

# Voluntary GHG Reductions: Early Experiences of Climate Leaders

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## ABSTRACT

Despite its rejection of Kyoto, climate change remains a hot issue in the U.S. As we await possible future regulatory action, a plethora of voluntary GHG reduction programs have sprung up, including the U.S. EPA's Climate Leaders program. We interviewed nine large industrial companies that are participants in the Climate Leaders program. These companies have completed a corporate inventory of their greenhouse gas (GHG) emissions, and most have completed the next required step – setting a five or ten year voluntary reduction goal. Most of these companies already had a strong environmental policy and were involved in efforts to reduce GHG emissions, including energy efficiency efforts. Most of the companies, especially those with good existing energy data, found that completing the corporate GHG emissions inventory was not difficult or overly time-consuming. Although many Climate Leaders partners have not yet set reduction goals, several have set aggressive goals and have begun to implement significant projects to achieve them.

## Background

Although the U.S. has rejected the Kyoto treaty on climate change, it will still be affected to some degree by the winds of change stirring in the Kyoto-signing countries, including Canada, the EU countries, and Japan. Many large U.S. companies have facilities in these countries, and some are already taking proactive steps to anticipate Kyoto-driven policies. Meanwhile, the current U.S. policy is to emphasize voluntary GHG emissions reduction efforts as an alternative to mandatory caps on emissions.

The U.S. EPA's Climate Leaders program is the only voluntary GHG program in the U.S. besides the Climate Neutral Network that requires a comprehensive inventory of corporate GHG emissions as the basis for setting a voluntary reduction goal.<sup>1</sup> The Climate Leaders program follows the guidelines of the "Greenhouse Gas Protocol" developed by the World Resource Institute (WRI) and the World Business Council for Sustainable Development for developing the corporate inventory. (The EPA has developed more specific guidance on reporting and has made a few minor modifications to the WRI protocol for Climate Leaders.) In addition to developing the initial inventory, EPA requires partners to set a five or ten year reduction goal, either normalized or absolute, and to report their corporate GHG emissions annually to the EPA.

To provide some insights into voluntary GHG emissions reduction efforts – the GHG inventory and goal-setting process, and overall benefits of participation; we interviewed nine large industrial companies that are partners in the EPA's Climate Leaders program. These

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<sup>1</sup> Some of the other voluntary programs include the U.S. DOE's "Climate Vision," the World Wildlife Fund's Climate Savers program, the Pew Center's Business Environmental Leadership Council, the Chicago Climate Exchange, the Climate Neutral Network, and the new Climate Resolve program of the Business Roundtable. Climate Neutral Network requires a comprehensive inventory before it will evaluate offset projects as part of the climate neutral certification process.

companies have completed a corporate inventory of their greenhouse gas (GHG) emissions, and most have completed the next required step – setting a five or ten year voluntary reduction goal. So far, a total of 39 companies have made the commitment to become “partners” in the Climate Leaders program, but only 10 have set a GHG reduction goal.

## GHG Inventory Process

As one of the sub-contractors to the EPA for the Climate Leaders program, a team from the E SOURCE product lines of Platts Research & Consulting offers free technical assistance to the partners to help them complete their GHG emissions inventories. This includes providing guidance on the information they need to collect, compiling the data and inserting the appropriate emissions factors to calculate the GHG emissions, calculating/estimating emissions from *de minimus* sources, and reviewing the sources and quality of the data. In addition we provide guidance and assistance if requested in the goal-setting process. So far, we have helped nine companies to complete their inventories. These include 6 industrial companies - Johnson & Johnson, SC Johnson, Miller Brewing, Pfizer, Lockheed Martin, Bethlehem Steel; and three utilities/power generating companies – WE Energies, Cinergy, and Florida Power and Light (FPL).<sup>2</sup> Most companies found that the process of developing their corporate inventory of GHG emissions was not difficult, especially with the free technical assistance provided.

