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Case Studies on CSR and Innovation: Company Cases from Germany and the USA

Project partners:

future  verantwortung unternehmen

INSTITUTE **4** SUSTAINABILITY



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Abstract

This collection of case studies was prepared as part of the research project entitled “The Relevance of Corporate Social Responsibility (CSR) for Innovation and an Integrative Approach to Management”. The project examined the potential of CSR as for innovation in general and for environmental innovations in particular. The project included a literature review, an e-mail survey of German companies, the present case studies and a multi-stakeholder workshop.

The case studies are documented in this present publication. The results of the literature survey and the opinion survey are published in German under the title *CSR und Innovation. Literaturstudie und Befragung* (Clausen and Loew 2009).

Examining the case studies, the following issues become apparent:

1. A number of companies, especially those with a wide array of different products, are striving to make a high number of products more sustainable bit by bit.
2. For companies in the energy technology and power generation sectors, energy efficiency has always been one of the product quality criteria required by the markets. Thus, energy efficiency is a traditional development objective in this sector.
3. Some companies have developed completely new sustainability innovations.

In light of these observations, the authors describe different problems and possible solutions.

From the case studies we learn primarily about the experiences and approaches of large corporations. The twelve case studies provide an impression of the opportunities, the approach, and strategies of these corporations, as well as the incentives and challenges that businesses face with respect to green and sustainability innovations. While not all of the lessons from the case studies may be applied directly within mid-sized companies, these lessons provide, at the very least, a helpful stimulus for companies of any size.

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1. Introduction

About the Project

This collection of case studies was prepared as part of the research project entitled *The Relevance of Corporate Social Responsibility (CSR) for Innovation and an Integrative Approach to Management*. The project examined the potential of CSR as for innovation in general and for environmental innovations in particular.

The project included the following steps:

- literature review: survey of the culture of CSR, innovation und entrepreneurship
- survey: e-mail survey of German companies
- case studies: preparation of case studies of German and U.S. companies
- workshop: discussion of initial results and experiences in business on the 7th German multi-stakeholder workshop on CSR (September 2, 2008).¹

The case studies are documented in this present publication. The results of the literature survey and the opinion survey are published in German under the title *CSR und Innovation. Literaturstudie und Befragung* (Clausen und Loew 2009)².

Finally, the central results and recommendations are presented in *CSR und Innovation: Die Zukunft nachhaltig gestalten [CSR and Innovation: Shaping the Future Sustainably]*, a brochure edited by the German Ministry for the Environment (2009).³

The project was sponsored by the German Federal Ministry for the Environment, Nature, Conservation and Nuclear Safety (BMU). Sabine Braun (future e.V.), Thomas Loew, Dr. Lasse Loft (both Institute 4 Sustainability), Dr. Jens Clausen (Borderstep) and Molly Hall (DeWitt Ross & Stevens) conducted the research between November 2007 and November 2008.

Procedural Method

For the twelve case studies, the authors examined six corporations in Germany and six in the United States. The authors sought corporations that had been recognized for their CSR activities and that had also recently launched „green“ innovations. The selection of the German corporations was based in part upon the written responses to the corporate survey. The choice of the American corporations was based upon interviews and internet research. A further factor in the selection of corporate case studies was the availability of information about the corporation. Consequently, the research focused on large, mainly multinational entities, because the scope of information available on these company web sites is much greater. The project included one small-to-middle sized company, the German company Lenze, in order to provide an impression of a company in this smaller size range.

From the case studies we learn primarily about the experiences and approaches of large corporations. As a whole, the twelve cases provide an impression of the opportunities, the approach, and strategies of these corporations, as well as the incentives and challenges that businesses face with respect to green and sustainability innovations. While not all of the lessons from the case studies may be applied directly within mid-sized companies, these lessons provide, at the very least, a helpful stimulus for companies of any size.

¹ See http://www.4sustainability.org/seiten/csr-multistakeholder-CSR_und_Innovation.htm (in German)

² Download: www.future-ev.de, www.4sustainability.de or www.borderstep.de.

³ Order via: bmu@broschuerenversand.de

The case studies are based on interviews with at least one employee of each of the corporations. Supplemental information was taken from corporate web sites or sustainability reports, as well as from documents provided by the individual corporations.

In the interviews, corporate representatives were asked about the meaning of sustainability megatrends such as climate change or the growing scarcity of energy and other resources upon the company's innovation, and were asked about the roll of CSR management and CSR's significant drivers and challenges. The corporate profiles also examined concrete examples of innovation with an eye towards using these examples to understand how innovation management can be implemented (Table 1). The telephone interviews for the case studies were conducted between July and November of 2008 and lasted between 45 and 70 minutes each.

Table 1: Interview questions

- | |
|--|
| <ol style="list-style-type: none"> 1. Which economic and political trends have had the greatest impact upon your company's innovative activities during the last five years and during the last twelve months? 2. How have these trends affected the course of decision-making? 3. Which areas of the business are involved with this decision-making today in contrast with decision-making in the past? 4. Which, if any, organizational CSR processes contribute to green innovations in your perspective? 5. Does the CSR process offer the chance to integrate diverse interests such as cost reductions versus sustainability in construction or supply chains? 6. What is the general focus of innovation at your company? 7. How would you describe (positive as well as negative) the sustainability aspects of these innovations? 8. Which factors are most decisive in achieving innovation today? Are these other factors than were relevant ten years ago? 9. Please describe a typical example of a green or sustainability innovation in your company. 10. Could you sketch out the history of how this innovation (described above) came about? Where did the idea come from? Who or what was most instrumental in furthering or hindering the innovation? What were the critical milestones? Why did the innovation become "sustainable"? 11. What are the essential drivers and obstacles to <i>green innovations</i> in your company? 12. How in your opinion, could innovation be furthered at your corporation in the future? 13. What role would CSR play in that process? What role has CSR played to date in the process of innovation? |
|--|

Structure of the Case Studies

The case studies are organized along the following lines:

1. introduction of the corporation
2. CSR-activities and CSR-management
3. the company's focus for innovation
4. presentation of one specific innovation that has contributed to sustainability
5. motivations and challenges
6. the role of corporate CSR-units in innovation management

Table 2: Overview of the case studies

Corporation	Business Domains	Country
Bosch	Focus includes automotive engineering and building services engineering	Germany
Henkel	Washing and cleaning agents, adhesives	Germany
Hewlett-Packard	Data processing equipment and services	Germany
Lenze	Propulsion technology	Germany
Osram	Lighting	Germany
Siemens	Focus includes among other things electrical engineering and medical technology	Germany
3M	Focus includes adhesives, thinsulate, washing products, tape and office products, and many others	USA
DuPont	Focus includes building materials, crop and pest management, adhesives, and chemicals	USA
General Electric	Focus includes electrical engineering and medical technology among others	USA
Johnson Controls	Focus includes automotive engineering and building services engineering	USA
Procter & Gamble	Focus includes washing and cleaning agents, cosmetics, and hygiene products	USA
SC Johnson	Cleaning agents, consumer products, air care and pest control	USA

2. Results

After examining the case studies, the following issues become apparent:

4. A number of companies, especially those with a wide array of different products, are striving to make a high number of products more sustainable bit by bit.
5. For companies in the energy technology and power generation sectors, energy efficiency is a quality criterion which commands a certain demand. Thus, energy efficiency has become a traditional development objective in this sector.
6. Some companies have developed completely new sustainability innovations.

In light of these observations, we see different problems and possible solutions that can be summarized as follows.

2.1 Companies with a Wide Array of Products

For corporations with a wide array of products, the following challenges are common: First, a high percentage of the company's staff needs to understand the corporate sustainability objectives and consider these objectives throughout a large number of diverse R&D projects. Second, there exists a large variation of detail problems and detail solutions. In those companies progress in R&D projects seems to be most easily achieved when:

- sustainability objectives have been integrated into the corporate strategies and those strategic goals are clearly defined;
- the company's R&D objectives are derived from corporate strategy and those objectives consider sustainability targets;
- a high number of the R&D experts has knowledge of sustainability problems and possible solutions;
- sustainability experts can be made available when the need arises;
- there is a R&D controlling or feedback system that considers sustainability objectives and targets;
- corporate culture reflects a positive, supportive attitude with respect to environmental and social issues.

Almost all of the corporations examined have developed standardized procedures for innovation, and have integrated sustainability features into those procedures. In many of the corporations, analytical instruments such as green accounting or energy analysis have been adopted within the innovation procedures in order to measure progress against these objectives and the potential of new ideas.

Eco-efficiency best characterizes the results achieved within these innovation processes.

In some cases, the corporate CSR and/or environmental teams were involved in establishing new procedures and instruments for innovation management. Examples of this type of collaboration in corporations with a wide array of products include but are not limited to the case studies from Henkel, Siemens and Procter & Gamble.

Application of Instruments and Approaches

In these case studies, the authors came across a number of instruments and techniques to promote environmental or social goals in the innovation process.

These include:

- Clear environmental and/or social targets for innovative products (Siemens, Henkel, Bosch Thermotechnik, General Electric, and SC Johnson).
- Methods for analyzing environmental, energy and economic efficiency (Henkel, Siemens, Bosch Thermotechnik, Procter & Gamble, Johnson Controls, and General Electric).
- Internal competitions for prizes or recognition for innovations with particular relevance to the environment (Siemens, SC Johnson).
- Configuration of the innovation teams in a manner that in each innovation project someone is knowledgeable about each of the sustainability topics and is able to integrate their respective goals (Henkel, Johnson Controls, Siemens).
- Support of an innovative corporate culture that is open to environmental and social goals (Henkel, 3M, SC Johnson).

2.2 Energy Efficiency as a Traditional R&D Goal

In the Bosch case study the business area of thermotechnology was considered. Bosch produces heating systems for buildings and energy efficiency is a traditional development goal. However the relevance of this goal with respect to other product quality objectives has changed from time to time. The goal to reduce Carbon Dioxide (CO₂) emerged recently.

The situation is similar at Siemens in the energy sector, and generally so at Lenz and Osram in Germany, and at Johnson Controls in the United States.

In the markets where these companies are active, energy efficiency has always been one of the criteria considered in purchasing decisions. Therefore, energy efficiency is always part of the R&D objectives. The push to develop procedures and instruments for bringing energy efficiency or CO₂ considerations into product development did not come primarily from corporate environmental and CSR departments. Nevertheless interesting CSR and environmental improvements of the R&D processes can be observed in these cases..

2.3 Completely New Sustainability Innovations

A fully different type of sustainability innovation is exemplified by the Osram case study. Osram recognized the following situation: Approximately 1.6 billion people in the world have no access to grid electricity and are dependent upon lamps that burn fossil-fuels, typically kerosene. Thus, 77 billion liters of kerosene are burned yearly to obtain light, through which 190 million tons of CO₂ are emitted. These lamps are not only extremely inefficient, uneconomic, and dangerous sources of light, but they also pose a risk to health to those using them. The advantage of kerosene is that it can be obtained in such small amounts that people with limited or uncertain income can afford it. Additionally, the lights that burn kerosene are inexpensive.

Based on this analysis, Osram promoted an innovation project that led to a complex systems innovation, but the focus of the innovation can only be characterized as low tech. The essential elements of the project are as follows:

- a technical product: a transportable light with a rechargeable battery,
- a service product: a battery loading station with a solar roof for recharging the batteries off-grid,
- a financing product: a micro-credit for purchasing the light.

All of this was developed outside of the usual innovation process. The result is a fully new

business model, which can be made available to people that up to now have had no access to electricity.

Cases such as this one make clear that a well-planned and standardized innovation processes with integrated sustainability objectives are not the only way. To address sustainability problems, it is not enough to merely optimize existing products. Society needs to develop ideas that are entirely new, to explore projects that up-to-now have never been conceptualized. The case studies make clear the importance of creativity, wealth in ideas, and networking between those who have problems and those providing solutions.

3. Bosch: Using CO₂-Flag for Targets in Innovation Projects

The Bosch Group is a leading global supplier of technology and services mainly in the areas of automotive and industrial technology, consumer goods, and building technology. The company was founded in Stuttgart in 1886 as “Workshop for Precision Mechanics and Electrical Engineering” by Robert Bosch (1861-1942).

Today the Bosch Group consists of Robert Bosch GmbH⁴ and 300 subsidiaries in more than fifty countries. The divisions automotive, industry appliances, as well as the consumer goods and building technology divisions have 271.000 employees and have generated a turnover of 46.3 billion euro in 2007.

Bosch Thermotechnik GmbH is one of the oldest parts of the consumer goods and building technology division, with one hundred years of experience in the manufacture of heating products and hot water solutions. Today its portfolio includes energy-efficient and environmentally friendly solutions, from floor-standing and wall-hung heating boilers, heat pumps and co-generation plants, to solar systems and water heaters.

Solar heating is a dynamic growing market for Bosch Thermotechnik. The annual production of solar panels has grown by a factor of ten in the years between 1995 and 2006 when it reached a level of 95.000 collectors. In 2008 a production capacity of 350.000 collectors was achieved.

CSR-Activities and Design of CSR-Management

Bosch has been reporting on its environmental activities since 1998. Information on employees and its global social engagement (corporate citizenship) have been published since the first sustainability report was presented in 2006.

The relevant sustainability activities of Bosch are coordinated by the “HSE Steering Committee” (Health, Safety, Environmental and Fire Protection and Emergency Control) The committee consists of HSE-representatives from twelve regions and manages the global implementation of strategic goals and standards regarding HSE.

The HSE central department is located at the Bosch Group headquarters in Stuttgart. Each production site has an officer who is in charge of environmental management and safety issues.

Figure 1: Organisational structure for HSE at Bosch



Source: Bosch (2008)

⁴ = Ltd.

All of Bosch's production sites have an environmental management system based on ISO 14001. Of its 292 sites, 213 have already achieved external certification. As with all of Bosch's divisions, Bosch Thermotechnik is committed to the "House of Orientation", The "House of Orientation" includes corporate values such as orientation towards the future, the interests of society and social and ecological responsibility. The "House of Orientation" offers general objectives which can also be considered as tools to be used during decision-making processes within the innovation process of Bosch Thermotechnik, for example when it is necessary to decide between economic toll aspects and environmental performance.

Innovation Objectives

The Bosch Group strives to enlarge its "green" business activities. The growing relevance of climate protection and rising prices for energy are driving factors for this strategy. Against this background, especially business activities in the area of renewable energies were promoted. One example is the recent acquisition of Ersol Solar Energy a leading producer of solar cells.

In all markets in which Bosch Thermotechnik operates, climate protection and security of energy supplies are of special relevance: the building sector requires approximately 40 % percent of the total energy used worldwide (for heating, cooling, warm water, lighting, and appliances). In Germany the private housing sector consumes 20 % share of the total German energy used. The major part is used for heating (75 %) and another 11 % is used for the provision of hot water. The company has a good opportunity to exploit its many years of experience with these technologies and therefore Bosch Thermotechnik formulated objectives for product development: the reduction of GHG emissions, energy efficiency and use of renewable energies.

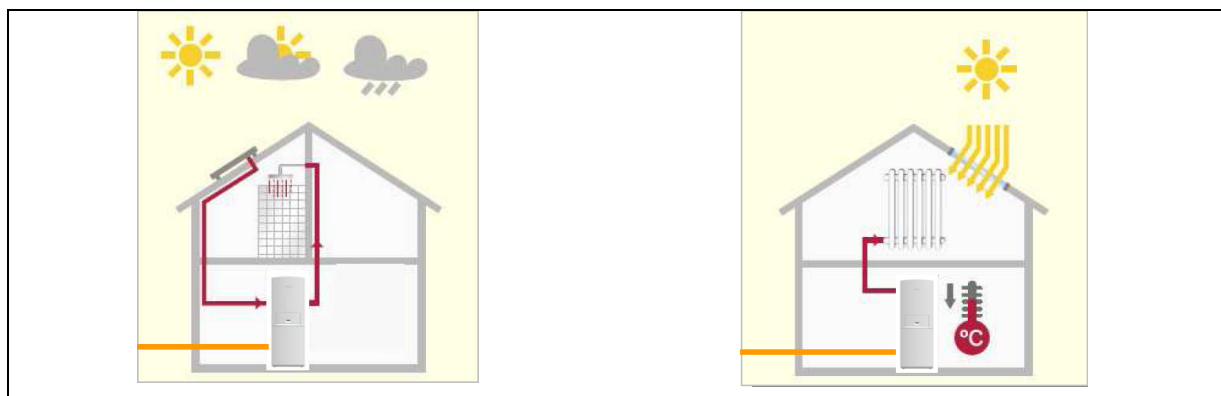
Innovations regarding renewable energies focus on system technology, meaning the systematic linkage between solar and conventional heating technology. Important issues in this field include the integration and optimisation of these systems.

