alcoa employees and various external experts. These teams have three roles. They are invited by operating locations to conduct energy efficiency assessments that confirm and help solidify the business case for possible improvement. They also identify, document and distribute globally, any strong energy practices observed at the plant locations. Finally, they provide technical support and access to further resources as needed. As of mid-2005, assessments had been completed at more than 50 plants. To increase ownership of assessment results, plants participate in reviewing initial recommendations and reach agreement on potential savings before a final report and action plan is issued. Plants have confirmed nearly \$80 million in annual savings potential and captured sustainable annual savings exceeding \$20 million.

The overall goal of the EEN is to help Alcoans understand and value the long-term benefits of the company's energy efficiency and climate change strategy. According to Vice President of Energy Services Richard Notte, who manages a global portfolio of energy for Alcoa and the EEN, "The challenge is to provide a business case which influences us to make a shift on how we think about energy. The Network, including all its members globally, encourages us to consider energy as a manageable expense and also to consider life-cycle costs. As that shift occurs, we build into our business concept that production can be met using less energy per unit of output without sacrificing quality or production. Also, it encourages us to know and consider the cost of energy flowing through the equipment when making maintenance and end of life equipment replacement decisions. This shift in thinking provides significant financial and environmental paybacks." Although the precise cost of setting up the EEN is difficult to quantify, Alcoa estimates are as high as \$500,000 after accounting for travel, human capital, and use of internal resources. Notte believes that the vast majority of companies will not require the same level of sophistication as Alcoa. "Our system is as complicated as anyone is going to get."

Projects requiring capital investment are pursued based on their financial return and the fit with the other local needs and strategic interests. The availability of capital and the threshold financial return or internal rate of return (IRR) required therefore depends on the business situation of the individual location. The company has traditionally not pursued such projects unless they have had a payback of one year or less. However, as the program has matured, provided real returns and demonstrated its potential, Alcoa is moving beyond the "low hanging fruit" and investing in projects with longer payback periods. Plants have been asked to keep track of all energy efficiency projects as they can become more attractive with time (as energy prices rise). Within the Primary Metals division energy efficiency projects with an IRR as low as 20 percent can be considered even if needed funds might not be allocated as part of a given plant's annual capital budget. According to Van Son, the identification and tracking process is critical: "The most important step is to get all opportunities systematically on the radar screen. Just as every piece of fruit ripens at a different time, not all projects should be pursued immediately. The process starts with quality information."

Alcoa has also taken significant steps to extend the reach of its climate change strategy beyond operations and into the personal lives of Alcoans in an effort to help broaden engagement in the issue. For example, following on the heels of its successful One Million Tree program the company launched an even more ambitious Ten Million Tree program on Earth Day in 2003 to help increase employee awareness about climate change, carbon sequestration, and the importance of reducing GHGs. To reach the goal of planting 10 million trees by 2020, each participating Alcoa location purchases the trees from a supplier of choice and distributes them to employees. Alcoans are then encouraged to plant the trees in their communities and on Alcoa property. Through 2005 the number of trees planted via these internal programs is estimated at 1.5 million. The company also plants millions of trees each year as a part of its mine reclamation projects around the world.

Alcoa has also encouraged its employees to participate in local and regional programs such as Smart Trips¹⁴¹ to encourage use of public transportation and car pooling and the one-ton challenge launched by the Canadian Government in 2003. The one-ton challenge enables individuals to measure their GHG footprint and pledge to pursue those actions they can take to reduce their personal emissions by one ton per year.¹⁴²

External Outreach

As with other companies in this survey, Alcoa's climate-related strategy reflects, in part, the insights it gains from its external outreach. To accomplish this, Alcoa has formed partnerships with various environmental non-governmental organizations (NGOs). Although the company acknowledges that such partnerships provide the company with credibility and third-party verification, it emphasizes that these relationships are much more than just stamps of approval. According to Siewert, "We know we're not the expert on these issues; we need help. Our people broaden their view of sustainability by interacting with others who think more broadly, with the people who help manage the growth process more effectively. When we think too narrowly, we get in trouble because the rest of the world doesn't think that way." Martchek believes these partnerships also provide the company with more leverage to participate in the process of shaping climate change policy. "Working closely with organizations like the World Resources Institute and Pew Center on Global Climate Change provides us with some insights about what the future may look like."

