The 2012-2013 academic year marked the fifth year of the Sustainable Products & Solutions (SPS) Program at the Haas School of Business, University of California, Berkeley. The program continues to encourage the advancement of sustainability research and education.

The SPS Program partners with multiple departments across campus to engage in research projects, course development, and stakeholder events that explore a variety of topics from an array of industries. We research diverse areas, from developing sustainable housing opportunities in Haiti, to understanding the best drivers for promoting partnerships between private corporations and local governments. In 2012-2013, we started a new research path on energy efficiency that included three new projects. In the natural resources management area, we addressed the forestry sector, financial and social implications of waste conversion projects, and gulf remediation techniques. Sustainable supply chains were investigated from multidisciplinary perspectives, covering audit challenges, world-class benchmarks, and bioenergy value chains. These forward-thinking projects lay out a path for innovation and solutions to current sustainability challenges.

This year, the Haas School of Business, in collaboration with the College of Natural Resources, was very excited to launch the course Business and Natural Resources: Ecosystem Services. This new course, along with a continued one on carbon capture and sequestration, exemplify our constant efforts for learning and leadership in this field.

In addition to research and courses, the SPS Program also supported convening events and programs such as the Alliance for Research on Corporate Sustainability (ARCS) Forum and Research Conference, Resources Roundtable 2013: The Future of Urban Water, and the Dow Sustainability Innovation Student Challenge Award (SISCA).
We are deeply grateful to The Dow Chemical Company Foundation, Kimberly-Clark, and Waste Management for their generous support. We truly look forward to continue engaging with our partners in building a legacy of sustainable innovations and practices.

Omar Romero Hernandez

Dr. Omar Romero-Hernandez
Director of Research
Sustainable Products & Solutions Program

Jo Mackness
Executive Director
Center for Responsible Business
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The Sustainable Products & Solutions (SPS) Program operates as the main research arm of the Center for Responsible Business. Our mission is to drive business relevant, multidisciplinary solutions to tackle sustainability challenges. Our program builds on UC Berkeley’s tradition of excellence in sustainability through applied research (short-term and long-term), stakeholder engagement, and academic courses.

The SPS program manages four types of engagements in three areas:

1. **World Challenges:** Addressing major social issues including water, health, and housing by taking scalable, market-based approaches to develop and grow sustainable communities.

2. **Sustainable Resource Management & Consumption:** Understanding the value of nature and developing products and solutions to better manage world consumption.

3. **Sustainable Supply Chain Management:** Assessing the environmental, social and economic impacts of, and encouraging good governance practices throughout, the lifecycles of goods and services.

4. **Short-term Applied Research** is typically conducted by professors, staff and research assistants across UC Berkeley with a specific interest in a business problem. Alternatively, projects are staffed by graduate students participating in a one semester experiential learning course on corporate sustainability at Haas or independent studies. Results are usually delivered within 6 months.

5. **Long-term Applied Research** is usually the continuation of short-term applied research projects, taken into a second stage. Discussions with faculty leads and corporate sponsors are the main drivers to promote this type of “deep dive” project, which may continue throughout multiple academic years.

6. **Stakeholder Engagement** activities include organizing symposiums, cohosting conferences, and supporting other groups and public events to disseminate knowledge and research.

7. **Courses** are our continuous academic efforts to bring top notch research findings and world trends into the classroom, giving students tools and vision to strengthen the value of sustainability.
1.1 Dignified and Desirable Low-Income Housing in Haiti:
Opportunities and Challenges

Jorge Zapata Barbara, Andrew Rastetter, Hien M. Vuong, Prof. Kellie McElhaney, Prof. Omar Romero-Hernandez

The Alchemy of Housing in Haiti: Turning Waste into Homes

More than 3 years have gone by since Haiti’s devastating earthquake. After billions of dollars have been poured into the country, 350,000 Haitians are still living in temporary camps. Given the unattractive business conditions to provide low-cost housing in Haiti, NGOs have undertaken the job of providing some of these needed houses.