Innovations and their Sustainability Aspects

The following two products of Bosch's trademark Junkers ("SolarInside", "CerpurModul Solar") are innovations which are designed to raise the energy efficiency of heating systems and to integrate several components of the system.

The Junkers solar technology "SolarInside" measures the temperature demand of the water consumption and the heat on the surface of the solar collectors. By calculating the possibility of using the solar heat to warm up the storage this technology is considerably energy efficient. The energy saving effect for warm water supply is up to 15%.

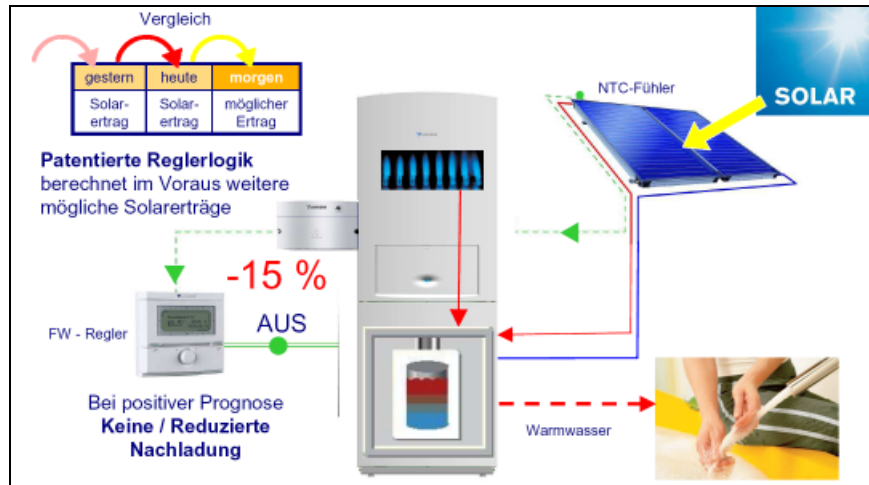
Figure 2: SolarInside



Source: Bosch (2008)

Solar Inside technology is used in the „CerapurModul Solar“. The module integrates all components (accumulator, heater, heat exchanger and differential controller) of a combined solar and conventional heating system. The advantage of such a system is that it uses up less space and its installation is simple.

Figure 3: Cerapur Modul Solar



Source: Bosch (2008)

Innovation Management Process

Bosch Thermotechnik has a process orientated innovation management. Different units such as product management, production, product development and quality management are integrated in the innovation process. Environmental engineers are integrated in the process, too. This results in the consideration of the different aspects at an early stage in the process.

Bosch Thermotechnik introduced the “CO₂-Flag” in its innovation management. By using this indicator in the innovation process all products have to show how much energy (and thus CO₂) they save. By quantifying the energy savings of a product the customer can see the economic advantage of an energy efficient appliance. Overall this leads to a set of qualitative and quantitative indicators which can be used in the innovation process, especially in deciding whether or not to go forward with a new product. Formal processes have been established in order to support good ideas in the innovation process such as monthly meetings to discuss new product ideas and a reporting system on these ideas.

Main Drivers and Obstacles for Sustainability Innovations

Some years ago one of the major objectives in product development was the increase in standards of living, for example the need to increase the performance of a heating system. Due to climate change, rising energy prices and discussions regarding long-term safety of energy supply nowadays, low CO₂ emissions and energy efficiency have become much more important to customers. A growing number of energy efficient appliances are demanded by customers in order to reduce their heating and hot water costs. Furthermore there are a growing number of customers who wish to reduce their dependency on a single energy source. As an answer to these desires Bosch offers a wide range of products that use renewable energies such as solar systems and heating pumps as well cutting edge conventional heating technologies.

4. Henkel: The Role of Corporate Culture for Sustainability Innovation

Henkel AG & Co KGaA is a stock listed company with the majority of its voting stock owned by descendants of the founder Fritz Henkel.

The company is active in the three business sectors: laundry and home care, cosmetics / toiletries and adhesive technologies. The company was founded at the end of the 19th century. Its first products were detergents and bleaching soda. Henkel's best known product, the first "self-acting laundry detergent" Persil was launched in 1907 and until today it is the flagship product in the detergents division.

Since the beginning of industrial production, Henkel has been confronted with environmental problems. In the early years neighbouring farmers were troubled by air pollution. In the late 1950s tensides of the detergents led to large amounts of foam which covered rivers and lakes. This problem was the main driver for the development of substituting substances. In the 1970s synthetic textiles became fashion, which made it necessary to lower washing temperatures and adapt the detergent ingredients to these temperatures. Enzymes were introduced as a major ingredient, because they were effective at lower temperatures. As a result the energy use per washing has been cut by half since their introduction. Already at an early stage Henkel communicated this environmental advantage within its advertising. Another challenge was the necessity of substituting phosphates as ingredients of the detergents, because phosphates led to eutrophication. Since 1986 Persil has been free of phosphates. Finally, the volume of the detergent (transport) and the packaging (material and waste) are important aspects for potentially optimising detergent and home care products with respect to their environmental impact.

CSR Management

Henkel published its first environmental report in 1992 and continued doing so annually. In the year 2000 environmental reporting was transformed to sustainability reporting. Meanwhile a sustainability council was established which coordinates the global activities in cooperation with the corporate divisions of their regional and national companies.

Figure 4: Organization for sustainability



Source: Henkel (2008)

Henkel has a matching set of codes of conduct and standards which are applicable throughout the whole company. These e.g. include requirements for leadership, amount of protection, safety and health and purchase.

For Henkel sustainability has a strategic dimension. Therefore all business activities throughout the value chain focus on the challenges of sustainable development. Henkel has grouped these challenges according to five focal areas: energy and climate, water and wastewater, materials and waste, health and safety, and social progress.

With respect to sustainability, progress has been made in recent years, particularly when focussing on products as well as the production process. Since 1998 energy use has fallen by 40 % per tonne of product, water use by 40 % per tonne of product and waste generation by 37 % per tonne of product. Work-related accidents declined by 68 %. New objectives have been set up. By the year 2012 work-related accidents should be reduced by 20 % compared to the year 2007. Reduced energy use, water use and waste shall achieve further improvements between 10 % and 15 % compared with the year 2007.

Figure 5: Focal Areas

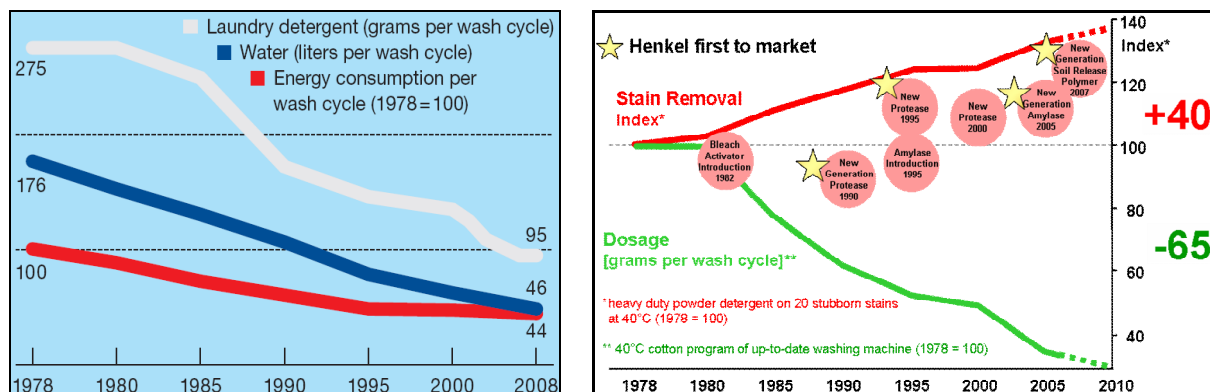


Source: Henkel (2008)

Henkel continuously improves the quality of its detergents. Once a board member described the relationship between the quality of the brand and innovation as follows: “Persil remains Persil, because Persil does not remain Persil”. This means that during the past 30 years the performance of the washing powder has improved tremendously while during the same time the environmental impact has been reduced significantly. Due to the continuous improvement of the formulae for washing powder gels and tabs the amount of detergent, energy and water needed, per wash cycle has been reduced continuously. This development is the result of several innovation steps. The research and development department for detergents worked continuously on the improvement of these product qualities.

In order to produce a successful product market demand and the behaviour of competitors need to be considered. Henkel therefore established strong coordination between the marketing department and the product development unit.

Figure 6: Sustainability in laundry washing: progress from 1978 to 2008



Source: Henkel (2008)

Main Drivers and Obstacles for Sustainability Innovations

Today the issues of climate protection, prices for energy and corporate responsibility attract more attention than they used to in the past. These issues have become more relevant for purchasing decisions. However prices/costs and product performance still remain decisive for the purchasing decisions of the customers. As long as energy prices remain high [which was the case as the case study was being prepared] products which lower the energy costs for the customer will become more interesting.

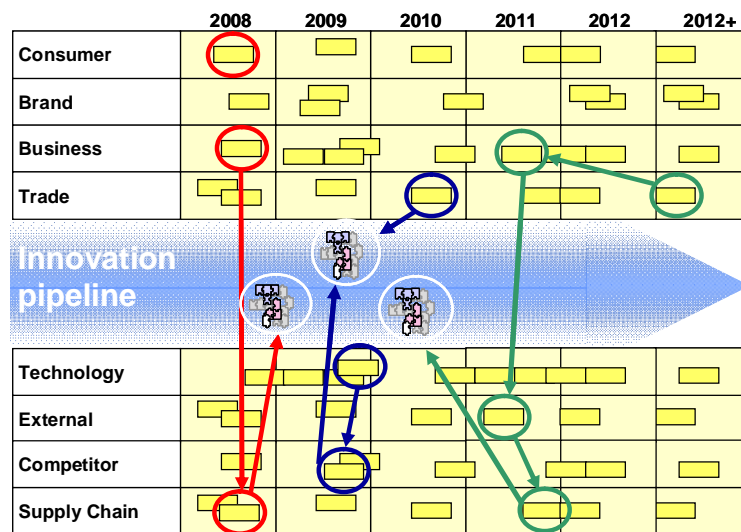
Inside Henkel corporate culture plays a major role. Quite early Henkel dealt actively with environmental problems. When, for example in the 1950s synthetic detergents and tensides were used and as a result rivers and lakes were crowned with mountains of foam Henkel reacted and started to systematically analyze the water in the Rhine and its tributaries in order to determine the levels of washing active substances and as a result introduced regular ecological quality checks for all their laundry detergents and household cleaners. This, in combination with the influence of the culture of a family-led company paved the way for a corporate culture which places a huge emphasis on environmental and sustainability issues. The company regards its corporate culture as an important asset because at the end of the day the development of ideas as well their uptake cannot be influenced by a formal target setting system. In this respect awareness and values are much more important.

However a general barrier for innovative sustainable products is the mind set of the customer. Consumers and customers are used to sticking to certain processes and product qualities. In the market for detergents for example the behaviour of the competitors can become a serious obstacle for sustainable product improvements e.g. if they offer detergents with a large volume some consumers buy these – as they have the (wrong) impression they get more goods for the same price. Such behaviour of competitors prevents a reduction in size of the packaging.

The Design of the Innovation Management

The company's innovation processes are organised according to the stage gate approach with clearly defined steps. The starting point of the process is the consideration of the needs and current difficulties of existing customers as well as within its own value generation processes. Innovation management uses roadmaps to consider future developments. Roadmapping involves taking a look at possible developments from two perspectives: from now into the future and from an expected future back to today. When setting up roadmaps Henkel considers eight different areas such as consumer markets industry markets or competitors (see figure 4). Aspects such as climate change, scarcity of water or rising prices for raw material are considered in the category "external". Demographic change and rising importance of health awareness are part of the category "consumer". When a team for a certain innovation project is established, it is a requirement that for each of these categories a suitably qualified team member is selected and assumes responsibility for this area.

Figure 7: Including roadmapping results in the innovation process



Source: Henkel (2008) (adjusted)

The Role of the CSR Department in Innovation Management

At Henkel CSR has got several roots. One is the mind set of the founders which was embossed by responsibility towards employees, consumers and the environment. The first self working detergent "Persil" for example led to a tremendous ease of work for the consumers and it no longer contained chlorine which reduced the environmental impact. Since the company is still owned by descendants of the Henkel family this tradition is still very much alive. The early confrontation with the environmental impact of the products the health risks in the production process led to an organisational structure in the company that considers these aspects.

As time went on, these issues seem to become closely linked to each other. The early experiences led to the establishment of a corporate culture which is open to and serious about sustainability issues.

Sustainability management fosters the awareness for the relevance of these issues through sustainability communication and the continuous integration of respective mechanisms in the existing management processes. The definition of the focus areas (energy and climate, water and waste etc.) was an important step. The respective issues and tasks had been considered before, but a clear structure was missing. The clarity provided by the focal areas (see above) has several advantages. These focal areas created a mutual understanding which made communication easier and enabled a systematic integration of these issues in organisational processes.

The early recognition of certain issues which are relevant for research, development and marketing is a further contribution of sustainability management to innovation management.

Note: This case study is based on a telephone interview with Dr. Arnd Scheidgen, Head of Global R&D Chemistry Laundry & Home Care, Henkel in Summer 2008 and his presentation on September 2, 2008 in Berlin. Download of the English language slides at http://www.4sustainability.org/seiten/csr-multistakeholder-CSR_und_Innovation.htm

5. HP-Germany: Promoting Diffusion of Green IT Innovations

Hewlett-Packard was founded in 1939. With a huge product range HP is today the IT-company with the highest turnover of 104 billion \$ in 2007 and employs 107.000 people. Three business units concentrate on “computing and workstations”, “imaging and printing” and “storage, servers and software”.

CSR Activities and CSR Management

Environmental protection is integrated in HP strategy since the 1970s. About 1990 the design for environment program was initiated, which lead to HPs “environmental product lifecycle” approach. Today, HPs global citizenship strategy highlights three areas of activity:

- Supply chain responsibility
- Climate and energy
- Product reuse and recycling

In 2007 the stakeholder advisory council (SAC) has been created in which 5 persons from NGOs and CSR-specialists are active. The main responsibility for global citizenship is situated in the environmental departments of the business units.

Innovation with Contributions to Sustainable Development

Facing challenges of sustainability the HP-Labs are currently working on two overarching subjects:

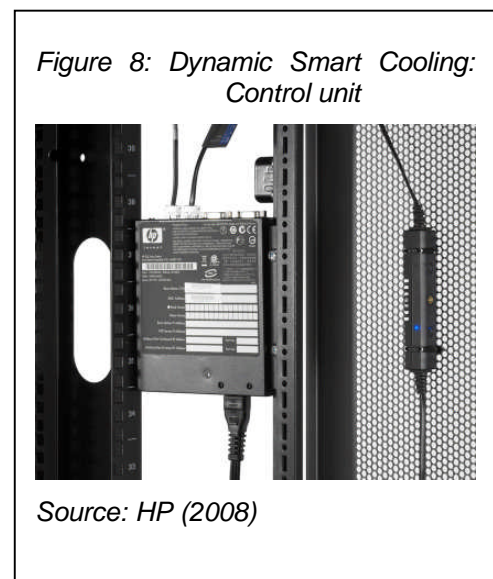
- The green data centre: The target is to reduce carbon emissions from data centres by 75% at lower investment cost. The energy use of data centres is subject of research from cradle to grave.
- Light instead of electricity: Optical wires are 20 times as efficient as electrical wires made from copper. Companies may save Gigawatts of electricity by this technology. The HP-Labs Photonic Interconnects Initiative aims at replacing all electrical cables in IT by optical wires.

A large share of new or optimized HP products contribute to material or energy savings. They cover a big part of IT, e.g. workstations (Thin Clients, energy efficient PC), the data centre (energy saving servers, dynamic smart cooling) and printing.

Drivers and Obstacles

Important drivers of sustainable product innovation are climate protection and rising energy prices. Another driver is scarcity of small metals, e.g. platinum group metals, which lead to material efficiency and optimized recycling.

Material and energy efficiency as additional objectives of R&D increase the speed of innovation. Marketing and sales have to face this and have to communicate everything to the customer, which is not always easy. And the customer as well has difficulties to understand all the improvements and decide, whether they might be helpful for his business. The diffusion of new solutions is further hindered by the fact, that quite often sector specific requirements have to be fulfilled.



The Role of CSR in Innovation Management

The environmental management of HP-Germany contributes to several activities and working groups of innovation- and product management.

In 1998, Klaus Hieronymi, today the environmental speaker of the board of HP- Europe, Middle East and Africa (HP-EMEA), founded the „Environment Business Management Organisation for HP-EMEA“. In close contact to opinion leaders, government and NGOs this team develops solutions for environmental problems of product lines, e.g. in recycling, and promotes innovative applications of IT-solutions which contribute to solving environmental problems.