## Inventory ABCs

The inventory process under the EPA Climate Leaders program, based on the protocol developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development, consists of three main steps (World Resources Institute, 2001). The first step is to decide on the boundaries, or, in other words, which facilities and operations will be included. For the Climate Leaders program the EPA urges companies to include all major U.S. facilities that are owned or leased, and in addition to at least estimate the emissions from the smaller facilities. The second step is to gather the information needed to calculate the emissions of the six major types of greenhouse gases that fall into Scope 1 or Scope 2 of the WRI’s GHG Protocol. **Table 1** summarizes the main sources of emissions for each of the six major greenhouse gases.

**Table 1. Typical Sources of Major Greenhouse Gases**

| Greenhouse Gas      | Typical Sources                     |
|---------------------|-------------------------------------|
| CO2                 | Combustion of fossil fuels          |
| CH4 (methane)       | Landfills, natural gas leaks        |
| N2O (nitrous oxide) | Adipic acid, nitric acid production |
| HFCs                | Cooling and refrigeration equipment |
| PFCs                | Semi-conductor manufacturing        |
| SF6                 | Transformer leaks                   |

<sup>2</sup> Brief descriptions of these companies are available on the EPA Climate Leaders web site, at <http://www.epa.gov/climateleaders/partners.html>.

Scope 1 includes direct emissions from on-site activities (such as fuel burned in boilers or on-site power generation) and company-owned or leased vehicles. Scope 2 includes indirect emissions from purchases of electricity or steam. Scope 3 emissions, which are not included in the Climate Leaders program, includes many types of indirect emissions such as emissions associated with the off-site production of raw materials used in the process, methane emissions from off-site solid waste disposal, employee travel, contractors' vehicles, etc. Based on this, the main types of data needed for most facilities to complete their inventories of scope 1 and scope 2 emissions are as follows:

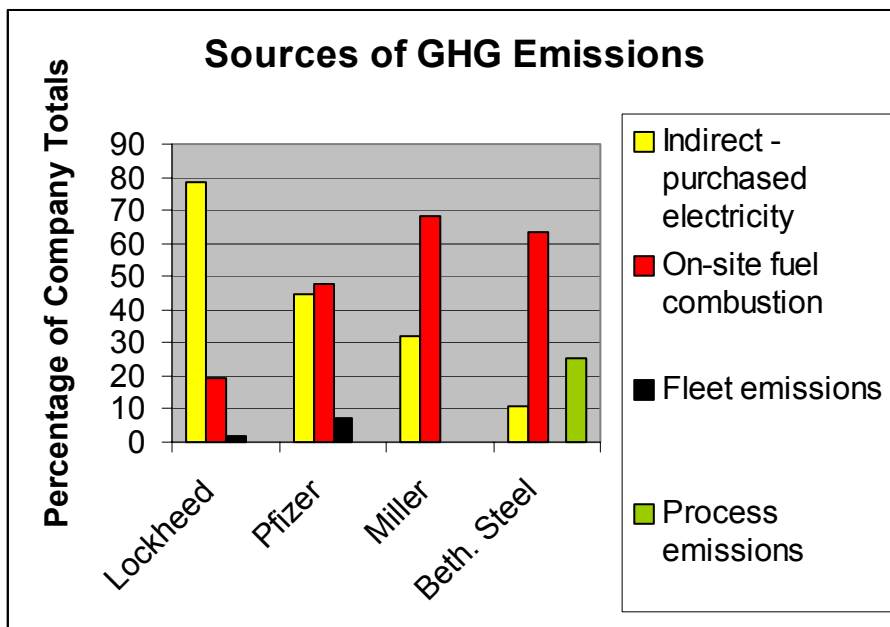
- On-site fuel usage data for each facility by type of fuel;
- Data to calculate process-specific emissions (for example flux usage in steel making);
- Transportation fuel usage for company-owned or leased vehicles; An estimate of HFC losses (based on tons of cooling capacity or actual HFC purchase data); and
- Electricity and steam purchased for each facility (Scope 2).

In addition if the company wishes to set a reduction goal based on intensity rather than absolute emissions, it needs to provide a measure of company activity such as pounds of product or dollars of sales, or megawatt-hours (MWh) of electricity produced in the case of utilities.