Although it was necessary to provide temporary shelter after the earthquake, what the country needs now is to rebuild permanent homes and its economy. This is not a job that can be done alone by NGOs in the long-term. The question is whether or not there are sufficient conditions for business to provide homes for the poor in Haiti. Direct business opportunities are very limited for 80% of the population, as they earn less than USD 240 a month per household.

The Center of Responsible Business partnered with a team of designers, engineers, materials scientists, architects—including William McDonough, environmental thought leader and author of Cradle to Cradle and The Upcycle—and private companies including The Dow Chemical Company and Waste Management Inc. to tackle housing and waste problems in places such as Haiti. Though the road ahead remains long, there are reasons to be optimistic about a low-cost housing solution that incorporates resources locally available in Haiti.

Abundant resources that currently have no use in Haiti, such as plastics in streams and rice straw, have been used successfully around the world for housing and could be used there as well. However, none of the housing initiatives in Haiti have worked on (continued)
1.1 Dignified and Desirable Low-Income Housing in Haiti: Opportunities and Challenges (continued)

a large scale. The challenge is to find something that is economically viable, structurally sound, environmentally friendly, and culturally appropriate. Developing a solution that helps to solve two of our generation’s most pressing problems (housing and waste) would be a breakthrough that could benefit Haitians and millions around the world. Click here for a presentation on the project.

A first multidisciplinary assessment was carried out by the Haas Team. Requirements for Low-Income Housing in Haiti include:

**ECONOMIC/MARKET**
- Target families with a monthly income of USD 240-500
- Costs less than USD 10K when produced in large scale
- Promotes local economy throughout its supply chain
- Involves community through its construction

**ARCHITECTURE DESIGN**
- Responsive to hot and humid climate
- Energy independent
- Proper latrine solution
- Durable house with 50 year life span
- Easy to maintain
- Resist earthquakes + hurricanes
- Built by workers with minimal training

**MATERIALS**
- Are reusable at the end of the house’s life
- Promote wellbeing of its inhabitants
- Are locally available
- Have positive environmental impact
- Incorporate C2C principles
- Are easy to transport

**CULTURE**
- Modular design for easy future addition/subtraction
- Front porch as prominent feature of the house
- Outdoor kitchen
- Back door included in design

Garbage Found in Port Au Price’s Dumpsters (% of Total Volume)

- 6% Compostable/Organic
- 40% Others
- 21% LDP
- 26% PET
- 7% HDP
1.2 City & Company Partnerships For Economic Development
Doing Well by Doing Good: Incorporating Real Economic Development Gains to Win More Business

Skol Lockyer, Tariq Aldukair, Alan Chen, Roy Fujimoto, Sabrina Odah
(Berkeley-Haas MBA Consulting Team)

In a highly competitive environment, how can large companies gain more business with cash-strapped municipalities?

A Fortune 10 company's wholly owned subsidiary faced the challenge of winning cost-saving infrastructure projects that also reduce environmental impacts. The client came to our student team with an idea on how to approach this challenge, based on two key pieces of information.

First, the client had previously identified which city personnel make municipal decisions and understood their varying levels of sophistication. Second, a prior consulting engagement with UC Berkeley students showed that boosting economic development is the over-riding, top concern facing municipalities today.

Having identified economic development as their municipal customers’ critical challenge, the client sought help in gaining a better understanding of overall economic development, measurement criteria, and best practices. Taking a step further, the client asked our student team to synthesize their learnings to create options to improve the company's competitive edge. A cross-functional team (MBA, structural engineering, and chemical engineering graduate students) quickly found that the scope of factors affecting economic development is broad. Nearly all processes and developments in and around a city can affect economic development to one extent or another, and every city has a unique set of resources and capabilities.

Understanding this, the student team sought to identify cities (continued)
that excelled in a variety of specific areas. Distilling city ranking data from numerous sources, they ordered cities that are leaders on multiple fronts, eventually selecting 16 cities as models to study. The primary research involved interviews with officials from leading cities, which provided an understanding of what was working (and not working), new ideas, and an overview of challenges. Subsequent secondary research also identified municipal mindsets that create desirable residential environments. More importantly, the students identified environments in which to locate businesses that create jobs and a thriving economy.