Within the last year, HP founded the „Environmental Leadership Council“. Under co-ordination of Klaus Hieronymi a team from all business units as well cross-functional units with environmental importance are working to:

- set priorities and objectives and develop a controlling for all environmental functions within EMEA,
- represent the position of EMEA in exchange with HPs global functions,
- co-ordinate market research activities,
- exchange information about planned products and activities to maximize synergies.

In 2008 an Eco-Solutions-Engagement-Team was piloted. This pre-sales Team is co-ordinated by environmental management. All business units as well as cross-functional units are represented. The team has the task to develop cross-business-unit proposals to clients. It is also responsible to identify necessary innovation from the clients point of view and initiate projects within the HP-Labs.

In co-operation with the HP Education Services the environmental management Germany developed a new idea in 2008, the Eco Solutions Workshop. It aims at informing clients about new green developments of HP. Four focus subjects are part of the workshop:

- the green data centre,
- workstations and environment ,
- green printing,
- purchasing green IT.

The idea is to qualify decision makers from clients with a view on innovative HP products to speed up diffusion of material and energy saving products.

More information concerning HP:

Global Citizenship Report: www.hp.com/de/globalcitizenship

Environmental activities of HP-Germany: www.hp.com/de/umwelt

6. Lenze: Energy Efficiency as Core Competence of Innovation Management

Lenze was founded in 1947 and is active in drive engineering. Lenze is situated near Hameln and employ 2008 3.200 people. More than 300 are in R&D. Lenze realized a turnover of € 587 mil in the fiscal year of 2006/2007.

CSR Activities and CSR Management

CSR at Lenze focuses on environmental management, good working conditions and some support for cultural initiatives. The environmental management system was initiated at the end of the 1990s and currently, about 15 units are certified according to ISO 14 001. Product related issues are an important part of the EMS. At the beginning, the subjects were take back, recycling and avoidance of hazardous substances in electronics. In 2007, a project to improve energy efficiency has been started and is co-ordinated by innovation management. The environmental manager takes part in the project to apply lessons learned in Lenze's own production.

Focus Areas of Innovation

Lenze is active in automatization. The trend to further automatization is as important for business as the trend of globalisation. Globalisation leads to more international marketing in developing and emerging economies. Decision making becomes more international.

Climate protection and saving energy have become more important since the last IPCC report. In Lenze's view the interrelationship is simple: Energy use becomes lower when efficiency rises. Since drives require about two thirds of industries electricity use, energy efficiency of drives is of utmost importance.

The possibilities to enhance energy efficiency of drives are shown in the following model:

Figure 9: Three ways to improve energy efficiency

1. Using electrical energy intelligently: as little as possible	2. Converting energy with a high degree of efficiency	3. Using the recovered braking energy
Concepts with high energy efficiency (should be used)		
<ul style="list-style-type: none"> ▶ Requirements-based dimensioning ▶ Controlled drive (frequency inverter) ▶ Energy-efficient open-loop and closed-loop motion control 	<ul style="list-style-type: none"> ▶ Components with a high degree of efficiency 	<ul style="list-style-type: none"> ▶ Energy exchange between the drives ▶ Intermediate storage of the braking energy ▶ Feeding back of the braking energy
Concepts with low energy efficiency (should be avoided)		
<ul style="list-style-type: none"> ▶ Oversizing ▶ Uncontrolled operation 	<ul style="list-style-type: none"> ▶ Components with a low degree of efficiency 	<ul style="list-style-type: none"> ▶ Use of a brake resistor

Source: Lenze (2008)

Innovation with Contributions to Sustainable Development: Efficiency in Drive Engineering

About 30 years ago frequency converting was invented. Since then, rotation speed control makes it possible to adapt drive power to the power needed for propulsion.

But to date, only about 12% of all drives use speed control for enhanced energy efficiency while on about 50% of all drives the technology would help saving energy. In Germany alone, speed control would have lowered energy consumption of drives by 22 TWh in 2004. The effect would still be bigger, if energy from brakes would be fed back to the electric systems by generators. All these technologies are ready for use and well tested.

For diffusion of these technologies it is important to lower the price. The lower the price, the faster is the market access of innovations.

Drivers and Obstacles

The main tool for speeding up the diffusion of drive innovations for Lenze is marketing. By multiple tools the customer is informed and convinced of the technical and economical feasibility of new generations of efficient drives. The climate protection debate as well as rising energy prices (in 2007 and 2008) did help, but yet in many companies decisions are postponed. The reason is, that in many sectors energy cost is only about 1% of total cost. Hence, top management attention is not available. But the younger generation of top managers in Germany is more interested. People who took part in the environmental movement when they were young are more prone to take interest in environmental friendly technology.

Figure 10: Electronic component for regaining energy from breaking in drives



Source: Lenze (2008)

An other obstacle is the culture of purchasing plants and equipment. Decades or even centuries after the invention of the calculation of profitability, in many cases the basis for decisions of the purchase departments still is the criterion of liquidity. Very often, the purchasing price shall be lower, even if long term profitability could be better at a higher price. Hence, maximum quality and efficiency are often disposed of because of the priority for a lower price.

The Role of CSR in Innovation Management

The environmental department of Lenze is focussing on compliance, management of hazardous substances, waste management and recycling of Lenze products. The link to product related R&D is well established.

The innovation management initiated the energy efficiency program. The environmental department was integrated, but did not co-ordinate the program. The employees taking part in the project became a kind of energy efficiency champions and are key persons to spread knowledge throughout the company. In division of responsibilities the tasks recycability and avoiding hazardous substances are still in the responsibility of the environmental management, the improvement of energy efficiency of products is managed by innovation management.

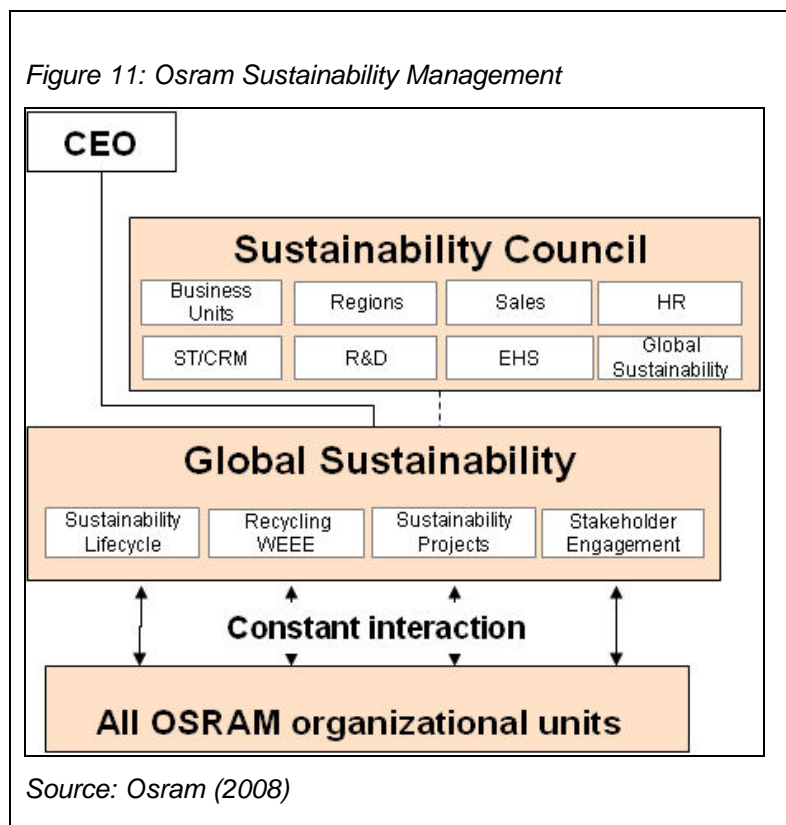
7. OSRAM: Light for the “Bottom of the Pyramid”

The Munich based Osram GmbH produces the Osram brand of light bulbs since more than 100 years. Since 1978 Osram is owned by Siemens AG. More than 41.000 Osram-employees create a turnover of more than € 4,7 bil. OSRAM has 52 production sites of which 48 passed an ISO 14 001 certification for environmental management.

CSR Activities and CSR Management

The Osram Team „Global Sustainability“ was launched April 1st 2008. The team is led by the Chief Sustainability Officer, who reports directly to the CEO of OSRAM, and has global responsibility. The teams main functions are:

- Sustainability Lifecycle: Applies to all processes within OSRAM and assures that sustainability is considered in all relevant topics. The research and development departments are of special importance because it is here that the basis for our energy-saving products is created.
- Recycling/WEEE: OSRAM and other lamp manufacturers have set up “Collections and Recycling Support Organizations” (CRSOs) in many European countries in fulfilment of the EU-WEEE-directive. The sustainability function administers these organizations and promotes the development of a worldwide recycling system.
- Sustainable projects: OSRAM has started important projects which concentrate on sustainable development with environmentally preferable and affordable light: Off-Grid and CDM projects.
- Stakeholder Engagement: Sustainable development requires dialogue with different stakeholders. A part of this dialogue is the non-financial reporting, e.g. in the framework of the UN Global Compact.



Focus Areas of Innovation

Lighting consumes about 19% of the worldwide production of electricity. A special responsibility for energy saving and climate protection therefore lies with the principal manufacturers of conventional and energy saving bulbs, OSRAM, Phillips and General Electric. Each of them represents a global market share of more than 20%. The objectives avoiding hazardous materials in products and social responsibility in the supply chain also are of high priority.

The main targets for R&D as well as the key performance indicators of Osram are:

- energy efficiency,
- durability,
- reduction of hazardous substances in products.

Synergy between energy efficiency and cost reduction is high. Osram specially strives for growth with innovative and energy saving products.

Innovation with Contributions to Sustainable Development: Off-grid Lighting

About 1.6 billion people worldwide depend on "fuel-based lighting" because they do not have access to the electric grid, usually burning kerosene for light in different types of lanterns. An amazing 77 billion liters of kerosene are burned every year for lighting, resulting in emissions of 190 Million tons of CO₂ yearly. Besides being a very inefficient light source, kerosene lighting is expensive, dangerous and poses a health hazard for its users.

The main advantage of kerosene is that it can be bought in small portions, thus allowing for small and irregular incomes. The OSRAM off-grid solution is new because it takes into account exactly these issues. The key points of the system are:

- Efficient lamps or lighting systems using energy-saving compact fluorescent lamps and LEDs are powered by rechargeable batteries.
- Customers return the standardized system to the O-HUB and get a freshly charged system in exchange. The customer pays only for the energy, echoing a great advantage of kerosene - light can be bought in small portions according to available income.
- The 'deposit' for the system is taken care of with micro financing.

The idea emerged in the year 2005 as an outcome of an interdisciplinary brainstorming of international sales and the corporate innovation management. In 2005, Wolfgang Gregor was head of international sales. Today, he serves as Chief Sustainability Officer. He recognized the importance of the idea and invested his power to get a concrete R&D project on the rails.

The first OSRAM Energy Hub in Mbita (Kenya) on the shores of lake Victoria was opened after a planning phase of only one year and a construction time of only four months. Partners of the project are the solar cell company Solarworld AG and the cell phone manufacturer Nokia, who analyses possible synergies of decentralized energy hubs with the usability of cell phones. To date OSRAM-teams are working on three additional Energy Hubs in Kenya and Uganda, which shall be opened in the next time. Also, an energy hub in India is under consideration.

Figure 12: Off-grid lamp



Source: Osram (2008)

Figure 13: Energy Hub in Kenya



Source: Osram (2008)

Wolfgang Gregor, Chief Sustainability Officer, summed it up: "OSRAM has recognized the problem and is providing a viable solution, a perfect example of the fusion between corporate responsibility and sound business addressing the triple bottom line. We are proud to be the first lighting manufacturer in the world to offer a sustainable lighting solution for regions without power supply networks."

Drivers and Obstacles

Climate change and the related rising energy cost are the most important driver for innovation in energy efficiency.

The main obstacle is the difficulty of the R&D of new lighting forms. There is a couple of inventions which are the bases for new products, but there is a lot of work to do to produce functional and durable lighting devices e.g. on basis of an organic light emitting diode (OLED). If a new product is available, the market must become used to pay the necessary prices. Even if these products are economic and the product pays back its investment cost, customers must become used to higher investments.

In parallel, production capacity must be created. While LED-technology has been successfully introduced in the market and now the task is to enhance production capacity, OLED technology is still in its infancy and prototypes are in the test phase.

An additional obstacle will be, that for OLEDs, a cultural change in lamp design will be necessary. OLEDs are spread out over an area such as a wall. They emit their light from that area. Instead of a lamp hanging from the ceiling, a part of the ceiling itself might be the light source of the future. This can only be introduced to the market, when designers create new types of lamps and consumers are innovative enough to change their lighting priorities.

The Role of CSR in Innovation management

The Team Global Sustainability is in different ways involved in product innovation. The first link is sustainability awareness at the firm level as well as at the consumer level. In the past years for example, a 60-watt halogen lamp was offered as an alternative to a standard 60-watt bulb with the argument of 20% more light. To date, a 42-watt halogen lamp is offered as the same alternative with the argument of 30% lower energy consumption. The task for the Global Sustainability Team is, to enforce the necessary change in the way of thinking. This will also be a future task for human resources development at Osram.

The Team Global Sustainability is also involved in decision making about product portfolios and R&D programmes. Its representatives have the function to ensure, that sustainability targets are demanding and will be successfully met. By the integration of sustainability gates in the stage-gate process, this shall be ensured.

And at least in the case of the off-grid lighting concept it was of extreme importance, that the economic as well as environmental potential of the idea was realized by a manager, who was in the position to champion the idea towards a successful innovation process. This might occur in other cases as well.

8. Siemens: Strategic Targets Developed from Environmental and Social Mega-Trends

Siemens started its business with products in the field of telecommunications and electricity supply in the 19th century. Since then, the company has diversified its product portfolio. Siemens has produced computers, household appliances and parts for the automotive industry among other things. In recent years the portfolio has been adapted to the mega trends - demographic change, urbanisation as well as on environmental and climate protection. Accordingly in 2008 the businesses were reorganised into three sectors:

- industry (motors and drives, automation, building technologies, light (Osram))
- energy (power generation, power transmission and distribution) and
- health care (diagnostic imaging and therapy, laboratory diagnostics, hearing instruments).

In 2008 approximately 8200 inventions were reported and around 5000 patents were filed. With respect to the published number of granted patents, Siemens is ranked second in Germany, third in Europe and 11th in the USA. About 4.9 % of the turnover (2008) was invested in research and development. The global average of industry is estimated by the consultancy Booz Allen Hamilton at 3.7 %. These figures demonstrate that Siemens is very active in research and development.

CSR Activities and CSR Management

Since the early days of the company's history, there have been activities of corporate social responsibility. Siemens calls these corporate responsibility (CR) activities. In the 1990s Siemens implemented environmental management systems, started to consider environmental protection in product development and published environmental reports.

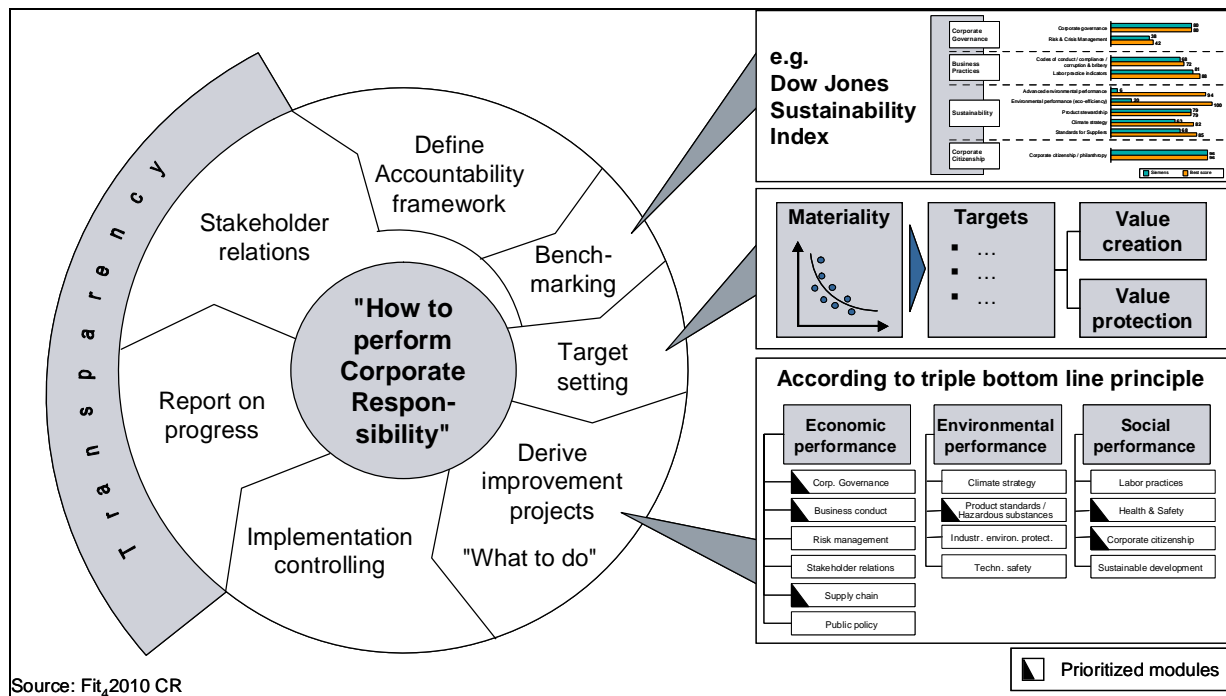
Due to the reshaping process of the corporate strategy on social and environmental megatrends, and under the backdrop of corruption affairs, Siemens set up new management processes for CR. The result, introduced in 2007, is a the system in which corporate values, strategies, operative tasks and codes of conducts interlock.