Moving beyond environmental NGOs, Alcoa has worked with several external groups to further its goals of increased recycling. The company is a member of the Curbside Value Partnership (CVP). CVP is an outgrowth of the Aluminum Can Council, a trade organization comprised of companies that make aluminum can sheet and aluminum cans. CVP joins with large and small communities across the United States, and their material recovery facilities, to increase education and promotion of recycling of a variety of valuable materials through existing curbside collection channels. CVP assists communities with participant education and promotion, data collection and interpretation and understanding the value proposition of recycling, especially aluminum can recycling. While proven to increase recycling rates, deposit legislation has traditionally been opposed by some of Alcoa's largest business customers. Alcoa and many of its customers favor a more comprehensive approach to recycling, such

as that advocated through the Curbside Value Partnership. And finally, aluminum can sheet makers continue a partnership with Habitat for Humanity, which channels money earned from recycled cans into materials for homes constructed by Habitat.

Alcoa routinely seeks the input of its key investors. Since 2003, Alcoa has convened its top five to fifteen investors during one to two visits to key facilities each year. During these visits the company has frank discussions about its corporate governance and sustainability initiatives. These events are an integral part of its communications and investor relations strategy. In addition, Alcoa's annual sustainability report is used by analysts and other interested stakeholders and documents how the company mitigates risk by reducing its footprint.

A final prong in Alcoa's outreach is directed at the aluminum industry; a highly consolidated industry that offers a potential opportunity. As Siewert explains, "At any time, the aluminum industry can easily get 75 percent of world capacity at one table. This is not true of other industries." But despite such high industry consolidation, the industry lacks a consistent strategy or approach to addressing climate change or energy issues. Therefore, Alcoa recognizes a value both in making great strides in emissions reductions and encouraging others to follow. Mindful of competition from cheaper, less energy-intensive metals, Alcoa believes it is in its own economic interest to raise the reputation and standards of the entire aluminum industry, particularly in places like Europe. And Alcoa's international competitors are beginning to respond to the challenge by improving efficiency and reducing emissions. To increase access to certain financial markets, competitors from Russia, China, and the Middle East are increasing transparency of operations by publishing sustainability reports.

+ Policy Perspectives

In general, Alcoa supports cap-and-trade systems where regulatory limits are imposed if all gases are included. Alcoa currently empowers local management to determine the company's official position within each country. And elements of these positions can vary based on local circumstances.

Of greatest concern to Alcoa is climate change legislation that does not recognize companies for taking early action. Alcoa seeks the use of a 1990 baseline for determining allocations. According to Siewert, "Although I can't imagine anything coming out of Washington that would be too strict for us, the worst case scenario is not getting credit for what we've already done." It is for this reason that Alcoa is concerned with the U.S. Department of Energy's 1605(b) program. Alcoa believes the recent DOE decision to disallow any reduction before 2003 not only discourages companies from taking early action, but potentially encourages increases in the short term.

To prod federal action, Alcoa testified on behalf of the McCain-Lieberman Climate Stewardship Act in 2003. The company feels strongly that there must be a global standard and uniform playing field for all companies. According to Siewert, "We need to know that what happens will happen to everybody." In 2005, Alcoa called for a comprehensive national registry and mandatory emissions reporting as its internal successes have shown measurement and reporting are a fundamental part of attaining any target.

Unlike Whirlpool, which seeks to retain credits for the improvements in energy consumption its products may offer, Alcoa does not lobby for gaining credits for emission reductions by users of its products. Since Alcoa mostly produces semi-fabricated products and not final products as Whirlpool does, the company is satisfied with increased sales if GHG reduction goals increase the market for their product. Alcoa believes that the high performance-to-mass ratio of aluminum products will become increasingly attractive to its transportation customers (such as autos, trucks, rail cars, and planes) in a more carbon and energy constrained world. This reinforces an already strong business case for aluminum, and market pull for its rolled sheet, extrusions, cast components, forged wheels, and other related products. While airplanes are comprised of 90 percent aluminum and titanium, the composition for automobiles is only about 10 percent. Reducing a vehicle's weight by 10 percent typically yields a seven percent reduction in GHG emissions. Based on current growth rates, Alcoa projects that light-weighting coupled with increased recycling by the global aluminum industry has the potential to offset all industry direct and indirect emissions by 2017. Lighter cars and resulting improvements in fuel economy and lower emissions can potentially save 400 million metric tons of CO₂e. To increase the demand for aluminum, Alcoa supports both GHG reduction standards and federal Corporate Average Fuel Economy (CAFE) size-based standards for fuel economy as size and intelligent design have shown to help improve passenger safety and fuel economy (and subsequently reduce GHG emissions).