Two major dynamics emerged, City-to-Business and City-to Resident, which the student team subcategorized into seven areas of focus (small business development, workforce development, etc.). This framework provided the client with a solid understanding of a wide variety of approaches to economic development.

Finally, the student team presented four viable strategies for creating a competitive edge that did not merely accomplish “one-off” business goals. Their strategies create differentiation and long-term sustainability by demonstrating a deeper understanding of and concern for the potential municipal clients’ needs on a larger scope.

As a result, the client can help improve the quality of life for residents and businesses by providing solutions that help municipal decision-makers gain successes in economic development. The client will build reliable, lasting, and positive partnerships that produce solutions that “do well by do good”.

1.2 City and Company Partnerships For Economic Development
Doing Well by Doing Good: Incorporating Real Economic Development Gains to Win More Business (continued)
The Namib Desert beetle (Stenocara gracilipes) collects its own drinking water with a unique back feature that aids its survival in a water scare desert environment. The Stenocara’s bumpy back has alternating regions of waxy, super hydrophobic areas surrounding the hydrophilic bumps. This natural property was of interest for a group of researchers who identified it as a solution to worldwide demand for water. In 2011, the SPS program provided funding for this project, which has recently concluded.

In this study, the potential of enhancing condensation with a highly conductive, homogeneous material with variable wetting properties was explored. The research team ran multiple tests to mimic the process of water condensation on the Namib Desert beetle’s back. Fabrication techniques included sputtering, pulsed laser deposition (PLD), electrodeposition, and annealing zinc. Ultimately, the super hydrophobic Zinc Oxide (ZnO) was successfully fabricated on a mirror finished, commercially available copper substrate using a scalable electrodeposition technique.

The physical and mechanical mechanisms of this technology are understood and can be applied in large scale technological deployment for commercial opportunities. A journal paper is available. Click here for the full report.
Land use and climate change continue to be at the forefront of scientific research. It is now widely recognized that anthropogenic factors are contributing to changes in long term climate patterns, and forestry is part of it.

Greenhouse gas emissions (GHGs) are a key element in the anthropogenic impact on climate change. GHGs not only occur when fossil fuels are consumed but also when land change occurs, from forestry to agricultural uses.

In addition to providing key ecosystem services, the forestry sector is currently viewed as a major player in energy production, with potential consequences on land use.

The team identified key statistics of the forestry sector:
- Forestry land use by state in the US
- Energy production by the forestry sector in the US

Types of energy sources in the forestry sector and their relative importance in overall energy production by the forestry sector:

Key economic variables that show forest wood market behavior. Variables include price elasticities, income elasticities, cross price elasticities, and both long and short run own price elasticities (See table 1).

The main goal is to develop a framework for land use in the forestry sector that incorporates energy production. Energy, pulp, and paper companies are among the main groups of interest for this project. A publication is expected at the end of Fall 2013. [Click here for the preliminary report.]

### Economic Variables Associated with Land Use and Energy Production

<table>
<thead>
<tr>
<th></th>
<th>Base Year Price</th>
<th>Base Year Quantity</th>
<th>Cost</th>
<th>I/O</th>
<th>Price Elasticity</th>
<th>Income Elasticity</th>
<th>Cross Price Elasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cellulosic Ethanol</strong></td>
<td>2.35 ($/Gallon)</td>
<td>0 (10-Gallon)</td>
<td>1.37 ($/Gallon)</td>
<td>0.03 (m/gal)</td>
<td>-3.21</td>
<td>1.40</td>
<td>3.30</td>
</tr>
<tr>
<td><strong>Electricity</strong></td>
<td>89 ($/MWh)</td>
<td>36,644 (10-MWh)</td>
<td>22.69 ($/MWh)</td>
<td>2.4 (M/MWh)</td>
<td>-0.36</td>
<td>0.10</td>
<td>0.29</td>
</tr>
<tr>
<td><strong>Heating Biomass</strong></td>
<td>25 ($/M)</td>
<td>25,003 (10-M)</td>
<td>0</td>
<td>0</td>
<td>-0.87</td>
<td>0.24</td>
<td>1.55</td>
</tr>
</tbody>
</table>