CR at Siemens focuses on:

- corporate governance,
- compliance,
- climate protection and,
- corporate citizenship.

In order to achieve further progress in these fields, Siemens carries out internal projects to improve affected management processes. The decision regarding the starting point of these projects is made within the CR controlling model.

Figure 14: CR controlling model



Source: Fit, 2010 CR

Source: Siemens (2008)

In 2008 Siemens set up a portfolio, listing all products which contribute directly to environmental and climate protection. The portfolio includes:

- products and solutions, which are significantly more energy efficient than average solutions,
- renewable energy power plants and components,
- environmental technologies.

By the end of 2008 the portfolio accounted for 25 % of the turnover. Siemens intends an annual growth of 10 % in order to achieve 25 billion euro in 2011.

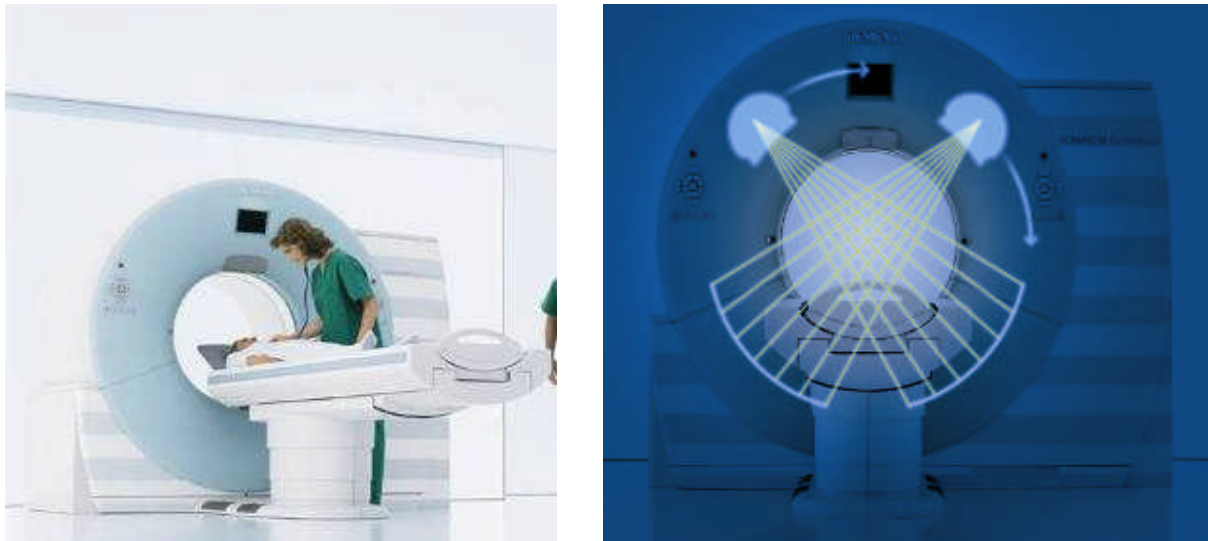
Innovation with Contributions to Sustainable Development: Computer Tomograph “Somatom Definition”

For the purpose of this case study we wanted to analyse Siemens’ approach to improving the performance of those products which are not contributing to environmental protection as their core function. Therefore we decided not to look at an innovation within the energy sector, instead we took a closer look at the development of a computer tomograph, which has been available on the market since 2006.

Until today conventional computer tomograph scanners (CT) have consisted of a single tube (gantry), with one radiator and one detector. The new model which is the world’s first dual source system, consists of two tubes (two radiators and two detectors). By introducing this new technology the computer tomograph has several advantages compared to its forerunner:

- sharper images, especially of the thorax,
- the device generates less than half of radiation during a heart scan, compared to the usual effective dosage energy savings of 30 % during an examination,
- reduction of lead used in the scanner of more than 80 %.

Figure 15: Computer tomograph scanner „SOMATOM Definition“



Source: Siemens (2008)

At the beginning of the product development process of this CT-scanner, Siemens carried out an energetic lifecycle analysis. The analysis showed that most of the energy is needed in the use-phase of the appliance. With ordinary use in a hospital the appliances needed about 50 kWh per day which corresponds to the energy use of five households.

When the product development process started the reduction of the necessary x-ray dosis, the reduction of energy use, and the reduction of environmentally harmful substances were set up as development targets. These targets were achieved by a range of new technologies and solutions, for example:

- Dual Source Technology which reduces exposure time.
- The use of improved detector material which needs less intense x-rays.
- Optimisation of stand by mode: usually CT appliances operate more often in the standby mode then in the x-ray mode, so that the optimisation of the stand by mode could contribute significantly to the energy reduction.
- An integrated water cooling system which was designed so that the warm water of the appliance cooling system could be used to support the buildings heating system.

Drivers and Obstacles

Obviously there are several positive drivers which promoted these significant improvements within the product development process:

- the win-win situation between medical objectives (reduction of x-ray doses) and energy use,
- the demand of hospitals and administrations for appliances with low running costs (energy),
- the application of management instruments for ecological product development.

Obstacles which prevent a stronger consideration of environmental targets within the product development process of healthcare appliances are of a technological and economical nature.

Innovation Management

Traditionally Siemens is very strong in research and development, which contributes to the competitiveness of the company. Therefore it is not surprising that innovation became part of the corporate culture.

The structured management processes in innovation management are well established. Back in 1993 Siemens set up an internal standard for environmental product development. That Siemens standard SN 36350 consists of guidelines which cover the full live cycle and which have to be considered within product development. As this standard is valid companywide, it has to be applied to quite different types of innovation processes. In order to improve the standard with respect to user-friendliness, sector specific guidelines were developed. The sector specific requirements for innovation process for example consist of the following features:

In one of the first steps of innovation processes the innovation team needs to develop a specification. This specification describes the objectives of the innovation process. Since 2006 it is required that the innovation objectives also include environmental targets.

At the end of the innovation process, when the product is launched to the market Siemens carries out an environmental product assessment using the categories “use of critical substances”, “product design”, “disposal (end of life)” and “labelling”. The results of this internal environmental product assessment are made available to other research and development departments in order to stimulate their efforts in design for environment. Ideally it is possible to transfer good solutions to other product development processes.

For all major product developments the cumulative energy use is calculated. This analysis is not only helpful for the innovation management, but for marketing and external communication in general, too.

Another instrument that promotes sustainable innovations is the internal Siemens innovation award. In this annual competition 12 innovations of the year receive an award. The Siemens environmental award is another competition which is carried out during a three year term.

Organisational Structures

The unit “Product-related Environmental Protection” is part of the department Corporate Environmental Affairs and Technical Safety which is directly responsible to the board. The unit has to develop companywide requirements for environmental product design, it has to coordinate compliance to product related environmental regulation. The unit also designed the Siemens environmental portfolio. Additional pieces of this governance structure are environmental officers and agents within all divisions and within those business units that are environmentally relevant. In each research and development department some of the developers are responsible for ecological product development and environmental health and safety.

Figure 16: CT-Scan



Source: Siemens (2008)

Figure 17: Current targets of the product-related environmental protection

Program: Product-related environmental protections	
Performance indicator	Goal
Revenues generated with the environmental portfolio	25 billion euros in fiscal year 2011 (2006: 14.7 billion euros)
Quantity of CO ₂ emissions our customers avoid by the use of Siemens products and solutions per year	275 million tons in fiscal year 2011* (2006: 84 million tons*)
Number of business units that voluntarily waive the use of restricted substances according to the RoHS Guideline in their electronics products, although these products are not covered by the RoHS Guideline	All business units within the scope of application (company's own electronics manufacturing operations), which today comprise more than 90% of products*
Number of Divisions issuing environmental compatibility declarations for their products according to Siemens' in-house standard SN 36350-7 "Product Declaration"	<ul style="list-style-type: none"> ▪ To increase the number of environmental compatibility declarations ▪ Such declarations to be issued also by the divisions Drive Technologies, Industry Solutions, Power Transmission, Power Distribution, Fossil Power Generation and Renewable Energy by fiscal year 2010
Development of training modules for:	
<ul style="list-style-type: none"> ▪ Environmentally compatible product development according to SN 36350 (module for product developers) 	by 10/2009
<ul style="list-style-type: none"> ▪ Integration of restricted substances into the requirements profile for suppliers (module for purchasing managers) 	by 10/2008
Complete integration of restricted substances into contracts with suppliers	by 10/2010
*A business unit is considered to have waived the use of restricted substances if at least 90 percent of its products comply with the RoHS guideline. One-hundred percent compliance is not always possible since some products cannot comply with the guideline for technical or economic reasons (for example, availability of components, long-standing delivery obligations).	

Source: Siemens (2008)⁵

Note: This case study is based on telephone interviews with two Siemens experts in Summer 2008, as well as on a presentation by Dr. Thomas Kaiser, who was then Corporate Vice President CC CR, Siemens AG. Download of the English language slides at http://www.4sustainability.org/seiten/csr-multistakeholder-CSR_und_I_und_Innovation.htm

⁵ In 2007 the environmental portfolio generated a turnover of 16.9 billion € and led to the avoidance of 114 million CO₂ eq.

9. 3M: Pollution Prevention Pays

3M Company was founded in 1902 as the Minnesota Mining and Manufacturing Company, and has its headquarters in St. Paul, Minnesota. The company has 79,000 employees worldwide, with more than half of those employees employed outside of the United States. 3M has been listed on the Dow Jones Sustainability Index for eight years classified as “diversified industrial” manufacturing company. The company participates in six major market sectors with everything from consumer and office products, industrial business, health care, electro- and communications, display and graphics and safety, security and protection. 3M is considered to be an “innovative” company, introducing more than 500 new products each year with more than 60,000 products sold worldwide. In 2007, the company had sales of \$24.5 billion.

3M’s Sustainability Activities - Pollution Prevention Pays

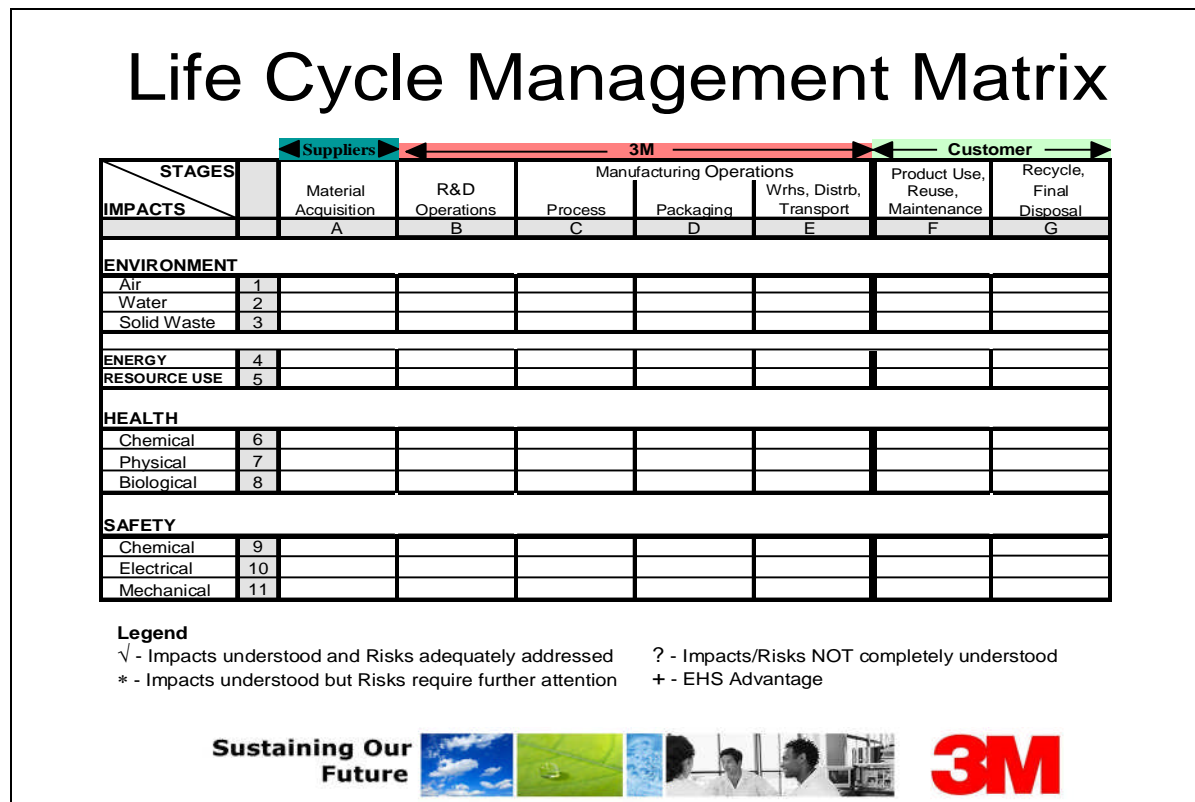
3M instituted its environmental department in 1970. During that time, pollution prevention was a new concept, and the focus was on eliminating pollution at the end of pipe rather than at the source. Raw material prices were going up during the 1970s and the United States EPA had promulgated the first round of environmental regulations. Instead of end of pipe solutions, Joe Ling, 3M’s Environmental Vice President at the time, developed 3M’s program “Pollution Prevention Pays” (3P) in 1975 to eliminate pollution at its source. 3M’s goal of eliminating pollution at the source was to save money, and in its first year, the 3P program saved the company \$10 million. 3M’s management quickly moved to support the program, and 3P became part of the 3M culture.

In 2007, 3M had 438 3P projects, saved the company \$91 million, and prevented the release of 51 million kilograms of pollution (including pollutants contained in air emissions, hazardous and solid waste, and wastewater). 3M also was able to prevent 2.5 million metric tons of GHG emissions from being emitted in 2007. During the 33 years of the 3P program, 3M has developed more than 6,800 projects, preventing more than 2.7 billion pounds of pollution and saving nearly \$1.2 billion in the first year alone.

Life Cycle Management

According to Keith Miller, Manager, Environmental Initiatives and Sustainability Group, the best illustration of how CSR processes contribute to green innovations at 3M is the Life Cycle Management (LCM) program for screening potential products at 3M. This protocol for new products reviews the risks for each potential product, including the environmental, health and safety risks, as well as the energy and raw material impact of a potential product’s life cycle. The Life Cycle Management (LCM) process also looks at the opportunities associated with each new product at each stage of its life with suppliers, within 3M, and with customers.

Figure 18: Life Cycle Management Matrix



Source: 3M (2008)

3M developed the Life Cycle Management process during the mid-1990s at a time when the company was becoming more involved with sustainability under CEO Livio DeSimone. DeSimone was chair of the World Business Council for Sustainable Development in 1996-1997 and wrote a book on eco-efficiency. He also set a goal to develop a product life cycle management process and played a key role in driving the 3M environmental group to come up with ways to implement that process. 3M launched the Life Cycle Management Process in 1997, which became policy in 2001 requiring that all new products go through a Life Cycle Management review. The LCM process now is integrated into the 3M new product introduction process worldwide.

Sustainability Management at 3M

3M began sustainability reporting in 2001 and formed an official Sustainability Group in 2003. The group has five employees dedicated to sustainability, according to Miller. 3M has a larger Sustainability Team, as well, that includes members from various 3M functions including investor relations, community affairs, marketing, Environment Health and Safety (EHS), Human Resources, communications, and various business groups. The focus of this Sustainability group is twofold: (1) managing the data, reporting and plans for environmental initiatives and sustainability (3P, climate change, and environmental targets for 2010); and (2) helping business units develop sustainability strategies, completing sustainability reporting pursuant to Global Reporting Initiative (GRI) guidelines, and cataloguing of some 2000 sustainability product solutions to help customers reduce their environmental footprints.