The third step is to calculate or estimate the emissions based on the above types of data. There are standard emissions factors for each type of fuel. These factors do not depend on the combustion process, since it is normally reasonable to assume that 99% of the carbon in the fuel eventually is converted to carbon dioxide (CO<sub>2</sub>). For electricity usage, companies can either use specific emissions factors obtained from the specific utilities supplying the electricity, or use the average emissions factor for the National Electric Reliability Council (NERC) sub-region in which the facility is located.

By far the majority of emissions for most companies come from either on-site fuel usage, mainly natural gas or coal, or from the indirect emissions associated with electricity usage. Surprisingly, transportation emissions were 8-12% for Pfizer and Johnson & Johnson, although not significant for the utilities and more energy-intensive manufacturers. The breakdown of emissions sources is shown in **Figure 1** for four representative industrial companies.

**Figure 1. GHG Emissions Sources for Four Industrial Companies**



Source: Lockheed Martin, Pfizer, Miller, and Bethlehem Steel GHG emissions inventories, from the companies' data, compiled by Platts Research & Consulting

### Easy As It Sounds?

We asked the nine companies approximately how much time was required for them to conduct the inventories.. Most companies had 90% of the necessary energy data already compiled, which made the inventory process relatively easy. However, all of these companies spent some additional time and effort collecting data on transportation energy use (fuel consumed by company owned or leased vehicles), and estimating HFC emissions. WE Energies also spent additional time estimating the fugitive emissions from its natural gas pipelines.

Generally the inventory process took several months for most companies, but not a large amount of effort in terms of person-hours for the companies that already had good energy use data available. Several companies, including Miller, SC Johnson, and Cinergy, did not have the necessary detailed energy use data by facility. Consequently, it took these companies much more time than others to develop the inventory. However, these companies also felt that taking the time to put this type of data together would be helpful to them in their energy management efforts. These companies also appreciated the technical assistance offered by the EPA under Climate Leaders program. Eric Kuhn of Cinergy commented, "Without your assistance, we would still be working on our inventory" (Kuhn, 2003). Pfizer had the energy data for its main U.S. facilities, but not for the smaller ones, so it spent some additional time estimating the emissions from these smaller facilities.

The process of updating the data on an annual basis will mainly involve collecting the annual facility energy use information and updating the Excel spreadsheets used to calculate the emissions. This will be much easier for these companies, having gone through the process of developing the baseline inventory. As part of the documentation required to assure a thorough and accurate inventory, EPA requires the Climate Leader partners to explain to the

consultant assisting with their inventories where the data comes from, assumptions used in calculating the emissions, etc. This documentation is required for the baseline year only, with the assumption that the partners will follow the same procedures for subsequent years, and that any significant changes to procedures or sources of data will also be documented.

## Goal Setting Process

The inventory process allows companies to see where their GHG emissions come from, and becomes the basis for the next step – setting a specific GHG emissions reduction goal. Ten Climate Leaders partners overall and five of the companies that we worked with directly have set a voluntary GHG reduction goal. We interviewed the companies we have worked with about the goal-setting process. Specifically, we asked how the goals were developed and which staff and managers were involved.

The EPA's guidance is that the goal should be better than business as usual, based on benchmarking and economic projections for the particular industry sector. The EPA encourages the business to be as aggressive as possible in setting a five or ten year reduction goal, which can either be an absolute goal, or can be normalized for an indicator of production or business activity.

Most companies that we talked with developed (or are developing their goal) by estimating the reductions in emissions from specific measures anticipated or planned, and then checking to make sure the overall corporate goal seems aggressive enough while still being achievable. For most companies, the upper management was involved in the goal-setting discussions along with the environmental and energy staff. Several companies such as FPL and WE Energies described the process as beginning with the development of a proposed goal by the environmental staff, to be discussed with and approved by upper management. In some cases the process worked from the top down. SC Johnson's initial goal was suggested by the management, and then verified by the environmental staff based on projects being planned, mainly the landfill gas/CHP project described below (Ericson, 2003).

Some companies set goals that require them to stretch beyond projects they know are already planned for other business reasons, and some companies set more conservative goals, mainly relying on these types of already planned projects. The reduction goals and actions these goals were based on are summarized in **Table 2**. Five companies chose an absolute goal for emissions reductions (despite projected growth), which is more aggressive and more meaningful to the environment. Six of the companies chose a relative or intensity-based goal, since this is easier to calculate despite fluctuations in production levels and growth rates. SC Johnson chose both a normalized goal (easier to develop) and an absolute goal (more aggressive).