Source: Castillo & Gilless et al. Internal Report 2013
Interest in energy efficiency has surged over the last several years, in large part due to unprecedented levels of public support. This increased attention to energy efficiency represents a substantial opportunity for manufacturers and retailers of energy-efficient products. The market is unusual, however, in that it involves a high level of cooperation between the private and public sector. With many energy efficiency programs, manufacturers and retailers work together with utilities to offer and administer rebates and other forms of direct incentives.

This study aimed to study the demand for energy efficient products by using a regression discontinuity (RD) analysis. Data was used from a large-scale energy-efficiency program that provided incentives for households buying energy-efficient refrigerators and air conditioners.

Overall, the graphical evidence provides a strong indication that program participation increases with higher subsidy amounts. Although the differences in participation rates are relatively modest, it seems quite clear that the subsidy amount was a strong factor in the decision to make a replacement.

More research is needed, but these preliminary results are interesting because they suggest that demand may be relatively inelastic beyond a certain incentive level.

These results potentially have important implications for product marketing of energy efficient or “green” goods. They suggest that other factors, in addition to price, are playing an important role in driving consumer behavior. This sector is unusual in the scope of non-price factors playing a substantial role. In future work, it would be interesting to combine quantitative analyses like this with qualitative evidence from consumer surveys. Click here for the full report.
The industrial energy efficiency market has experienced rapid change over the last four decades. In the late 1970’s, energy was supplied by a utility at a rate set by the public utility commission; the only option for efficiency upgrades was direct purchases. Since then, the utility market has experienced significant deregulation. These changes have led to the proliferation of new business models, technologies and best practices to navigate, exploit and profit in the new environment. Still, manufacturers do not always grasp how business models affect the feasibility of energy efficient projects. This research is organized to deliver a framework for understanding and evaluating different options for financing and implementing industrial energy efficiency projects. It focuses on both financial and non-financial key performance indicators. The project provides an overview of the industrial energy efficiency market by describing its size in both relative and absolute terms, its history, and key stakeholders.
In 2004, industrial energy use accounted for ~33% of total US energy use. The majority of this energy is used in manufacturing, with much of the remainder going to mining, construction, and agriculture. This energy comes in various forms with nearly 33% coming as electricity, 28% from natural gas, 26% from petroleum, and 7% from coal.

Due to the changes in the industrial energy efficiency market since the late 1970’s, the utility market has experienced significant deregulation and many companies have adopted energy efficiency projects such as new lighting, HVAC, and process improvements. Despite this momentum, it has been found that it does not always pay to be green. Thus, companies need to identify the best set of circumstances that would make their business case attractive. As part of the SPS program, the Haas School of Business developed a business case to guide decision makers on the adoption of energy efficient projects. (continued)

**Energy Procurement Models:**

<table>
<thead>
<tr>
<th>Energy Procurement Change</th>
<th>Change to Energy Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat rate pricing to time-of-use pricing</td>
<td>Focus on reducing energy use at peak times led to the creation of demand response technology</td>
</tr>
<tr>
<td>Choice of energy suppliers</td>
<td>Created opportunity to assess energy options and attempts to lower cost</td>
</tr>
<tr>
<td>Increase in power prices</td>
<td>More attention on energy use as it represents a larger percentage of total cost and products create more savings/value</td>
</tr>
<tr>
<td>Development of third-party financed equipment</td>
<td>Ability to lease or pay for use instead of initial large capital outlays led to the creation of Energy Service Companies (“ESCOs”)</td>
</tr>
</tbody>
</table>
This business case includes examples of a new lighting project in which the manager has to decide if the payback period is short enough and the power savings sufficient to help meet the company’s goals. The case goes further and incorporates the potential impact of a ‘cap and trade’ program on the economics. Teaching material is under preparation along with user friendly Excel files that can be adopted by any professional interested in energy efficiency projects. Click here for the full report.