Another way in which 3M has integrated sustainability into its top decision-making bodies is the company's Corporate Environment Health and Safety committee. The EHS Committee, which was formed in the early 1990s, includes about 10 senior executives from Research and Development, manufacturing, supply chain, and other business areas. The EHS

Committee is responsible for setting EHS policies, the environmental targets, and the metrics for the 3M EHS Management System.

The Impact of Climate Change

Climate change has had a significant impact upon 3M, and upon the interests of 3M's customers. 3M completed its first corporate inventory on greenhouse gas (GHG) emissions in 2002. As part of the U.S. EPA's Climate Leaders program, 3M reduced GHG emissions by 60 percent from the 2002 baseline level between 2002 and 2007. The company achieved this reduction of 9.7 million metric tons of GHG emissions through energy management (winning EPA Energy Star Sustained Excellence Award over last five years) and by making process modifications including moving from solvent-coating to water-based types of coating, which reduced carbon dioxide emissions from the thermal oxidizers used to control the solvent emissions. 3M has also made significant reductions by controlling high global warming potential gases with emission control technology and eliminating them through process modifications.

Within the last few years, many of 3M's customers have begun to seek ways to reduce their carbon footprint and decrease energy costs. Miller observed that in 2005, Wal-Mart's CEO Lee Scott came out with his 21st Century leadership speech which pushed many of Wal-Mart's suppliers (and other retailers) to look at green product solutions, and sustainability has entered into the mainstream in the U.S. as a result.

Innovation at 3M

Miller said that one of the decisive factors for achieving innovation at 3M has been the support the company gives to scientists for experimentation. 3M encourages its technical community including scientists and engineers to dedicate 15% of their time to innovation, and a number of new products, including Post-it® Notes and 3M™ Tegaderm™ Medical Dressing, have been developed during this 15% of employee time. This freedom gives scientists room to experiment, if they believe the product they are interested in might have viable application. Second, 3M tries to energize its technical community by bringing in speakers such as Daniel Esty, co-author of *Green to Gold*, to help explore solutions to climate change and scarcity of resources.

Climate change has intensified the company's interest in renewable energy innovations such as solar, wind and biofuels, as well as more environmental products, including 3M's new water filtration business. More and more of 3M's products are focused on reducing the environmental footprint, not only of 3M, but also of the company's customers, Miller said.

One Example of Green Innovation at 3M: Post-It® Super Sticky Notes

One recent example of a green product innovation at 3M was 3M's *Post-it® Super Sticky Notes*. 3M is perhaps most well known for its *Post-it® Notes*, which the company began distributing in 1980 to stick gently to horizontal surfaces such as books and papers. As people began to use *Post-it® Notes* for vertical or bumpy surfaces, such as refrigerators or windows, they found that the weak adhesive on the paper notes did not adhere as well as it did to paper. In 2003, 3M introduced *Post-it® Super Sticky Notes*, an enhanced *Post-it® Notes* product for use on vertical and hard-to-stick surfaces. 3M had developed a prototype of this enhanced *Post-it® Note* using solvent-based adhesive formulations during the late 1990s, but did not release the stickier *Post-it® Notes* because of the Volatile Organic Compounds (VOCs) in the formulation. Rather than install pollution control equipment to control the VOC emissions from the proposed production process, 3M delayed introducing the product until it was able to develop a new, water-based adhesive formulation. 3M's new water-based formulation had the desired sticking power, while generating fewer air emissions, and was less expensive to manufacture than the proposed solvent-based formulations that 3M had originally developed. Miller said it is unclear what the lost

opportunity costs of delaying the marketing the *Post-it® Super Sticky Notes*. 3M reports that the new formulations emit less VOC emissions (33,400 pounds (controlled) or 2,170,000 pounds (uncontrolled)) of VOCS per year, and less Toxic Release Inventory (TRI) emissions (20,500 pounds (controlled) or 1,024,000 pounds (uncontrolled)) annually than if the proposed solvent-based process had been implemented.

Obstacles to Green Innovation

Miller said that while many customers may want green products, not many customers are willing to pay more for those products, and green products often cost more to produce. Customers primarily are interested in the initial purchase price instead of the full life cycle cost of a product. Customers have not always been willing to pay more upfront to save money from reduced energy, to reduce waste, nor for more durable products that last longer. Miller said the first challenge is to develop green innovations that are not significantly more expensive than their counterparts. The second challenge is justify the substantial capital expenditures associated with new production procedures as companies substitute green innovations for old procedures, such as moving from solvent-based to water-based paint.

Having a process such as Life Cycle Management in place that looks at the full life cycle of a product - from raw materials through production and the ultimate customer uses - has helped to make 3M's innovations become more "sustainable," according to Miller. As the Sustainability Manager of Environmental Initiatives and Sustainability Group, Miller stated that one thing that could help 3M and other companies make innovation more sustainable in the future might be more government incentives for both Research and Development, and for innovation to help companies overcome the obstacles to green innovation.

10. DuPont: Using Science to Develop Sustainable Solutions.

E. I. Du Pont de Nemours Company (DuPont) was founded in 1802 as a producer of black powder. Classified as a chemical company today, DuPont offers a wide range of innovative products and services for markets including agriculture and food; building and construction; communications; and transportation. DuPont is headquartered in Delaware, and has 60,000 employees worldwide, with 35,000 of those employees in the United States. DuPont had \$29 billion in sales in 2007.

CSR Activities and Management at DuPont

History of Sustainability at DuPont

DuPont's Director of Sustainable Development Dawn Rittenhouse said DuPont had identified three worldwide trends as having tremendous significance and to which DuPont is most suited to respond. These are the need for sources of renewable energies and materials, safety and security, and improved food productivity. Examples of how DuPont is already working in these areas include products for solar panels, Kevlar for bullet-proof vests and Nomex for the turnout coats that firefighters wear to protect themselves from high heat, and higher yield seed through Pioneer.

DuPont traces its interest in environmental, health and safety concerns back to the company's beginnings. Because one of DuPont's first products was black gunpowder, the company focused on safety and designed its first safety rules in 1811. One of these earliest safety procedures was that a member of the family be present for all start up of new equipment. From then on, DuPont began to integrate safety procedures into all stages of product and process development, Rittenhouse said.

Setting Ambitious Goals Early On

Rittenhouse said that as a science company, DuPont has used science as a way to approach environmental and sustainability issues. "In our early stages it was using science to find ways to reduce waste and emissions from our facilities. Now science is being used to develop new solutions to the major sustainability issues facing society," she said.

One of the strongest aspects of DuPont's sustainability program is its willingness to identify problems, set goals to solve those problems, and to track the company's success in meeting targets. DuPont has set ambitious goals with respect to reducing its impact upon the environment early on, and claims to be willing to allow those sustainability goals steer major company decisions.

In 1988, the environmental group Greenpeace named the company "Number One Corporate Polluter" in the USA, hanging a banner with that infamous title on one of the company's smokestacks at a New Jersey plant. The environmental group based this claim on Toxic Release Inventory (TRI) information made public by the United States Environmental Protection Agency (EPA) with the enactment of the Emergency Planning and Community Right to Know Act (EPCRA) in 1986. In response, DuPont set out a new approach which became known as corporate environmentalism. The company announced a number of environmental goals that would move the company beyond environmental compliance. These included reducing air toxics and air carcinogens, reducing energy intensity and increasing community dialogue.

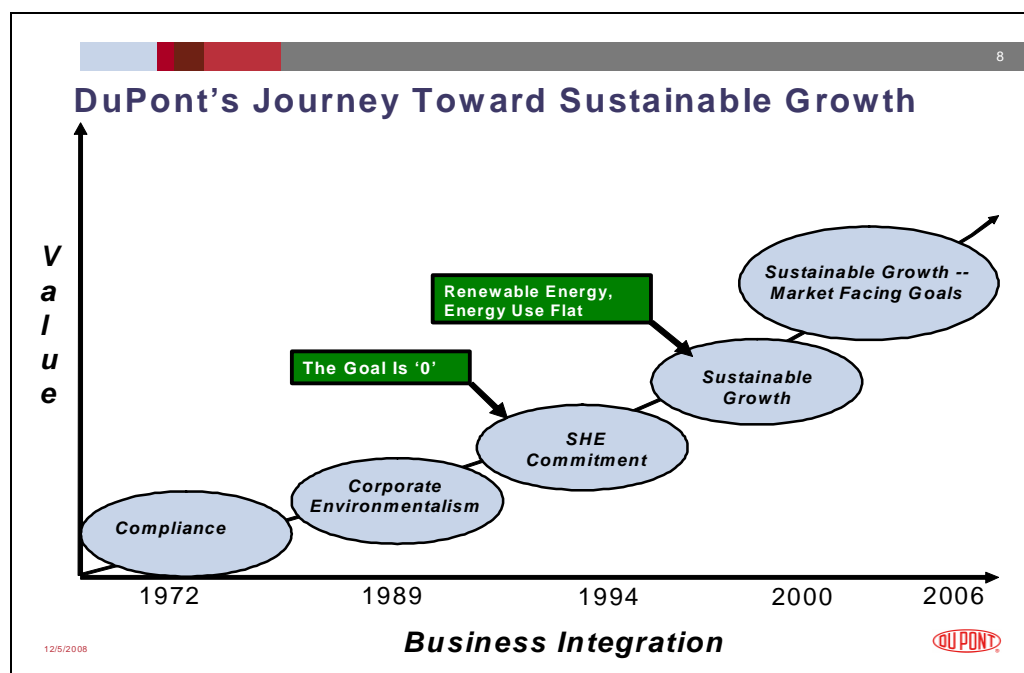
DuPont remains one of the largest chemical companies in the nation, and still ranks consistently among the list that the Political Economy Research Institute (PERI) prepares of "top air polluters." According to PERI, DuPont emitted over 12 million pounds of toxic air emissions. Despite top ranking in toxicity, DuPont has received awards from *Ceres* and *Business Week Magazine* in the last few years for its success in reducing GHG emissions. Outside observers such as Daniel Esty and Andrew Winston credit DuPont for the company's willingness to work on its problems, to set aggressive goals, and to make those

goals public. According to Ed Mongan, Global Manager for Energy and Environment, who was interviewed by the Pew Climate group, DuPont sets goals and “openly tracks progress by individual sites and business units to meet those goals so no one can hide.”

DuPont began measuring and tracking its plants’ largest GHG emissions — CO₂, nitrous oxide (N₂O) and HFC-23—in 1991 and also made an internal commitment to reduce net emissions. In 1994, DuPont announced it would reduce GHG emissions 40% below the company’s 1990 baseline by 2000. DuPont exceeded that goal so in 1999 announced a new goal to reduce GHG emissions by 65% from a 1990 base by 2010. By 2003 DuPont had reduced GHG emissions from its 1990 baseline by 72%. After selling off a large part of the business in 2004, DuPont announced new goals to reduce GHG emissions by another 15% from its 2004 baseline by 2015. In addition to this GHG emissions reduction target, DuPont announced that it will increase revenues by \$2 billion annually from products that reduce GHG emissions for customers or final consumers.

Public goal-setting had the effect of encouraging innovation because the company had to develop the tools to meet the targets. The goals have driven the company in a strategic direction, and these sustainability goals have encouraged innovation. Before making investments, committing resources in Research & Development, or making a decision on a merger or acquisition, the company decision-makers now also consider how potential changes might impact on the company’s ability to meet the goals. “These goals create a conversation on sustainability,” Rittenhouse said.

Figure 19: Journey Toward Sustainable Growth



Source: DuPont (2008)

CSR Management

Part of DuPont’s success in setting and tracking its environmental goals has been due to strong management support. CEO Chad Holliday, co-author of the sustainability book *Walking the Talk*, set sustainable growth goals for DuPont which require an integration of economic, social and environmental performance. DuPont’s approach to CSR management focuses on integrating CSR principles into management areas. The company’s management support has been essential in the successful integration of the

goals of sustainable growth into corporate culture. DuPont views sustainability goals in the context of overall goals. For example, the need for renewable energy and materials is connected to limits to carbon emissions and need for moving away from fossil fuel and energy.

Another component of CSR management has been DuPont's Corporate Environmental Plan (CEP), a database that captures environmental performance (such as waste, emissions, GHGs, and energy) from facilities worldwide. CEP is maintained and managed by DuPont's corporate Environment and Sustainable Growth Center (a corporate function comprised of policy and technical experts under the VP and Chief Sustainability Officer whose role is to lead the development and facilitate implementation of corporate sustainable growth programs and policies.)

Life Cycle Analysis of Major Products

An internal team at DuPont works with a number of the businesses to look at the full life cycle of a product as it is being developed. This life cycle analysis generally includes an analysis of the materials needed and the impacts from the DuPont manufacturing operation. The team can also work with the business on the impacts further down the supply chain for customers and final consumers. The DuPont product stewardship process continues the analysis throughout the product development process with a protocol of questions asked at every stage – from conception, through the evaluation stage, as the candidate product is prepared and evaluated for prototyping readiness and demonstration, and finally as the product makes its way through the transition to commercialization. In many cases, product stewardship reviews continue even after commercialization.

Innovation at DuPont

Two factors at DuPont indicate the importance DuPont places on change and innovation, according to Rittenhouse. First, DuPont's announced in 2001 that 35% of the company's revenues must come from products that are less than five years old. DuPont has increased its revenues coming from new products from 20 percent of revenues in the early 1990's to 36 percent of revenue coming from new products in the 2007 revenues. Additionally DuPont measures progress by looking at the number of patent applications, and the company's ability to bring those new products to commercialization. Between 2001 and 2006, DuPont increased the number of patents per year from 800 to 1800. The second factor that assists DuPont in keeping innovation as a central part of its culture is the amount of resources the company dedicates to Research and Development. In 2007, the \$29 billion company devoted \$1.4 billion to Research and Development.

Using Innovations in Science to Find Alternatives that Pollute Less

One early example of a way in which DuPont used its awareness of environmental sustainability to innovate is the story of CFC-alternatives. DuPont was one of the largest domestic producers of chlorofluorocarbons (CFCs), a coolant used in refrigerators and aerosol sprays during the 1970s and 1980s. DuPont's scientists had seen the seriousness of CFCs impact upon the ozone layer. As a result, DuPonters began to look first at how to minimize releases of CFCs and then to develop chemical alternatives to CFCs. As the link between CFCs and depletion of the ozone layer became clear, DuPont looked to lead corporate efforts in development of the phase out of CFCs. In 1987, delegates to the Montreal Protocol on Substances that Deplete the Ozone Layer agreed that CFCs should be phased out by 1996 in developed countries. To the surprise of many, DuPont and several other multinationals quickly joined the Protocol negotiations, and were an important part of this decision-making process. DuPont announced a voluntary plan to stop CFC production at the end of 1994, ahead of the required deadline.

Recent Green Innovation at DuPont

A more recent example of a green innovation at DuPont is the company's success in developing renewable resources. Over a decade ago, the company set out the goal of designing new products based on renewable resources that at the same time meet the cost, quality and performance criteria that customers have. The idea for the innovation came from early work in the lab that indicated that DuPont could develop products using bioprocess. DuPont worked in partnership with other companies to create the technologies to make large quantities of Bio-PDO, a renewably-sourced propanediol. Bio-PDO is an ingredient for a number of products including specialty polymers such as cosmetics, liquid detergents, and industrial applications such as antifreeze, as well as new products such as Sorona, a polymer that is claimed to be both soft and stain resistant despite having high strength and stiffness. The production of Bio-PDO™ consumes 40% less energy and reduces greenhouse gases by 20 percent versus petroleum-based propanediol.

The process of making Bio-PDO began as scientists tried to modify the microbe and use the corn syrup to make a renewable material that could as a base for products.

In June of 2006 DuPont announced a partnership with BP to develop advanced biofuels including biobutanol. This linked to work started in 2003, a project funded by the U.S. Department of Energy, called the Integrated Corn Biorefinery (ICBR), which focused on developing the system for utilizing cellulosic feedstocks for biofuels and biomaterials. DuPont scientists are also working on how to ultimately produce products like bio-PDO from cellulosic sources- fibrous plant materials such as husk, stem, or switchgrass rather than the kernel).

DuPont's Dawn Rittenhouse said the company was well-situated for developing this innovation of replacing petroleum-based feedstocks with corn feedstocks because it had invested years of early research to develop the core competency to modify the microbes, or micro-organisms. The major challenge now is to determine how to compete with incumbent polymers such as polyethylene and polyester in a huge market which has had years to drive to a low-cost position, Rittenhouse said.

Making Innovation More Sustainable

When asked for advice for other companies, including smaller companies on integrating sustainability principles, Sustainability Director Rittenhouse suggested the following. "Start by understanding what your biggest issues are- so if it emissions then first you need to focus on that, if is labor practices, then first you need to focus on that. Make sure that as you start your work that you are relevant to what stakeholders want you to be focused on."

