Proctor & Gamble
Gillette
Energy Use & Footprint Reduction

MIT Sloan School of Management
Laboratory for Sustainable Business

Catherine Liang Chew, Akinori Nagano, Daisuke Tominaga, Alex Zheng

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Introduction

Company background

Procter & Gamble Co. (NYSE: PG), one of the world’s largest consumer goods manufacturers, was founded in 1837, and today provides its products to customers in roughly 180 countries with total revenue of $79.03 billion (2009). In 2005, the company acquired The Gillette Company, a leading global supplier of shaving products based in Boston. In 2007, the company established five strategies for Sustainability as shown in the chart below and set goals to be achieved by 2012.

<table>
<thead>
<tr>
<th>2012 Strategies</th>
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<td><strong>Strategy 1:</strong> Products</td>
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<td><strong>Strategy 2:</strong> Operations</td>
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<td><strong>Strategy 3:</strong> Social Responsibility</td>
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<td><strong>Strategy 4:</strong> Employees</td>
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<td><strong>Strategy 5:</strong> Stakeholders</td>
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- **Operations Goal**
  - Reduce the environmental footprint in PS by 20% (B&G – 25%), including Energy, CO2 Emissions, Water and Waste Disposal by 2012.

- **Strategy 1: Products**
  - Delight the consumer with sustainable innovations that improve the environmental profile of our products.

- **Strategy 2: Operations**
  - Improve children’s lives through P&G’s social responsibility programs.

- **Strategy 4: Employees**
  - Engage and equip all P&Gers to build sustainability thinking and practices into their everyday work.

- **Strategy 5: Stakeholders**
  - Shape the future by working transparently with our stakeholders to enable continued freedom to innovate in a responsible way.
Since 2002, significant progress has been made in the areas of energy usage, CO\textsubscript{2} emissions, waste disposal and water usage. These are the main sustainability metrics that P&G uses. However, since 2007, improvements have not kept pace with prior progress in some areas, suggesting that more can be done. For details, please refer to the chart in Appendix A: Current State of Sustainability Progress.

**Gillette South Boston Manufacturing Center**

Production began at the South Boston Manufacturing Center (SBMC) in 1904, soon after Gillette received a patent for its safety razor, with the original production process developed by MIT graduate William Nickerson. The current state-of-the-art production facility in South Boston includes full razor manufacturing operations. For more information about SBMC, please refer to Appendix B: Detail Information about SBMC.

**Project Objectives**

The purpose of our project is to help SBMC understand its energy usage across the plant, to identify the major loss areas, and recommend efficiency improvements, which have a potential to be reapplied to other P&G plants. For the purpose of this project, we will work together with the Energy Loss-Elimination Team, created within the SBMC. With the completion of our project we will provide SBMC with the following deliverables:
• Systematic energy flow map, report and presentation

• Assessment of energy usage and costs

• Identification of loss elimination/recovery opportunities with an aim of identifying 30% potential savings

• Recommendations for longer range equipment/site

• Preliminary environmental impact and financial analysis of recommendations

• Summary with recommended procedure on how to reapply the energy analysis process at other P&G sites

**Methodology and Approach**

**A General Framework for Evaluating Resource Use**

In the course of evaluating each of the resource use categories for the SBMC, we applied a common framework in order to take a systematic, whole-system perspective to each resource. The approach can be extended to other campuses and resources, as it is broad enough to apply in a variety of situations. The seven steps to the approach are outlined below.
The first thing our team did in looking at each of the resource areas was to create a snapshot of the existing state of the system. In some cases, this involved...
constructing resource flow maps that carefully show the inputs, outputs, and uses of resources in the system. For our project, we focused on assessing resource flows for energy and water in the SBMC system. This allowed us to get a better understanding of the total magnitude of each end-use, as well as prioritize our thinking in terms of areas of greatest impact. While the data we found were useful, we discovered that in many cases measurement systems at SBMC were incomplete. It is important that in the future these systems be updated and made more comprehensive.

Base-lining is also important because it creates a platform of common understanding about the current state of the system. This is not useful for planning potential future savings, but is vital for looking back on a project once it has been implemented and understanding the savings over what was there before. Projects that fail to create a detailed benchmark before implementation reduce their ability to make claims about their effectiveness once they have been implemented, because the base case was not recorded.