**Table 2. Climate Leaders Partners' GHG Reduction Goals and Anticipated Actions**

| <b>Company and Main Products</b>   | <b>Reduction Goal (using 2000 as baseline year unless otherwise stated)</b>  | <b>Anticipated Actions<sup>3</sup></b>   |
|--|--|--|
| <b>J&amp;J</b> – producer of personal products and health care products  | >7% reduction in emissions by 2010 (absolute) <sup>4</sup>   | Energy efficiency (EE) improvements, CHP, clean on-site generation (PV and fuel cells), green power purchasing, use of biofuels, and offset projects or emissions trading. |
| <b>SC Johnson</b> – producer of household products                       | 23% reduction per pound of product by 2005; 8% total reduction by 2005 (absolute)                                      | One large landfill gas project, EE improvements  |
| <b>Pfizer</b> – producer of pharmaceuticals and other products           | 35% reduction per dollar of sales by 2007  | Energy efficiency improvements and projects.   |
| <b>Miller Brewing</b> – beer producer                                    | 18% reduction per barrel of beer by 2006   | Large CHP projects at two facilities, EE improvements  |
| <b>Bethlehem Steel</b> – steel manufacturer                              | 12% per ton of steel by 2010   | EE improvements, fuel switching from coal to natural gas   |
| Norm Thompson Outfitters – producers of backpacks and outdoor gear       | 90% reduction in emissions by 2005 (absolute)  |  |
| General Motors – car and truck manufacturer                              | 10% reduction by 2005 (absolute)   |  |
| IBM – computer manufacturer  | 4% reduction in CO2 emissions from electricity and fuel use by 2005; 10% reduction in PFC emissions by 2005 (absolute) |  |
| National Renewable Energy Laboratory (NREL) – energy research laboratory | 10% reduction per square foot by 2005  |  |
| Holcim (US) Inc. – cement manufacturer                                   | 12% reduction per ton of cement by 2008  |  |

Source: J&J, SC Johnson, Pfizer, Miller Brewing, and Bethlehem Steel;  
<http://www.epa.gov/climateleaders/goals.html>

J&J chose an aggressive absolute goal, based on reducing GHG emissions 7% below 1990 levels (the Kyoto target for the U.S.) despite significant corporate growth expected during this time period. This is a very aggressive goal for them, and J&J is not at all sure it is achievable, but it is making a strong effort. J&J's strategy includes a five-tiered strategy, from most cost-effective projects (to be implemented first) to more costly efforts to be implemented as necessary to achieve the goal. At least for the first three tiers, J&J's required hurdle rate for investments is a 20% return on investment (ROI), which for some projects requires incentives/subsidies from the local utility or state energy office to achieve (Kaufman, 2003). J&J's five tiers of its GHG emissions reduction strategy are:

<sup>3</sup> We did not interview the last five companies listed in the table to ask about anticipated actions, but include their goals for comparison purposes.

<sup>4</sup> J&J's final goal is yet to be announced, but will be more than 7% below 2000 levels, since emissions have increased from 1990 to 2000 (due to J&J's substantial growth during this period), and the goal will be based on a 7% reduction from 1990 levels.

1. Energy efficiency projects – based on implementing J&J’s list of energy efficiency best practices at each J&J facility;
2. Combined heat and power projects, both combustion processes and fuel cells;
3. Renewable on-site generation (J&J has implemented two large PV projects so far);
4. Procurement of green power and use of biofuels;
5. Investing in offset projects and/or emissions trading.

Pfizer set an aggressive normalized goal based on projects being planned or considered at its 25 largest U.S. facilities that account for 90% of Pfizer’s GHG emissions (Forte, 2003). Miller’s goal is fairly aggressive, but is based mainly on CHP and energy efficiency projects already planned, mainly for other business reasons. (See case studies below.) Bethlehem Steel’s goal is fairly conservative, probably due to its capital constraints for significant EE projects, and due to EE improvements it already achieved in the 1990s through voluntary programs such as the EPA’s Climate Wise program.