While it is much easier to simply make products the same way they have always been made, Rittenhouse said DuPont is trying to dedicate capital to transforming its products and processes. Part of sustaining innovation is having the right questions in place as the company looks at capital expenditures. For example, for energy efficiency, the company must get questions about how to use less energy and help its customers use less energy into the conversation.

In bringing CSR into the structures already in place, DuPont is able to get its decision-makers to consider how each allocation of resources might impact the company's sustainability goals. Rittenhouse said the sustainability group is driving to have CSR more embedded into the decision-making processes that DuPont has always had. The group takes sustainability questions and integrates them into process that are already used by research and development, capital expenditures, and mergers and acquisitions, to make sustainability more fundamental to the company's thinking.

11. General Electric: Ecomagination – Growth Strategy with a strong R&D Budget

General Electric Company was founded in 1878 and was built upon the work of Thomas Edison, who invented an incandescent electric lamp in 1877. General Electric Company (GE) has its headquarters in Fairfield, Connecticut. In 2007, the company had revenues of approximately \$173 billion, and had 327,000 employees worldwide. With products including aircraft engines, power generation, entertainment, medical systems, and home appliances, GE is considered to be one of the largest companies in the world. General Electric has been selected as part of the top 10% by the Dow Jones Sustainability Index based upon the Index's in-depth assessment of economic, environmental and social performance.

As a company with a portfolio in diversified technology, media and financial services serving customers in over 100 countries, General Electric has had the opportunity to discern worldwide trends and problems and provide solutions to those problems. The company's 2007-2008 Citizen Report identifies six business themes that will be significant in the world economy. These include "a massive investment in infrastructure technology, the rise of emerging markets, a demand for environmental solutions, expanding aging demographics, the transforming power of digital connections, and opportunities in origination. Changing demographics over the coming years, for example, will drive the need for new healthcare solutions along with the need for reliable infrastructure, from roads to clean water. At the same time, the pace of technical innovation, government regulation and digital connections will accelerate, especially in emerging markets."

According to Georg Knoth, CEO & Regional Executive of GE in Germany, Austria and Switzerland, GE had been working to make products more efficient for a while, but this need for more energy-efficient products has accelerated within the last few years. Knoth said that people in GE's aviation sector were the first to really appreciate the rate at which energy prices were rising as early as the 1990s. Within the last few years, however, the demand for energy-efficient products has increased. As GE's people talked to their customers worldwide, it was clear that other companies needed more efficient products. Even in China, companies have become much more concerned about the environment, Knoth said.

Sustainability Management at GE

Knoth emphasized that at General Electric, sustainability is not just about working on environmental products but that sustainability has become a whole mindset. GE's citizenship report includes three elements: make money, make it ethically, and make a difference. Knoth said that it is up to management to set the tone within the company by setting goals. "You are expected to implement these goals, goals which go beyond Ecomagination, to volunteer and to do things within the community. This is something that goes through the whole organization," Knoth said.

General Electric first conducted a greenhouse gas (GHG) Inventory in 2002 to develop an understanding of GHG emission characteristics and to start measuring emissions trends. The company joined the U.S. Environmental Protection Agency's (EPA's) Climate Leaders in 2004, committing to reduce the company's greenhouse gases in three ways. GE has committed to retrofit lighting at 84 of GE's industrial manufacturing plants and warehouses worldwide within two years. The company also sponsors Energy Treasure Hunts to identify energy savings and GHG reductions at 215 GE global locations. Finally, GE created the eCO₂ Site Certification Program that rewards the numerous sites and facilities that have embraced the goals of ecomagination and GE's GHG reduction goals.

In a program called 1-30-30, GE committed to reduce absolute GHG emissions by 1% from the 2004 baseline by 2012, even though GE predicts 25% growth for the company over the

same period. GE has also pledged to improve GHG intensity and energy efficiency by 30% from a 2004 baseline by 2008, and by 2012, respectively.

In addition to sustainability goals, GE also tracks its philanthropy and volunteerism. In 2007, GE focused on two central themes — education and healthcare, with total giving exceeding \$210 million in contributions from the GE Foundation, GE businesses, GE employees and retirees. The company's employees volunteered more than 1 million hours of community service in 2007 in their own neighborhoods.

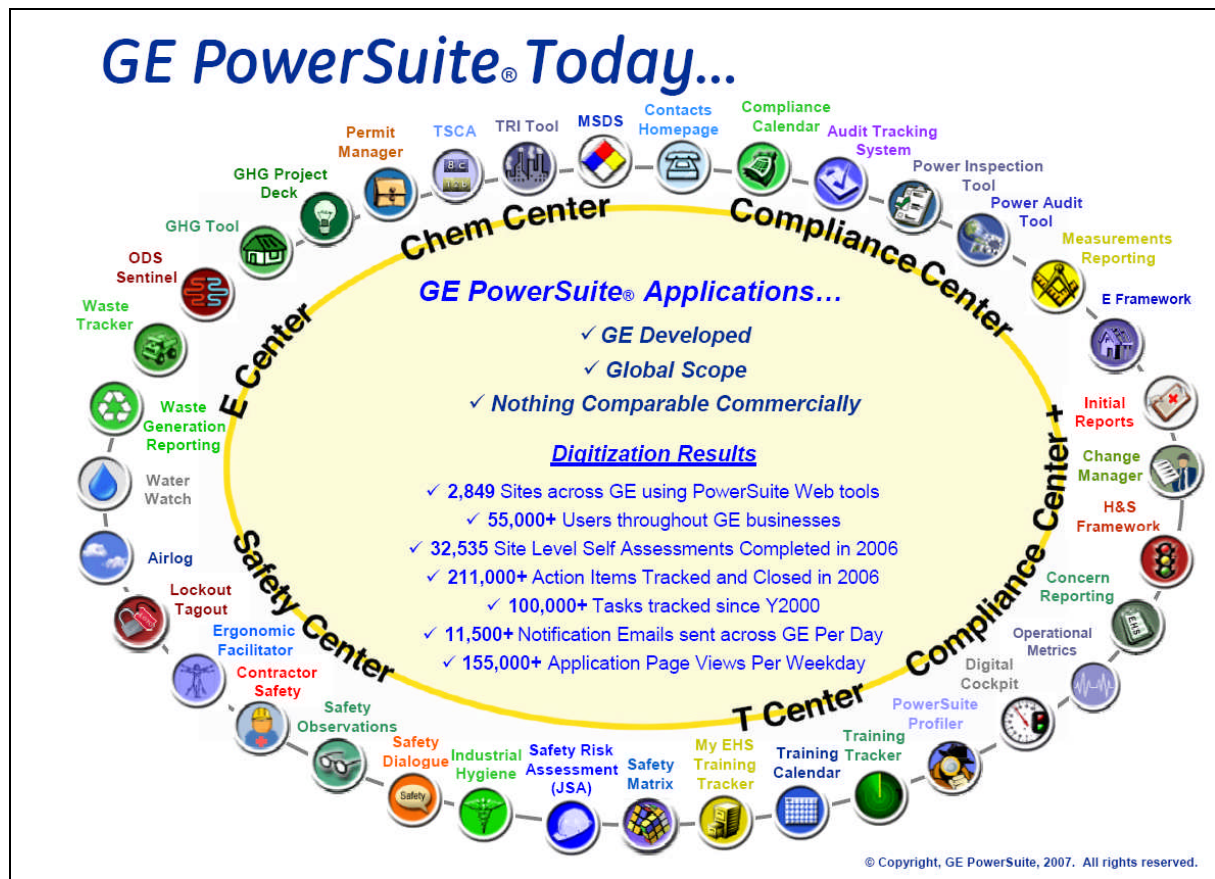
Knott said GE employs two types of mechanisms to review progress on its goals: (1) an individual review through the Human Resources process and, (2) a corporate review conducted through the business units and product lines. During the last five years, GE has conducted a GHG emissions and energy inventory review annually with employees from over 500 of GE's largest manufacturing, service and headquarters locations around the world. Three of General Electric's Vice Presidents take responsibility for the 1-30-30 program and conduct periodic business reviews to assess progress towards the goal. A cross-business, cross-functional team from the GE businesses and corporate offices coordinates the effort and share the best practices across divisions.

How General Electric Pursues Innovation

GE invests \$5-6 billion every year in Research & Development and has global research centers in Niskayuna, New York, with facilities in Bangalore, India; Shanghai, China; and now Qatar for oil and gas. GE seeks to have a constant exchange of product development ideas globally with a great deal of intellectual exchange on the topic of innovation by talking to universities. In 2008, FAST Company Magazine selected GE as the fourth most innovative companies in the world based on the following breakthrough products: a scanner that reduces radiation exposure by half, a reengineering of the best-selling CF34 jet engine for the booming Chinese aviation market, and a hybrid locomotive that cuts emissions by 50%. With more than 3,000 researchers working toward the next breakthroughs, GE says that it is positioned to continually innovate, invent and reinvent.

One CSR process that has contributed to green innovations is GE's *PowerSuite*®. A web tool, *PowerSuite*® manages Environmental Health and Safety (EHS) data throughout the company, allowing those in charge of compliance process at GE facilities to access a standardized platform to record, track and follow up on all EHS matters every day. *PowerSuite*® acts as an intranet calendar that reminds managers what to do and when to do it, with metrics on environmental performance, resources use, safety and compliance at many levels of the company. GE developed *PowerSuite*® in one of GE's industrial businesses in 1997, with five core web applications focused on digitizing compliance auditing, corrective action, and task/obligation process management, and has linked it to the company's Six Sigma efficiency. GE spent \$10 million to develop what it calls a real-time "digital cockpit," and completed its company-wide launch of *PowerSuite*® in 2000. *PowerSuite*® has won a number of awards for both innovation and for sustainability including the Dow Jones Sustainability Index's "best in class" award in 2004. *PowerSuite*® has paid for itself several times over through environmental and safety productivity improvements.

Figure 20: GE Power Suite®



Source: GE (2008)

Ecomagination - GE's Process, Product and Marketing Strategy Innovation

General Electric describes ecomagination as a growth strategy, but it is also part product innovation and part marketing innovation. Ecomagination involves a set of five public commitments that GE tracks and reports upon. According to authors Dan Esty and Andrew Winston in their 2006 book, *Green to Gold*, ecomagination is more than marketing. "The company is creating intangible values by building trust in GE's brands."

GE's ecomagination includes innovations in renewable energy such as wind, solar and biomass; advanced gasification technologies to increase plant efficiency, lower emissions and make these systems carbon capture ready; research in composite materials, advanced aerodynamics, turbine alloys and advanced coatings and combustion systems to improve the fuel efficiency and overall performance of aircraft engines and electric power generation systems; research to support the development of the next generation hybrid locomotives; energy efficiency lighting initiatives to reduce energy consumption; and most recently more affordable, less energy-intensive solutions to water purification and re-use that enable an increase in the quantity and quality of clean water around the globe.

GE Chief Executive Officer and Chairman Jeffrey Immelt saw that GE had become involved in a number of different environmental projects over the last several years, and had a number of environmental concerns. In 1999, General Electric had agreed to pay a \$250 million settlement for the clean up of polychlorinated biphenyls (PCBs) and other toxic substances in the Housatonic River and other sites. In 2002 and 2003, the U.S. EPA was still pursuing GE to clean up hazardous wastes at a 40-mile stretch of the Hudson River and the Rome, Georgia Site. Additionally, as one of the largest companies in the United States, GE was consistently ranked among the seven most toxic companies. GE released 4.14

million pounds of toxic air releases in 2005, according to the Political Economy Research Institute's ranking based upon Toxic Release Inventory data collected by EPA. GE was also anticipating the coming GHG emissions regulations in the European Union.

The company had recently acquired wind power and solar panels businesses. GE Water & Process Technologies was formulating plans for the largest water desalination plant on the African continent. As CEO, Jeffrey Immelt told *Business Week* Magazine, he was surprised to learn during an annual strategic review in 2004, how many business units of GE were pursuing environmental initiatives independent of one another. "We kind of pulled that as a thread across the company," Immelt told *Business Week* Magazine. GE'S CEO team did surveys with GE customers and sensed that GE was ready for an initiative somewhat like this. Since Immelt saw GE as a numbers-oriented company, Immelt wanted GE's environmental initiative to have real metrics on Research and Development (R&D) and revenues to measure the project's success. Immelt took the idea of an innovative cross-company green initiative to the top 35 in the company in 2004 and all but five or six of them said no, some because it was "too public" and others because they saw the initiative as "too soft." Some in the group of 35 that Immelt talked to said that GE could not lay claim to an environmental initiative given the ongoing Superfund litigation against the company.

Immelt pushed ahead anyway. By May of 2005, Immelt had launched ecomagination with a speech that Immelt gave at George Washington University in Washington, D.C. As Immelt said, "We have taken a long look around, and this is what we see: diminishing domestic oil and natural gas reserves; our continued dependence on foreign sources of energy; increasingly scarce resources like water in an ever more populated world; and signs of global climate change."

Knoth described the goals for GE's ecomagination campaign. The first goal was to increase the company's revenues. GE set the target of ecomagination generating \$25 billion in annual revenues by 2011. GE wanted ecomagination to represent a disciplined and transparent new approach to dealing with social and environmental issues through commercially motivated growth strategies. GE worked with outside environmental groups to develop criteria for evaluating products and technologies and selecting those few eligible for ecomagination status. To qualify for ecomagination, products not only must outperform environmentally, but also economically - both for GE and its customers. The company estimated its revenue growth from ecomagination between 2005 and 2007 as \$36 billion. GE's second ecomagination goal was to double R&D from \$700 million annually to \$1.5 billion by 2010. GE has focused R&D on the company's product pipeline on ecomagination products. Between 2005 and 2007, General Electric spent over \$2.6 billion on ecomagination R&D.

GE's third goal was reducing the company's own GHG emissions and increasing energy efficiency. "We not only wanted to tell our customers what they can do to become more environmentally efficient, but wanted to do our homework and lower our own emissions across the board," Knoth said. According to GE's web site, GE's GHG emissions were 7.02 metric tons in 2007. The company reduced its GHG emissions by 8% between 2004 and 2007, reduced its GHG intensity by 34%, and improved its energy efficiency by 33% during the same period. GE's fourth and newest goal is to reduce the company's water consumption across the globe by 20% between 2006 and 2012.

Finally, the company needed a communications strategy to achieve its fifth goal of keeping the public informed. Knoth said that in 2005 there was only limited concern about the environment and GE needed to think through a communications strategy and "gather the troupes." In addition to the company's citizen report, GE seeks to keep the public informed through its ecomagination Web site, dozens of global conferences and stakeholder events, and new public-policy engagements.

Ecomagination has been successful, Knoth said, because of intense sponsorship from the Chairman and CEO Jeffrey Immelt, GE's willingness to dedicate someone high-up in the organization on a full-time basis to the campaign, the internal communications strategy that GE used to explain the goals of the project to the employees who are working on the products, external communication with GE's customers to understand their need in order to get the right products into the pipeline, and the decision to use rigorous and specific criteria to determine which products are appropriate for the ecomagination program.

Conclusion

According to Knoth, three things make GE's approach to sustainability unique: the comprehensiveness of GE's approach, the timing of its approach, and the company's perseverance in pursuing sustainability. General Electric has a multifaceted portfolio of products and services, and the company has pursued sustainability in all business areas. "I think the way that we develop new products, the consistency in investing in R&D and investing in new products shows GE's commitment to sustainability," Knoth said. Second, the company started incorporating sustainability early when no one else was talking about it, a milestone in corporate America, according to Knoth. GE is also unique in terms of the company's perseverance. "Even though no one else was really doing it, we went full speed ahead. That takes some guts," observed Knoth.

12. Johnson Controls Inc.: Closed Loop Recycling for a Better Environment

Johnson Controls Inc. (Johnson Controls) was founded in 1885 by Warren Johnson, a professor who invented the electric thermostat. The company's headquarters are in Milwaukee, Wisconsin. It currently employs 140,000 people worldwide, and operates in three global businesses: Automotive Experience, Building Efficiency and Power Solutions. In 2008, Johnson Controls had sales revenues of over \$36 billion, with over \$1 billion in profits. Almost half of Johnson Controls' revenues come from automotive interior components, with over half coming from automotive batteries and heating, ventilation and air conditioning (HVAC) products and facility services. In the past four years Johnson Controls has been selected as part of both the Dow Jones Sustainability World and North American Indexes which rank the top ten percent of companies in terms of sustainability performance.