**Benchmarking**

Once a baseline has been created, it needs to be viewed in context. The question is, what is the appropriate frame of reference for a given benchmark? What makes a given factory comparable to another factory even if it is performing the same function?
There are two major approaches to benchmarking, both of which we took to some degree. The first is to look for a direct match that performs basically the same functions as the existing system on all levels. This “peer comparison” approach allows managers to draw direct parallels between the plants and share information about best practices. It also naturally lends itself to a systems perspective, since some plants may have completely different ways of accomplishing the same tasks. For the SBMC, this might be the Berlin plant or another similar Gillette plant, since they produce similar products. However, this is not always possible, especially for unique operations. A second approach divides the system into a number of sub-systems, which can be individually compared to reference systems that are better established. For example, at SBMC, the Power House can be designated as a separate sub-system that can then be directly compared to other powerhouses with similar equipment. The water treatment system might also be designated as a separate sub-system that can be compared to the water treatment systems of other industrial applications.

**Opportunity Identification**

Once the plant has been base-lined and appropriate benchmarks have been identified, it is then a simple matter of comparing the two across the relevant dimensions. Problem areas can be quickly identified as
Areas where the baseline resource use is high in an absolute or relative sense
Areas where the same function is being performed by the baseline plant and the benchmark plant but with a much lower resource consumption level at the benchmark plant

These problem areas represent the most obvious opportunities for resource use reduction. These opportunities are not just a function of total magnitude of the energy use, but also the ease with which an issue can be addressed. At SBMC, it seems that many of the problems have already been identified qualitatively. However, what is often missing in many of these systems is a comprehensive sense of which problems and opportunities are greater in magnitude than others. This goes back to the basic issue of developing metrics and base-lining the system on an on-going basis, and comparing the system to relevant benchmarks. While Gillette has taken steps towards through their sustainability reporting system, this system can and should be made more comprehensive. An improved system could include more detailed analyses of individual sub-systems as well as a broader lifecycle perspective that incorporates the overall footprint of the plant’s activities.

Solution Generation

The reduction of resource consumption is not always a simple matter of taking practices from benchmark plants and importing them wholesale into the plant under
consideration. Path dependencies, fixed costs, and limited scope of application often hinder these direct approaches. Instead, once an area of opportunity has been identified, a number of options can be brought to bear to try to reduce its resource consumption:

- Best practices from other plants and industry benchmarks
- Emerging trends and technologies
- Elimination or redesigning of processes and functions

The best solutions are often not taken from external sources but promoted from within the organization. Those who are on the ground performing frontline functions on a day-to-day basis are best positioned to identify and report potential areas for savings. Establishing channels for these ideas to propagate to management is an important part of on-going solution generation. At SBMC, a number of systems are already in place to propagate great ideas from the staff upwards. However, the ability to analyze and act on these suggestions, especially when they are larger or involve multiple systems, is significant impaired. Greater priority and human resources should be given to promoting and implementing some of these cross-cutting solutions at SBMC.


**Analysis of Solutions**

Most likely, more solutions will emerge than can realistically be implemented. Proposed solutions should be analyzed on a number of dimensions to determine their alignment with overall goals of the company as well as general feasibility. These dimensions may include:

- Financial and economic
- Environmental and resource consumption
- Worker relations
- Public relations
- Alignment with overall corporate strategy

These factors need to be weighed together in order to understand the overall impact of a solution. Most solutions involve tradeoffs of one kind or another. It is important that management not only understand these tradeoffs, but that the management make tradeoffs that push greater alignment with the firm’s overall corporate strategy. In general, SBMC has a great core of technical expertise that can help analyze these solutions quickly. However, it is becoming capacity constrained as these resources are limited. In the future, SBMC should consider engaging vendors and outside groups at an earlier stage in the process in order to offload a greater share of analytical tasks on the relevant firms. While core managerial decision-making cannot
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be outsourced, the basic analyses that are inputs to that decision making process can be, especially if the analyses required is outside of the expertise of existing staff or if current human resources are highly constrained.