Lockheed Martin and the three utilities mentioned above have not yet developed a goal for GHG emissions reductions, but we expect these companies to do so some time in the summer of 2003. Lockheed Martin’s goal will be based on cost-effective energy efficiency improvements only (McMullen, 2002).

The utilities we have spoken with are intending to base their goals on modest efficiency improvements to their generating operations (such as through improved operating practices), some limited amounts of fuel-switching from coal to natural gas, and in some cases development of additional renewable generating capacity. In the case of utilities, there are probably fewer available actions or projects that can be justified economically. For example, switching from burning coal to burning more natural gas costs more in most cases because natural gas costs more than coal. (If new generating capacity is needed, then combined cycle gas turbines are more cost-effective.) Developing and marketing of green power could bring increased revenues if done effectively. Both of these options are important business decisions for the utilities that are not likely to be influenced significantly by the voluntary goal-setting process. However, one of the utilities told us it is considering investing in offset projects, in the third tier of its overall strategy, even though this would not yield a financial return. The first tier would be energy efficiency improvements requiring no investments (improved operating practices), and the second tier would be efficiency or fuel-switching upgrades that have an acceptable financial return. The third tier (not to be used extensively) would be investments in GHG offset projects.

Voluntary programs tend to be more effective if there is a threat of new regulation or environmental taxes (Geller, 2003). For example, in the UK, industries are being given a strong incentive to make voluntary reductions in energy use, through a carbon tax on fuels known as the climate change levy (CCL). An industry sector can avoid paying 80% of the Climate Change Levy if the sector makes an aggressive voluntary goal to reduce its energy use and emissions. In the U.S., despite repeated attempts in Congress, there is no national legislation to control GHG emissions, and just a handful of states have enacted limited caps on power plant emissions. Given the absence of significant regulatory drivers in the U.S. it is not surprising that only ten Climate Leaders partners so far have set a goal. On the other hand, it is a little surprising that five of the ten goals so far are fairly aggressive absolute reduction goals.

## **Motivations for Joining Voluntary GHG Programs**

One of the main benefits we suggest to companies who are considering participating in Climate Leaders is the ability to document early reductions in GHG emissions, so that if/when GHG regulation becomes effective, the company receives credit for these early reductions. In addition through Climate Leaders the companies receive free assistance in developing their GHG emissions inventories, the basis for documenting these early reductions. The other main benefit we mention is the free publicity offered by the EPA, which can help improve the corporate environmental image.

The companies we have worked with offered several main reasons for undertaking and/or enhancing voluntary efforts to reduce GHG emissions. In most cases, the companies were already involved in some GHG reduction efforts, and felt that addressing climate issues was important to the company's principles as well as its corporate image. A few companies such as Pfizer mentioned that they felt stronger regulations on GHG emissions were inevitable, and that therefore it was only prudent to begin taking steps to reduce emissions, and to document these early reductions with an accepted inventory protocol.

J&J listed several additional reasons for joining Climate Leaders: 1) because they have had good experience with other EPA voluntary programs, 2) because J&J had already set a goal for stationary combustion sources of GHG emissions but were seeking assistance from the EPA in setting a goal for their mobile sources, 3) in order to benefit from the technical assistance provided by Platts Research & Consulting, 4) to take advantage of peer exchanges and other sources of information, and 5) to support the U.S. GHG reduction efforts (Kaufman, 2003).

WE Energies told us, "Our decision was motivated by the need to continue to address climate concerns and to quantify the results of our existing and planned activities." (Daniehel, 2003) SC Johnson and Johnson & Johnson were motivated by a strong corporate commitment to being socially and environmentally responsible. Cinergy told us that they joined mainly because of their CEO's environmental commitment, and his desire to have an influence on U.S. climate change policy by taking a proactive position (Kuhn, 2003). On the other hand, a few companies, including Miller and Lockheed Martin, de-emphasized the policy aspects of undertaking GHG reduction efforts in favor of the practical, cost saving benefits (based on energy efficiency).