### Pro Forma Model based on Lighting Projection

<table>
<thead>
<tr>
<th>Assumptions</th>
<th>Standard Energy Use</th>
<th>Old System</th>
<th>New System</th>
<th>Yearly avoided energy costs kWh</th>
<th>$0.06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting Investment (Gross)</td>
<td>$211,473</td>
<td>Hours per day (6 am - 12 am)</td>
<td>8</td>
<td>9</td>
<td>Annual energy cost increase</td>
</tr>
<tr>
<td>Duke Rebate per fixture</td>
<td>$50.00</td>
<td>x Days per Week (Mon-Sat)</td>
<td>6</td>
<td>6</td>
<td>Monthly energy cost increase</td>
</tr>
<tr>
<td>x Units</td>
<td>522</td>
<td>x Watts per Year</td>
<td>6,567</td>
<td>6,900</td>
<td>Costs per kWh from grid (pounds)</td>
</tr>
<tr>
<td>x Watts per unit</td>
<td>456</td>
<td>Hours of Operation per Year</td>
<td>2,598</td>
<td>2,908</td>
<td>Pounds per ton</td>
</tr>
<tr>
<td>x Units</td>
<td>338</td>
<td>kWh per hour</td>
<td>4.38</td>
<td>4.38</td>
<td>Pounds of Carbon Avoided</td>
</tr>
</tbody>
</table>

### Evaluation Tool for Energy Efficiency Projects:

**2.2.3 Business Models for Sustainability and Energy Efficiency**

An Energy Efficiency and Payback Analysis for Legrand (continued)
During the spring of 2013, a team of MBA students sought to frame and define an approach to position and price bio-based surfactants. These compounds are offered to brand owners and consumers in the shampoo and body wash segments of the personal care market.

The results suggest that there is a significant market opportunity that can best be exploited by using a penetration strategy to price a bio-based surfactant at an attractive value to brand owners.

The addressable market size for the shampoo and body wash segments is USD 640 million and USD 272 million respectively, out of which approximately 70% is captured by the top 3 brand owners. A successful launch of bio-based surfactants is only possible by targeting these top 3 brand owners.

An analysis of Dow’s core competencies and the market dynamics reveals that penetration (entering the market with a low price, expanding rapidly, and securing market share) presents the best opportunity to capture value. The main reasons that support this go-to-market strategy are: high price sensitivity, high volumes required to achieve economies of scale, and low consumer awareness.

The student team’s analysis shows that end consumers are likely willing to pay a premium for a bio-based surfactant. The final report provided recommendations for the price of a bio-based surfactant. Click here for the full presentation.
A result of the emerging urban lifestyle is significant growth in take-out food consumption. For instance, the average American had 75% more take-out meals in 2006 compared to 1984. This increasing trend leaves municipalities in charge of waste management with important decisions for regulating the take-out container. Landfill capacity is a constraint on municipalities and consumers are increasingly aware of the ecological impact of waste management policies for packaging.

Take-out containers made of Styrofoam are already banned in more than 20 cities, mostly in California. However, there have been no straightforward and concrete decisions made on the federal level despite increasing publicity and emphasis on the issue. Therefore, it is important to understand the complex network of stakeholders and decision factors involved in the process of creating regulations.

In this study, the researchers plan to take stakeholders and main decision making factors (e.g., environmental and economic metrics, consumer behavior, etc.) into consideration to understand the life cycle implications of compostable products. The project calls for a holistic review of environmental effects up and downstream. The project is at an early stage, with Phase I due to be finalized in Fall 2013.
2.5 Social and Political Issues Surrounding Municipal Solid Waste Conversion Technology Adoption

Prof. Sergio Romero, Prof. Omar Romero-Hernandez, Julie Lutz

This report explores the varying viewpoints on Municipal Solid Waste (MSW) conversion technologies by identifying the key stakeholders involved, outlining their interrelation with regards to the implementation of potential projects, and understanding their main concerns.