When asked about sustainability challenges around the world, Johnson Controls' Vice President of Global Energy and Sustainability Clay Nesler said he sees a nearly perfect alignment of the business' core competencies with critical environmental sustainability challenges. Clay Nesler noted that the two most cost-efficient ways for reducing greenhouse gas emissions are to reduce energy use in buildings and vehicles, and Johnson Controls does both. The company helps improve vehicle fuel efficiency by reducing the weight of interior components. It also uses natural materials such as soy-based foams and coconut fibers to replace petroleum-based materials in vehicle seats and other components. Johnson Controls has also been a leader in developing next generation Li-Ion batteries for hybrid and plug-in hybrid vehicles.

Johnson Controls' Clay Nesler said that in the company's experience, the best practice is not to view sustainability as a special initiative led by a separate team, but to integrate sustainability goals directly into business plans and objectives. Johnson Controls defines sustainability as the "Triple Bottom Line," measuring performance against economic, social and environmental indicators. The company has received high marks for its transparency and disclosure to stakeholders. In September of 2008, Johnson Controls received a commendation from the Carbon Disclosure Project for its candor in disclosures and good governance and is listed on their Carbon Disclosure Leadership Index.

One way in which the company's CSR principles have driven business innovation involves an element of social responsibility of particular interest to American corporations: encouraging diversity in the workplace and supply chain. Johnson Controls had made an early commitment to purchase goods and services from minority and women-owned business enterprises, in part driven by demands from its automotive customers. Johnson Controls wanted to increase its supplier pool of minority-owned and women-owned businesses, so the company began to create joint-venture partnerships with local business leaders, providing training, capital, and in some cases, supporting infrastructure. As one of its CSR goals, Johnson Controls announced in 2002 that it had joined the Billion-Dollar Roundtable, an organization that celebrates corporations that have achieved spending of at least \$1 billion with minority and woman-owned suppliers. In 2003 the company became the first business-to-business organization to be named Corporation of the Year by the National Minority Supplier Development Council (NMSDC). By 2007, over \$1.5 billion of Johnson Controls' materials was purchased from minority and woman-owned suppliers. In 2008, Johnson Controls was again named Corporation of the Year by the NMSDC, the only business-to-business company to receive the honor twice since NMSDC's founding in 1972.

Role of Johnson Controls Management in Sustainability Process

Johnson Controls management is committed to seeing that the company's own facilities are exemplary terms of energy and environmental efficiency. As part of the US EPA Climate

Leaders program, Johnson Controls announced that it would reduce the GHG intensity (metric tons of annual greenhouse gas emissions divided by annual revenues) of its US operations by 30% between 2002 and 2012.

In 2007, the company achieved a 29% global GHG intensity reduction from its 2002 baseline. The company's CEO Steve Roell requires each of the business units to come up with an annual plan as to how they will reduce GHG intensity by 3% of which 1% is achieved through an absolute GHG reduction. The CEO and executive management team review and track progress on these plans quarterly for each business. The annual plans include a variety of improvements including lighting retrofits and other energy efficiency improvements in manufacturing plants, purchase of green power, use of hybrid vehicles in its service fleet, supply chain efficiency improvements, office space optimization and installing on-site renewable energy generation.

One major area of focus is the design and retrofit of buildings to the Leadership in Energy and Environmental Design (LEED™) rating system, a system the company helped to develop. Johnson Controls built one of the first LEED™ certified buildings in the world in 2001, the company's Brengel Technology Center in downtown Milwaukee, Wisconsin. It also was the first to go from Silver to Gold certification. Johnson Controls is currently renovating and constructing its corporate and Power Solutions headquarters in Glendale, Wisconsin which will be the largest single campus of platinum-certified buildings under the LEED system. Environmental improvements will include a 50,000-gallon cistern that will collect rainwater for toilet flushing in the new buildings. Overflow from the cistern will be directed to a rain garden. The large parking lot on the southeast corner of the property is to be replaced with porous pavers and swales that will allow rainwater to be absorbed and naturally cleanse the runoff. The landscaping for the property will restore most of the open area to a prairie, using all native plants. Energy efficiency and renewable energy measures such as green roofs, solar panels and geothermal heat pumps are planned.

The company believes that the practices that it applies to its own facilities are also of great benefit to its customers. One of the services Johnson Controls offers is to help businesses engage in energy and sustainability strategic planning with a programmatic approach to project implementation. This involves setting goals, benchmarking and meeting those sustainability goals. Johnson Controls is helping the Indiana Department of Corrections outfit the prison facility with four industrial grade biomass boilers that will use 1.3 million bushels of corn each year, to produce an estimated 6.8 million kilowatt hours of electricity annually.

Innovating the Service of Sustainability Consulting

One innovation that Johnson Controls has brought to the process of helping improve energy efficiency in buildings is performance contracting. Many of the company's clients are public-sector entities such as schools, universities, and local governments that may not have the capital upfront to fund facility improvements. Johnson Controls uses performance contracting with these public sector clients so that improvements are paid for over time through the energy and operational savings generated by the project.

The process of performance contracting involves a review of the energy efficiency and renewable energy opportunities at the facility. Enabling legislation in each state allows public sector entities to enter into long-term agreements for infrastructure improvements funded through future energy savings. Johnson Controls has helped the Clinton Climate Initiative use this performance contract model in the non-profit organization's efforts to improve the energy efficiency of buildings in many of the world's largest cities, real estate firms, financial institutions and energy service companies in a landmark effort to reduce energy consumption in existing buildings across the municipal, institutional, commercial, private, educational, and public housing sectors.

CSR Causes Change to Decision-Making Procedures

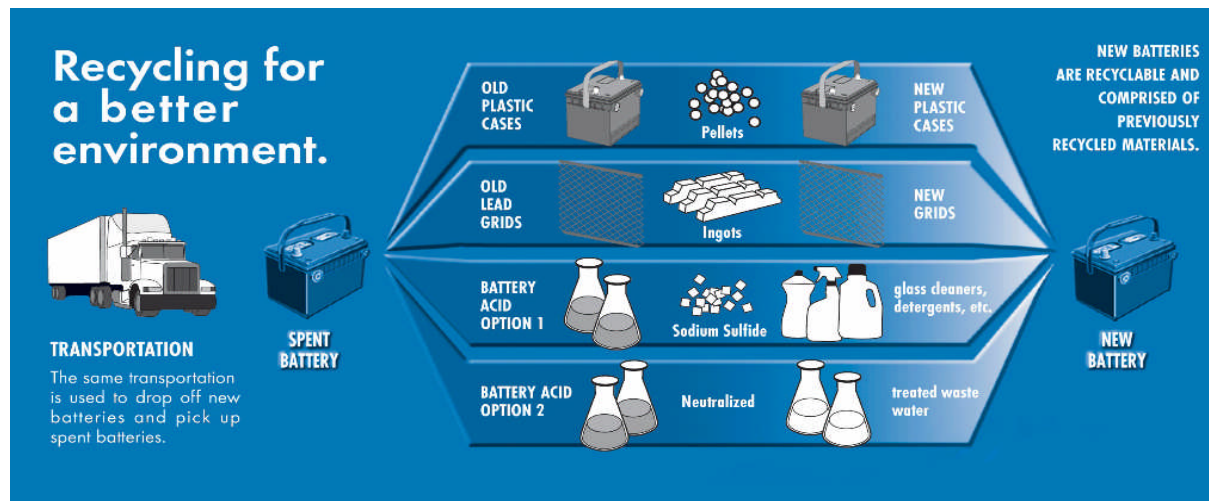
Johnson Controls has recently begun considering the future cost and potential value of carbon emissions in the company's decision-making process. For capital investments that may have a significant environmental impact, either positive or negative, Johnson Controls considers the carbon implications in their financial analysis. By including a value for carbon credits for energy-efficiency expenditures or carbon costs for energy-intensive investments in the company's financial analysis, Johnson Controls is treating carbon emissions as if they were regulated or capable of being monetized. The United States does not currently require corporations to reduce their GHG emissions, although the United States Environmental Protection Agency (EPA) is due to announce proposed regulation on the required registry of GHG emissions in 2008. Nevertheless, more and more American companies are making voluntary public commitments through organizations such as EPA's Climate Leaders program. Johnson Controls is also starting to look at the entire lifecycle impact of its products both upstream and downstream of the manufacturing process. The company has expanded the use of Life Cycle Assessments including environmental impact upstream, embedded energy in raw materials, and downstream through customer use and disposal.

Example of Green Innovation at Johnson Controls

Sustainability goals have driven both process and product innovations at Johnson Controls. An example of a process innovation is the closed-loop battery recycling for lead acid automotive batteries. Johnson Controls collaborated with retailers to make lead-acid automotive batteries the most recycled consumer product in the United States. The company instituted a closed-loop process for recycling batteries in which a truck that delivers new batteries to a retailer also picks up old batteries, not just those made by Johnson Controls, and takes them to Johnson Controls recycling facilities where the materials are separated, and then takes recycled materials to a battery factory for new use in production. The innovation of this closed-loop logistical approach results in an estimated 95% of all batteries sold making their way back into the manufacturing supply chain for new batteries.

An example of a product innovation is Johnson Controls' development of the technology for Lithium-ion hybrid-battery systems. Johnson Controls saw the opportunity to use advanced battery technology to improve vehicle efficiency. The primary battery chemistry for first generation electric vehicles, Lead Acid and Nickel Metal Hydride had limitations in power density and weight. To support plug-in hybrid and all electric vehicles, Johnson Controls partnered with Saft in Europe to develop state-of-the-art Lithium-ion batteries. This partnership is producing the world's first serial production of lithium-ion batteries for the Mercedes Benz S-class hybrid sedan, scheduled for introduction in 2009.

Figure 21: Battery Recycling



Source: Johnson Controls (2008)

Conclusion

The challenges companies face in innovating in the sustainability area are unique to each company. Nesler said that with the power solutions business, the challenge is the large investment in infrastructure required to design, develop and manufacture the advanced technology battery systems for what is now a niche and emerging market. In Johnson Controls' automotive interiors business, the challenge is the impact of the financial crisis on the global automotive business and the manufacturer's ability to invest in more fuel efficient and environmentally-responsible components. In the company's building efficiency business, the greatest challenge is to stimulate the private-sector investment in energy efficiency and renewable energy when building developers, building owners, and tenants all may have different objectives.

Clay Nesler said that many companies' initial CSR efforts end up not being sustainable because the companies base decisions on doing the right things environmentally without quantifying the economic benefits over the long run. There are no shortages of CSR opportunities that have an attractive business case as well as doing something environmentally or socially commendable. CSR values, policies and objectives help communicate to internal and external stakeholders what really matters to the organization in a way that is visible, transparent and measurable.

For companies trying to make sustainability more "sustainable" over the long run, Clay Nesler had the following advice:

1. Make a strong and public commitment to sustainability at a senior level.
2. Assess where your organization is today and where you would like to be in the future.
3. Look initially for win-win-win opportunities where you can deliver environmental, social and business benefits simultaneously.
4. Integrate sustainability goals and actions into the company's strategic and operating plans rather than creating a separate parallel organization and scorecard.
5. Set clear goals and targets, and measure progress using the operational platforms that drive the day-to-day business and hold business leaders accountable for results.

13. Procter & Gamble: Combining Product and Marketing Innovations for Sustainability

Procter & Gamble (P&G) was founded in 1837. The company's headquarters are in Cincinnati, Ohio. It currently employs 138,000 people worldwide. In 2007-8, P&G had sales revenues of \$83 billion, and the company has grown from \$39 to \$83 billion in the last eight years. P&G has been a leader of the Dow Jones Sustainability Index in the nondurable household products for seven of the last nine years. The company's 300 brands of products fall into three main categories: Beauty (e.g. *Head & Shoulders*, *Pantene*, *Gillette*, *Wella*, *Braun*); Health and Well-Being (*Always*, *Crest*, *Oral-B*), and Household Care (*Ariel*, *Tide*, *Duracell*, *Pampers*).

Recent Economic and Political Trends that Have Impacted P&G

One world trend over the last five years has been the increase in connectedness through the internet, cell phones and text messaging. To make innovation more efficient, P&G has tried to bring connectivity into the company. In 2000, P&G CEO A.G. Lafley announced the goal that over 50% of ideas that P&G brings to market would come from outside the company. In 2003, P&G launched the goal of "Connect and Develop," to search for and select ideas from non-P&G sources, and then to develop those ideas that tested as having the most promise. P&G increased opportunities to talk to people at universities, at government, to go out and look at ideas in start up companies, to advertise for ideas, and to tap into innovation centers around the world. The project is described by P&G's Larry Huston & Nahbil Sakkab in *Connect & Develop: Inside P&G's New Model for Innovation*, Harvard Business Review (March 2006).

Another trend that has had an impact on the company has been the world's growing awareness of sustainability problems. This has come in part through the United Nation's Millennium Development goals and increased awareness of environmental issues such as climate change, and recognition of the opportunity that companies have to provide solutions. As Director of Global Sustainability Peter White puts it, "The rise of environmental awareness and the scarcity of energy and water have given P&G the opportunity to provide products that use less energy and create less waste. We as a company currently improve the lives of around four billion consumers around the world, and have a goal to reach another billion by 2012, mainly in developing countries." White identified one product designed for people in developing countries, *Downy Single Rinse*, which halves the amount of water needed to hand wash clothes. Since less water is required, the girls and women in developing country villages who are responsible for washing clothes can spend less time transporting the water, White said.

Sustainability Management

P&G says that it has "embedded sustainability into the company purpose," and has changed the corporate statement of purpose to include sustainability, including the words "now and for generations to come." P&G has also added a specific sustainability principle to its corporate principles "We incorporate sustainability into our products, packaging and operations." P&G sees that it has a responsibility to make sure that those at the company do the right thing, but also looks for sustainability opportunities. Hence it has coined the term Corporate Social Opportunity (CSO) to describe its approach.

In 2007 P&G launched a new five-plank sustainability strategy, focusing on products, operations, social responsibility, employees and stakeholders. Building on its core strengths – innovation, consumer understanding, branding, scale and marketing capability – P&G decided that its best approach to sustainability was through designing products with reduced environmental profile. P&G's first goal is to bring to market \$20 billion in cumulative sales of sustainable innovation products with reduced environmental impact by 2012. Sustainability is part of all innovation review that takes place in Research & Development.

To make all of this happen at the business unit level, each business unit has a person accountable for developing and delivering the sustainability strategy for that business unit, which together deliver the corporate strategy and goals.

P&G's 2008 Annual Report states that the company "views innovation through the lens of sustainability," with investments made in order to "improve the environmental profile of our operations and products." One aspect of P&G's sustainability goals involves designing and producing products with less waste and more potential for recycling. Today, over 95% of materials that enter P&G plants leave as finished product. More than half of the remaining 5% of materials are recycled.

The annual report states that P&G has systematized the process of sustainability, designing and building new facilities to be more energy and water-efficient. Over the next five years, P&G will reduce CO₂ emissions, energy and water consumption, and disposed waste per unit of production by an additional 10%, giving at least a 40% reduction for the decade. P&G's White said that wind- and solar-power and bringing greater water and energy efficiency to the company's new production sites are all part of the solution.

White says the company develops and uses state-of-the-art science and product life cycle assessment, from raw materials through disposal, to assess environmental quality. Using these tools, P&G continually assesses environmental technology, and monitors the company's progress toward environmental goals. For example, P&G has redesigned both Charmin and Bounty for reduced water, CO₂ and energy usage.

The company's annual report says that the company leads innovation by inspiring its employees to take more responsibility in delivering the company's goals. This includes using video conferencing rather than travel, increasing recycling and getting involved in local community programs. P&G employees are encouraged to build sustainability thinking into their daily life and work through leadership focus and accountability, audit programs, Health Safety & Environmental benchmarking, and Health Safety & Environmental leadership training. On the employee side the need to do the right thing is laid out in the company's Worldwide Business Conduct Manual that is deployed to all employees. On the supplier side, P&G has specific sustainability guidelines for suppliers which are publicly available, as well as policies for areas such as environmental quality, sustainable forestry etc.

Focus of Innovation at Procter & Gamble

As illustrated by both the company's Connect and Develop program and the company's emphasis on innovation in the 2008 Annual Report, innovation is important to P&G. The company holds more than 29,000 patented technologies for products that are on the market, and invests more than \$2 billion a year on Research and Development, nearly twice the level of the company's closest competitor. According to the IRI Pacesetters study, which tracks and ranks the most successful new consumer products introduced in the U.S., one-third of the most successful Pacesetter products, on average, have come from P&G and Gillette for the past 13 years. In 2008, five of the ten best-selling new products came from P&G.