## **Benefits and Results**

Following from the reasons for undertaking GHG reduction efforts, the companies reported a few different benefits they have experienced so far. Miller has enjoyed cost savings from the energy projects it has implemented, including the combined heat and power projects. SC Johnson has taken advantage of publicity from joining the Climate Leaders program, especially from the visit of the EPA Administrator Christine Whitman to its Racine, WI facility in the fall of 2002. For other companies, the benefits have been perhaps less dramatic so far, but none expressed any regrets for the voluntary GHG reduction activities they have undertaken. Several companies reported the benefit of increased management support for energy efficiency and other GHG reduction efforts through having established a corporate goal.



Are there any results from the GHG emissions inventory and the goal-setting process so far? Several companies have gone ahead and implemented energy efficiency and other GHG reduction projects. We highlight a few examples here.

### **Case Studies – GHG Reduction Projects**

SC Johnson. SC Johnson's first Climate Leaders project will be implemented at its largest manufacturing facility, the Waxdale plant in Racine, Wisconsin. The project will involve recovering methane from a nearby landfill, piping it to the facility, and burning it to produce both electricity to power the plant, and steam for process heat and space heating. The project will significantly reduce GHG emissions by reducing the facility's use of conventional natural gas for heating (burning landfill gas is considered by the GHG protocol and the EPA to produce zero net GHG emissions), and its use of purchased electricity (generated mostly from coal and natural gas sources in Wisconsin).

SC Johnson evaluated two alternative cogeneration systems, one utilizing an array of four large internal combustion engines and the other employing a single gas-fired turbine. The analysis determined that although the two alternatives were generally comparable in most aspects, the turbine would provide much greater heat recovery, leading to a better financial return as well as a larger reduction in GHG emissions. The overall return on investment (ROI) for the turbine system was estimated to be about 20%, which exceeded SC Johnson's minimum hurdle rate for financial investments. The turbine system will reduce GHG emissions by almost 33,000 tons per year, in itself enough to exceed SC Johnson's Climate Leaders goal. This project was developed and will be implemented mainly to achieve the significant reductions in GHG emissions (Ericson, 2003).

Miller Brewing. Miller based its GHG reduction goals on several projects, including two large CHP projects and two major efficiency projects. The two CHP projects are highlighted briefly here. The first CHP project involved installing a second steam turbine at the brewery in Ohio. The coal-fired boiler at this facility produces high-pressure steam for power production, and low-pressure steam for process heat is also generated from the power-generating turbine. The facility needed more low pressure steam for the process than was able to be generated from the existing steam turbine, so superheated steam was being pressure-reduced to produce additional low pressure steam for process use, a wasteful use of high pressure steam. Since the boiler had plenty of capacity, Miller decided to install an additional steam turbine to allow the facility to generate additional power and the additional low pressure process steam needed (as a by-product of electricity generation), while greatly improving the overall efficiency of the system and significantly reducing energy costs compared to the existing system. The new turbine will reduce the need for power purchased from the local utility, which will significantly reduce the facility's indirect GHG emissions.

The second CHP project, implemented at the brewery in Irvine, Calif., involved installing two new 5 MW gas-fired turbines. This project was implemented because of the desire to guard against future blackouts at this facility, like those that

happened in early 2001. However, this CHP project will also result in cost-savings and reductions in GHG emissions reductions. Since Miller was already producing steam with a gas boiler at this facility, the main GHG emission reductions will come from the reduction in electricity purchases. However, these reductions in indirect emissions are less than originally expected due to the low GHG-intensity of the power generated in California (mainly from hydro and gas sources).

Both of the CHP projects were implemented in July of 2002, and the reductions in GHG emissions will become apparent in comparing the 2002 emissions totals for these two facilities with those for 2001. In Miller's case, the CHP projects and energy efficiency projects were mainly implemented to produce energy cost savings, and to improve the electrical reliability in the case of the California facility, with the GHG emissions reductions a secondary goal (Barthold, 2003).

## **Conclusions**

Momentum is growing in the U.S. business community to participate in voluntary GHG reduction programs. With the Kyoto Protocol likely to come into force in the coming year, many firms with international facilities expect to be facing mandatory GHG emission limits at many of those facilities before long. That in turn makes these companies recognize that they should start learning how to control GHG emissions in their U.S. operations as well, gain some public relations benefits, potentially save some money, and in the process help influence U.S. policy on this critical issue.

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