While gasification and pyrolysis may offer a potential business opportunity for MSW as an improvement over solid waste incineration (SWI), there are few examples of successful project implementation in the US.

In fact, several proposed projects with initial support and authorization stalled due to rescinded permitting, financial hurdles, and other challenges. In light of this reality, this report identifies stakeholders creating the underlying dynamics around MSW conversion technology adoption in the US and describes the reasons for each stakeholder group’s actions.

This report remains objective by providing viewpoints directly from interviewees. Although the interviews highlighted conflicting information and concerns, this report does not reconcile these differences or argue the facts. Rather, in presenting varying viewpoints, this report highlights the complex issues surrounding waste conversion technologies in the US. Click here for the full report.
In recent years, there has been a steady increase in the generation of municipal solid waste (MSW) due to rapid population growth and urbanization.

In 2010, around 250 million tons of MSW was generated in the US, compared to 208 million tons generated in 1990. Despite undertaking recycling and waste prevention programs, small states face difficulties in managing the increasing volumes of waste. Many east coast states export their waste to midland states with larger landfill capacities and pay tipping fees as a strategy to maintain current landfill capacities.

Adopting waste conversion technologies is another popular solution to the crisis of landfill capacity. Through Waste-to-Energy (WTE) technologies, waste is converted into various fuels used to generate an energy supply. Incineration is one form of WTE technology that is effective in reducing large volumes of waste. However, like many other WTE technologies, incineration raises ethical and environmental debates, specifically concerning “not-in-my-backyarders”, visual aesthetics, and emissions.

A new generation of WTE technologies is emerging with the potential to create renewable energy from waste and increase energy efficiency, while offering a less environmentally controversial alternative. Japan, Denmark, and the Netherlands have embraced WTE opportunities through waste management policies, while the US has lagged in adopting similar strategies. This is because conversion technologies involve a complex blend of factors including location, haul distance, regulations, capital costs, feedstock availability, tipping fees, taxes, electricity price, and incentives. These factors influence the feasibility of any WTE technology and must continue to be researched in order to promote the adoption of energy efficient systems. (continued)
Gasification and Power Generation Model Structure:

Financial Variables:
- Capital cost
- Operations cost
- Tax rate
- Depreciation rate
- Interest rate
- Discount rate

Location Specific Variables:
- Tipping fees
- Remaining landfill capacity
- Price of electricity

Process Variables:
- Feed rate
- Foodstock characteristics
- Gasification specification
- Power generation specifications

As part of an SPS funded project, the work focused on modeling the effects of key variables associated with revenue and cost structures. The sensitivity analysis showed the relative impacts of these key variables and indicated that capital costs and tipping fees have the largest impact on the net present value of a project. While operation costs and the price of electricity are also important variables, they play a secondary role. This information can be used in the process of determining the likelihood of success of a gasification project proposal. Click here for the full report.
The gulf remediation project was started in order to restore oil-impacted marshland in Barataria Bay in the Gulf of Mexico.

The team’s effort included a new, innovative way to effectively re-vegetate exposed marsh shorelines.

Conventional restoration efforts include hand-planting bare root Spartina (Smooth Cordgrass) plugs into the ground, which can be costly and labor intensive; damage can also occur to the marsh due to excessive foot traffic during transplanting. The team tested the use of propagation tubes as a method of bringing clean substrate to oil-impacted marshes, providing propagules with a more stable medium in which to establish new marsh. The tubes were filled with pre-composted bagasse (sugar cane fiber) and root masses from native genotypes of Spartina. These tubes were then laid perpendicular to the shoreline and staked into place, providing native plants, clean substrate, and additional elevation to protect against further loss of marsh. To compare this type of innovation with the conventional, hand-planting methods, a number of additional test plots were set up (see map below).
Also included in the study were a variety of genotypes of Spartina: Vermilion, Catfish Lake, and local Barataria Bay plants.