**Prioritization and Selection**

It is critical for organizations to prioritize the many solutions that are generated, given limited resources. Traditionally, projects are funded on a NPV basis. While cash investment needed, NPV and payback period provide a nice way to prioritize the projects from a financial perspective, sustainability projects need to be examined from a different mindset. As outlined in the Analysis of Solutions section above, a common set of metrics expanded to cover stakeholders and alignment with corporate strategy is important to avoid getting so narrowly focused on the immediate economic cost-benefits that other factors such the potential to create public goodwill and/or new markets are overlooked. These other factors can ultimately create longer-term benefits, though difficult to quantify. Therefore, we recommend examining the NPV using a longer payback period, especially since sustainability projects are usually infrastructure-related. We also recommend applying a color-coded strategy to estimate the impact of more qualitative factors, relative to the current state as well as each other. Making it visual will provide another way to prioritize projects to the high-impact and
Implementation Plan

As with any recommendation, the key ultimately lies in the implementation. It is critical to simultaneously work with vendors and internal staff to get buy-in and proper training. A new piece of equipment is useless if the staff refuses to use it or if the staff is not fully aware of its capabilities and how to maximize the gains. This is an area that we feel the Integrated Work System (IWS) can play a large role, not just in the Focused Improvements Pillar but across all pillars. Being able to speak the same common language of sustainability will enable the entire organization to see it as part of their responsibility and not just someone’s job.

Over the course of a project, conditions and needs are constantly changing. Staying flexible and continually revising the plan of action with vendors and staff will help projects to be successful and strategically aligned with the business goals.

Sources of Interest

Following the identified methodology and approach, we took a deeper look at several sources of energy including steam, electricity, water, and compressed air/nitrogen in order to understand the main flows within the plant and build a preliminary energy flow map. This approach would also allow us to assess the energy
usage and costs, potentially uncovering some loss elimination ideas that have been previously overlooked. The following diagram outlines the four areas and some highlights. For the detail description within each sources of energy please refer to Appendix C: Detail Diagnoses and Recommendation by Source of Energy.

### Steam
- Reconsider operating constraints of power plant once gas fired turbine is installed
- Consider shutting down steam circulation during summer months

### Electricity
- Additional metering could increase accountability of electricity use
- Potential to tie occupancy sensors to Lighting and HVAC systems

### Water
- More detailed water accounting could provide better understanding of losses
- Potential quick-wins with low-flow water heads

### Compressed Air / Nitrogen
- Better system monitoring may improve leak identification and help target efforts
- Distributed production and storage may offer potential savings in both systems

## Conclusions

We believe that SBMC is making strong progress with its aggressive sustainability planning and existing initiatives. Our recommendations include specific on-site tactical (micro-level) changes as well as high level strategy (macro-level) changes. Micro-level changes include shutting off the steam loads during the summer months to shorten the circulating loop and implementing a water storage system to collect water
for reuse. Macro-level changes include rethinking the way projects are selected, using distributed systems where beneficial, and improving the understanding of current state with expanded metering systems in all areas. The number of great ideas is numerous – the broader challenge lies in prioritizing time and resources and integrating the projects into a cohesive strategy that aligns with the business goals. We recommend prioritizing recommendations using a systems approach, taking into account more than financial impact – factors such as public relations, employee retention, environmental impact, and potential for new markets may also be important in approving a strategic project which may not have immediately quantifiable benefits but could be a cornerstone in changing the way SBMC is perceived both inside and out. While we understand business need for economic value, we also believe that sustainability projects require a shift in mindset to see the benefits that go well beyond savings. Sustainability projects can bring costs down but more importantly, they serve to mitigate business risks of overdependence on fundamentally limited resources. For infrastructure-related investments, the required payback period should also be extended to reflect its longer useful life and potentially lower cost of capital. The table below is an example of a prioritization and selection tool that has been expanded to incorporate a few key considerations in addition to traditional NPV analyses.
<table>
<thead>
<tr>
<th>Solution</th>
<th>Cost</th>
<th>Savings</th>
<th>CO₂</th>
<th>Energy</th>
<th>Water</th>
<th>Waste</th>
<th>PR</th>
<th>Morale</th>
<th>New Markets</th>
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<tbody>
<tr>
<td>Solar PV</td>
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<td>Low Flow Toilets, Showerheads &amp; Faucets</td>
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<td>Smart Occupancy Sensors</td>
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<td>Shorten Compressed Air Loops</td>
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<td>On-site Nitrogen Gen</td>
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<td>Balance H₂O pumping</td>
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Legend

- Large benefit or low cost
- Medium benefit or medium cost
- Low benefit or high cost