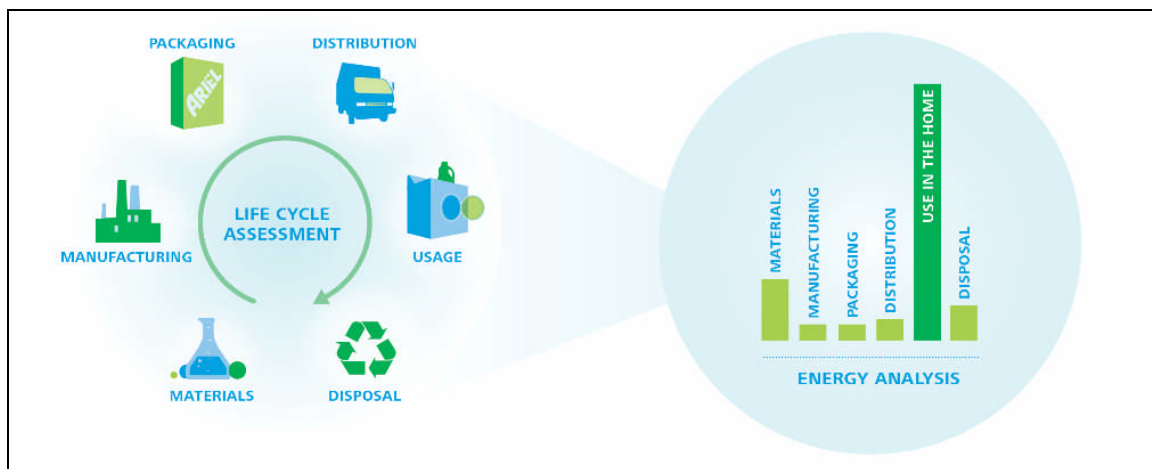
When asked which factors are the most decisive in achieving innovation today, P&G's Peter White replied that innovation is the company's "life blood," and that it is deliberately built into the methods of the company. The company's design, said White, ensures that innovation happens "reliably, consistently and responsibly."

Combining Product and Marketing Innovations for Sustainability

The general process of innovation that P&G takes is to first, understand where the opportunities are, second, to draw upon the company's technical know-how, and then to use social or marketing innovation to get consumers to buy the new product and use it correctly. To identify sustainability opportunities "from discovery through disposal and

potential reuse,” P&G has used Life Cycle Assessment (LCA). Through LCA, P&G assessed the material, energy and water requirements, as well as GHG emissions at each phase for its laundry detergents, including raw material acquisition and transport, manufacturing, packaging and distribution, consumer use and consumer disposal. The company’s research showed that up to 85% of the energy consumed through the life of the product is consumed during the consumer use phase by heating the washing machine water. Since consumers were using a vast amount of energy by washing clothes at high temperatures, P&G began working on designing a laundry detergent formula that could achieve the same level of cleaning performance at a lower washing temperature. Developing a product to save energy and reduce GHG emissions was only the first part of the battle, however.

Figure 22: Life Cycle Assessment



Source: P&G (2008)

P&G’s research on consumers indicated that 45-50% of shoppers would only buy green products if the product did not sacrifice performance or cost more money. The company realized that its biggest challenge was to market the sustainability benefit of washing at lower temperatures as a primary consumer benefit. P&G’s information on the U.S. product, *Tide Coldwater*, states that washing laundry in cold water can save consumers up to 80% of energy per load. In the United Kingdom, P&G’s “Turn to 30” campaign for *Ariel Coolclean* was a marketing innovation because it was able to translate the sustainability benefits of reducing energy use into consumer benefits of saving heating costs for mainstream consumers in the United Kingdom who had primarily been interested in getting their clothes clean without paying more money. P&G had similar campaigns in Germany for *Ariel Kalt-aktiv*. The recent European update on *Ariel Kalt-aktiv* is *Ariel Excel Gel*, which is not only able to wash effectively at even lower temperatures of 15 degrees Celsius, but also is a compact product, saving materials, packaging and transport costs.

Survey results show that technological innovation of products combined with consumer education have been successful in changing consumer habits and saving energy. In the UK, a 2007 study showed 17% of households washed at 30 degrees Celsius, compared to only 2% in a similar survey in 2002. Results in Netherlands are even more impressive. Within six months of the launch of the “Turn to 30” campaign, 52% of Dutch consumers were washing at 30 degrees Celsius, compared to 22% before the campaign.

White offered the following advice to other companies considering whether and how to incorporate sustainability: “Sustainability has to be strategic to what a company does, and how it does it. The first step is to understand where a company’s biggest impacts occur, and where they have the biggest opportunity to make environmental and social improvements.

For some, the biggest opportunities will be in making their operations more energy and resource efficient, while for others it will be through the products and services they provide. The second step is to use innovation to find ways to deliver more efficient products and operations with no tradeoffs in cost or performance. Sustainability can build both top-line growth and cut bottom-line costs. The third, and most far-reaching, step is to build sustainability into the culture and systems of the organization, so it becomes part of everyone's job."

White concluded: "Building sustainability into a business is a challenge, but one that the companies of tomorrow have to embrace."

14. SC Johnson: Integrating Sustainability at Each Stage of the Process

S.C. Johnson and Son (SC Johnson), a consumer products company, was founded in 1876. Its headquarters are in Racine, Wisconsin. SC Johnson is a family-owned company, which has never been publicly traded. The company reported sales of \$7.5 billion in 2007, and has 12,000 employees in 70 countries. Well-known SC Johnson products include Windex, Scrubbing Bubbles, and Glade candles.

Fluctuating costs for oil and other raw materials have meant higher costs for commodities such as steel used for cans, oil used in solvents, plastics and perfumes. With today's economic uncertainty, SC Johnson's Pat Penman said, the need for focus and efficiency has never been greater. Penman, who is Director of Environmental and Safety Actions at SC Johnson, said that as a family company, SC Johnson has had the advantage of being able to "do what is right for the long term rather than worrying so much about next quarter's earnings."

Penman credited the environmental leadership at SC Johnson with allowing the company to engage in an entire process of sustainability rather than merely launching a green product or two. She said that all representatives of the business have a seat at SC Johnson's "Corporate Social Responsibility table," including Research and Development Manufacturing and Operations. Penman said SC Johnson also consults with consumer groups, leading suppliers, NGOs, the U.S. Environmental Protection Agency (EPA) and universities in order to bring environmental thinking to the company's operations.

The company's reports reference H.F. Johnson Jr.'s trip from Wisconsin to Brazil in search of a sustainable source of wax for SC Johnson products in 1935 to illustrate the company's early interest in sustainability. In 2002, the company became the third member of Climate Leaders, the voluntary EPA-industry partnership dedicated to reducing greenhouse gas (GHG) emissions. Since 1990, SC Johnson has set targets and measured progress for sustainable development objectives in three areas: environment, economic and social objectives. Between 2000 and 2005, the company reduced GHG emissions 42% from its largest seven factories worldwide. The company has announced that by 2011, it will reduce GHG emissions from its U.S. operations on an absolute basis by 8% from the company's 2005 baseline, and will reduce GHG emissions from all worldwide factories by 12% on an absolute basis from SC Johnson's 2000 baseline. In 2006, SC Johnson received the Presidential Green Chemistry Award and Ron Brown Award for Corporate Leadership.

SC Johnson's Most Important Process Innovation - the Greenlist™

Pat Penman identified SC Johnson's Greenlist™ process as the best example of a green innovation at SC Johnson because the process "transcends every single product". The Greenlist™ is intended to classify raw materials for use according to a series of scientific criteria, and to increase the use of raw products that have the least impact on the environment and human health.

From the idea stage until the company patented the process in 2001, the Greenlist™ process took eight years to fully develop. During the 1990s, SC Johnson set out to find a way to reduce the "footprint" through eco efficiency, increasing recycling in the plant to greater than 96%. In early 2000, SC Johnson's Research, Development & Engineering (RD&E) team had looked at the different outside processes that existed for evaluating raw materials, and found that these models were "blackbox models" that did not reveal their criteria by which they were rating the materials. One of SC Johnson's strengths has been the ability to reformulate its products to draw upon raw materials with a better environmental profile. Thus, company scientists determined that it would be helpful to have a process for ranking raw materials based on scientific criteria such as toxicity, biodegradability, and the profiles of the ingredient. Additionally, the RD&E team wanted to have a model that could be incorporated into the everyday work of the scientists rather have the scoring at the end of the process.

Designing a system that provides useful information on a wide range of materials - from product packaging, to fragrances, insecticides, and propellants - was challenging. Therefore, Greenlist™ designers at SC Johnson proposed the development of screening criteria specifically tailored to each chemical function. The patent for the Greenlist™ process states that the criteria applied to the chemical components may, for example, reflect criteria selected from the group consisting of aquatic toxicology, biodegradability, acute human toxicity, European Union environmental classification, supplier, vapor pressure, water partition coefficient, propellant rating, aquatic toxicity, and bio-accumulation.

To create the Greenlist™ process, SC Johnson collaborated with scientists from the U.S. EPA, from the United Kingdom's Forum for the Future, and from numerous universities. Penman said that SC Johnson has named an administrator to license the patented Greenlist™ process royalty-free so that other companies, including SC Johnson competitors, may also improve the environmental profile of their materials. Some of SC Johnson's products now even meet the stringent U.S. EPA Design for the Environment criteria (DfE).

SC Johnson's annual report states that the computerized, global system for the Greenlist™ process provides ratings for more than 95% of the raw materials used in the company's products. In 2006 and 2007, the company improved products by using more materials rated "better" or "best" for the environment, and used less than one percent of materials with the lowest rating. Since 2001, the Greenlist™ process has enabled SC Johnson to remove more than 61 million pounds of volatile organic compounds (VOCs) – the equivalent produced by approximately 656,000 cars in a year - from the company's products, including Windex glass cleaner. SC Johnson's Pat Penman notes that the goal of Greenlist™ reformulation was not just to remove the 1.8 million pounds of VOCs annually from Windex, but also to improve the cleaning efficacy of the glass cleaner as well.

Other Examples of Process Innovations for Sustainability

SC Johnson's 2008 Annual Report states that the company is committed to bringing environmental thinking to all aspects of its operations by identifying and acting on great ideas from many parts of the organization. SC Johnson's Penman described four process innovations that had resulted in greater sustainability at the company.

Beginning with the process for selecting the raw materials in the products and the packaging, Penman said that SC Johnson's Greenlist™ process has been essential in integrating sustainability goals into the design and development of each product's formulation. SC Johnson is also attempting to make the way that it packages its products more sustainable, for example by using 100% post-consumer-recycled materials on the packaging of Ziploc bags. Noting that 40% of all hardwood harvested in the United States goes into making pallets, the company is switching from hardwood pallets to pallets made of recycled plastic.

"After we look at how we are creating and packing the product, we look at

Figure 23: Greening the Company

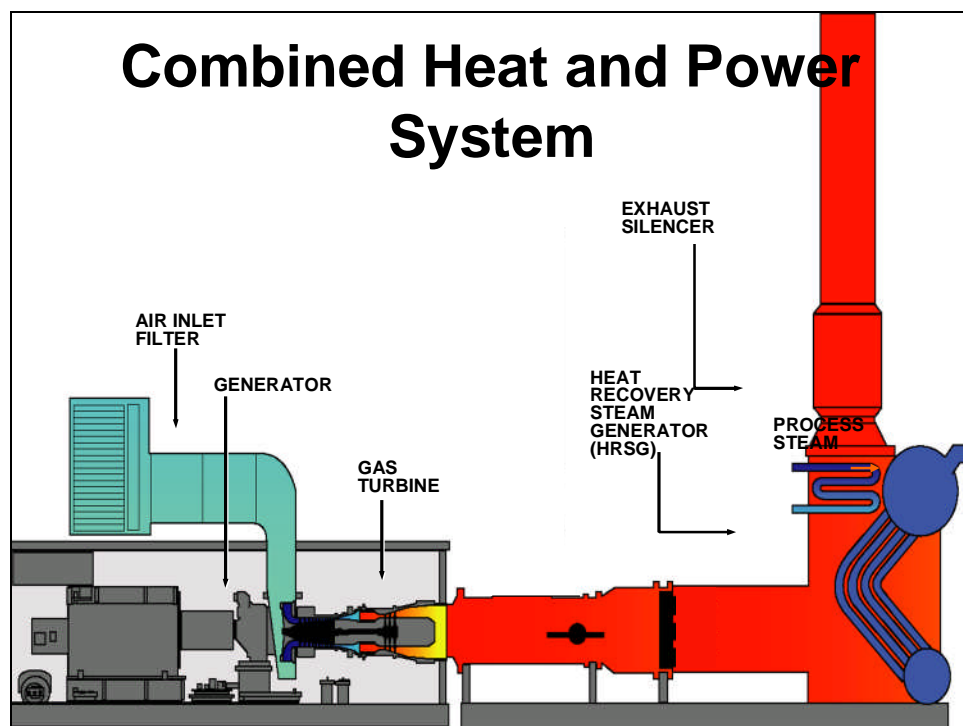


Quelle: SC Johnson (2008)

how we power the plants,” Penman said. In March of 2008, SC Johnson derived nearly 40% of its global electricity from renewable energy sources for all plants worldwide. Since 2003, the SC Johnson Waxdale plant began employing cogeneration from one combustion turbine and powered by methane gas from the public landfill to help power the entire plant. In 2005, SC Johnson added a second turbine that operates on natural gas. Penman said the two cogeneration wind turbines generate 6.4 megawatts of electrical power, supplying the average base-load electrical demand for the Racine, Wisconsin’s facility. Penman said that the decision to build the cogeneration plant was difficult because the plant represented a new energy source for the company’s largest factory and was expensive, not the kind of investment that can be paid off within a year. Penman said the idea came from a team led by Frank Ericson, an environmental engineer working at the Racine, Wisconsin manufacturing plant after they realized the value of capitalizing on the landfill located across from the plant. The two turbines reduce SC Johnson’s annual GHG emissions by 52,000 per year.

SC Johnson’s co-generation turbines used to produce green energy utilizing methane piped in from a local public landfill as well as natural gas. They generate the entire average daily base-load electrical demand of the company’s largest global plant, in Racine, Wisconsin.

Figure 24: Combined Heat and Power System



Quelle: SC Johnson (2008)

SC Johnson’s co-generation turbines used to produce green energy utilizing methane piped in from a local public landfill as well as natural gas. They generate the average daily base-load electrical demand of the company’s largest global plant, in Racine, Wisconsin.

In 2007, SC Johnson began purchasing about half of its energy for the Bay City, Michigan plant from wind turbine suppliers on the edge of Lake Huron. In Indonesia, SC Johnson uses biofuel from palm nut husks to replace diesel fuel.

Penman said the third way that SC Johnson works to improve sustainability is the way that the company gets its products to market. SC Johnson uses intermodal transportation programs. The company puts products inside tractor trailers placed on trains. That way, the

tractor trailer containers are ready to roll when they reach their destination and the majority of the distance is covered by train. The company also is a member of the Smart Way Partnership with the EPA and its trucking services adhere to best practices and the most efficient routes. Finally, the company packs the trucks to get as much product in as possible. Penman said that the company was able to use 2,098 fewer trucks, eliminate 1,882 tons of GHG emissions associated with shipping while reducing SC Johnson's diesel fuel use by 168,000 gallons per year.

In addition, Penman said the company was now looking to collaborate with retailers to innovate the process. This includes retailers in developing countries. Working through Cornell University's Base of the Pyramid Protocol, SC Johnson has attempted to build stronger communities in developing communities. Developed by Cornell Business Professor Stuart Hart, the Base of the Pyramid Protocol seeks to create mutually beneficial businesses in developing communities. In 2006, SC Johnson worked with entrepreneurs in three neighborhoods in Nairobi: Kibera, Mitumba and Mathare to create "Community Cleaning Services." The program provided training for entrepreneurs, who offer cleaning services directly to homes using SC Johnson products such as Pledge furniture care, Toilet Duck bathroom cleaner and Baygon pest control.

Conclusion

As Director of Environmental and Safety Actions, Penman had the following advice for other companies seeking to become more sustainable. First, she noted the importance of having a CEO dedicated to sustainability. Without a clear message from the top, people in the company might wonder why they should even care. She described her management's commitment as the key catalyst for sustainability. Second, Penman advised to make sure that everyone in the company is aware of the impact that each decision may have on the environment. Penman said that senior management at SC Johnson set environmental goals, communicated those goals and tracked progress against those goals. Penman said that SC Johnson tracks progress on environmental goals in several ways. Employees provide quarterly and annual updates to the highest levels of the organization on how company goals are being met and employees are evaluated in how they individually are helping to achieve the company's goals. Additionally, the company has internal mechanisms for recognizing and rewarding innovations made for sustainability from internal recognition in company-wide communication to financial rewards.

Third, Penman observed that it has to be much more than just creating one green product; rather companies should try to integrate sustainability into the company's entire business approach. She said that SC Johnson had really benefited from its years of experience. Environmental sustainability is not a new concept at SC Johnson yet she said "we keep learning as new information and new science becomes available. We continue to build up environmental knowledge over time."