Challenges Ahead

Of all accomplishments in the area of GHG reductions, Alcoa acknowledges that the development of its web-based systems for measuring and tracking emissions reductions is a major step forward in both achieving its goals and making all locations aware of their carbon footprint. +

And the company is pleased it has leveraged its efforts on climate change and other sustainability issues, leading to reputation and strategic benefits. For example, the company was invited by the Icelandic government to build a smelting facility in their country; a country with an extremely low GHG electricity profile and low energy prices. Alcoa's growth in Iceland is a direct reflection of its preference to use renewable energy resources (hydroelectric power) to achieve the lowest total GHG intensity per ton of aluminum possible. When Alcoa's new smelter begins operations in 2007 it will become one of the lowest GHG intensity smelters in the world. Another example of gaining from its efforts is being recognized by Innovest (along with Toyota and BP) as the world's top three most sustainable companies. The rankings were based upon how effectively companies have managed strategic profit opportunities by recognizing new environmental and social markets. Shortly after the rankings were released, Toyota approached Alcoa to discuss potential partnerships and synergies between the companies—again, a strategic aspect of the company's future plans. +

Looking forward, Alcoa seeks to make increasing progress into the light-weighting of vehicles. And the market looks bright. Over the past decade, the demand for aluminum has increased at a compound annual growth rate of 4.3 percent, and the aluminum is becoming the second most used material (overtaking iron) in ground

transportation vehicles after steel. For example, Alcoa developed “Dura Bright” commercial truck wheels that are lower mass than conventional wheels and don’t require polish or scrubbing. These wheels have high strength to mass ratio, are visually attractive, corrosion-resistant, and require no maintenance beyond spraying with soap and water. In February 2005, Alcoa announced that Hyundai Motor Manufacturing America (HMMA) will use an Alcoa cast aluminum rear upper control arm for the Korean automaker’s all-new 2007 Santa Fe crossover vehicle; the first Alcoa component to be used by Hyundai Automotive.

But, Alcoa is still working to improve its GHG related-strategies. Despite recent initiatives to engage and educate its employees, some managers believe the company would have benefited from launching such programs much earlier. Atkins admits that the company would be even further ahead if we’d “done this in year two, instead of year ten. It takes time to educate 130,000 people.” And looking forward, Overbey worries about the fact that the company’s global reach truly requires a global answer to the GHG issue. This highlights one important challenge for the future. Political and regulatory uncertainty via the absence of a uniform global climate change policy creates an uneven playing field with regard to its global operations. Alcoa believes such uncertainty coupled with high energy prices provide a disincentive for companies to set up new operations in many developed countries.

But despite such challenges, Alcoa sees climate change as a major differentiating factor in the future. According to Overbey, “Whatever enterprise you represent, you must ask ‘How can I be part of the solution?’” Adds Atkins, “What would the best company in the world do? We are citizens of the world and we must act responsibly.” With this as its starting point, Alcoa continues to move forward through leadership and action to be part of the solution—and sees benefits in reinforcing its reputation for doing so.

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137. In some DuPont processes, steam is generated at a temperature above saturation (superheated). When process steps require saturated steam (which is cooler than superheated steam), water is sprayed into the superheated steam, cooling it down. This desuperheating water must be very high in quality so no deposits are formed when it vaporizes.

138. Speech delivered to the Clinton Global Initiative Panel on Climate Change, New York City, September 17, 2005.

139. Op. cite, Aston, A. and B. Helm. 2005.

140. Op. cite, Cogan, D. 2006.

141. For more on the Smart Trips program, see: <http://www.smarttrips.org/>, viewed 3/3/06.

142. For more on the One Ton Challenge, see: <http://www.climatechange.gc.ca/onetonne/english/index.asp?pid=179>, viewed 3/3/06.

143. Calculated for 2002.

144. Inskip, S. 2005. "Gas Flaring Continues to Plague Nigeria." *National Public Radio*, Aug.25, <http://www.npr.org/templates/story/story.php?storyId=4797953>, viewed 10/18/05.

145. *National Public Radio* 2005. "Oil Firms Learn Trading Lessons." *National Public Radio*, May 9, <http://www.environmental-finance.com/2003/0302feb/bpshell.htm>, viewed 10/18/05.

146. Van der Veer, J. 2006. "A Vision for Meeting Energy Needs Beyond Oil." *Financial Times*, January 25: 21.

147. Reflects Whirlpool Corporation prior to the acquisition of Maytag Corporation in mid-2006

148. The company has been broadly recognized for this commitment, including being named in 2005 as one of the 20 best corporate citizens by *Business Ethics Magazine*. In fact, the company has been named to the list every year since the magazine began publishing it six years ago.

+ 149. *PRNewswire*. 2005. "Whirlpool Corp. to Cut Greenhouse Gas Emissions by 3 Percent From 1998 Levels." *PRNewswire*, <http://web.lexis-nexis.com/5>, viewed 9/7/06.

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+ 154. Greenhouse Gas Inventory Program. 2002. *Greenhouse Gases and Global Warming Potentials*. (Washington DC: U.S. Environmental Protection Agency): 9.

155. Energy Information Administration. 1997. *Mitigating Greenhouse Gas Emissions: Voluntary Reporting*. (Washington DC: U.S. Department of Energy).