Conventional methods use Vermilion, a Cordgrass selectively bred for restoration. By using Vermilion, nearby wildtypes from Catfish Lake, and local wildtypes from Barataria Bay, the study was able to assess which genetic varieties are most successful at restoring ecosystem function following oil-spill remediation. Long term monitoring continues, and will allow team members to gather data on changes in the impact of the oil, plant productivity, marsh elevation, rates of erosion, and resilience following storm events, among other things, to assess the effectiveness of these various restoration techniques.

Note: Thomas Azwell has written a chapter about the project in the book: *Oil Spill Remediation: Colloid Chemistry-based Principles and Solutions*, published by John Wiley & Sons Inc. The book will be available January 2014.
Luis Lopez, Ru Bai, Alon Cohen, Evan Wiener (Berkeley-Haas MBA Consulting Team)

A Haas team engaged in a sustainable supply chain strategy project for Kimberly-Clark Corporation, working with Kimberly’s Procurement Sustainability Leader.

The initial research answered three key questions:
1. Why is it critical for Consumer Packaged Goods (CPG) companies to address the sustainability of their supply chains?
2. How can this be achieved?
3. What specific issues are most relevant in the industry?

The team gained insight on the requirements of the different stakeholders that drive companies to improve their practices, and the relevance of focusing upstream of the internal operations, where 40-60% of the environmental footprint lies.

Four key elements that companies need to consider to successfully engage their suppliers around sustainability are:
• Integrating sustainability in different areas of the organization, as opposed to only establishing a stand-alone sustainability unit
• Leveraging external collaboration in different regions (e.g. NGOs)
• Establishing a tiered approach to interact with and develop suppliers, that goes well beyond merely auditing and penalizing them
• Aligning the supplier’s incentives in an effective way to foster transparency and disclosure of problems as opposed to false reporting

Click here for the full presentation.

The Project Supported Kimberly Clark’s 2015 Sustainability Goals

However, there are only a few examples of waste to energy investments in Mexico. Demand for energy in both countries and a hefty supply of feedstock suggest that more projects may emerge in the following years.

This work has been carried out jointly by the Haas School of Business, Goldman School of Public Policy, Instituto Tecnologico Autonomo de Mexico (ITAM), and the Woodrow Wilson International Center for Scholars in Washington D.C. 

Click here for the white paper.

A previous renewable energy system comprising of photovoltaic panels was investigated, producing a Haas Business Case. This project explores a second system involving the analysis of bioenergy potential in the US and Mexico. More specifically, the work focuses on the potential of municipal solid waste (MSW) to serve as bioenergy feedstock. The value chain involves an assessment of MSW potential, technologies, and political conditions. Infrastructure in the border states and labor availability make Mexico an attractive market for investment and a reliable source to export energy into the US.

It was found that second generation conversion technologies that are available today, such as gasification, have been proven to technically perform well and are well along the way in the process of commercialization.
3.3 Assessing the Social Impacts of Supply Chains

Prof. David Dornfeld, Prof. Zuo-Jun "Max" Shen, Prof. Sara Beckman

The manufacturing sector has become increasingly committed to developing and operating sustainable supply chains under a triple bottom line perspective.

Economic and environmental metrics have been included as part of the assessment while social impacts are still often left out. There are substantial challenges in identifying and understanding the social impacts associated with manufacturing activities. The SPS Program has acknowledged these challenges and provided funding that will help characterize the social impacts of manufacturing throughout the life cycle of a product or process. Social impacts occur on various scales in manufacturing, from the level of a unit process to the level of the enterprise.

Additionally, manufacturing activities impact consumers, communities, and larger political/spatial realms. The project identifies key characteristics of social impacts associated with manufacturing that should be considered to more effectively address the social dimension of sustainability for products and processes.

Results from this project indicate that, in order to successfully assess and address the social impacts of production as a means towards achieving sustainable manufacturing, it is necessary to:

1. Clearly identify the domain or scope of the enterprise in which relevant processes occur.
2. Consider whether it is the product or process that is of interest (i.e., the focus of evaluation for potential social impacts).
3. Use a clearly defined set of indicators to identify social impacts and risks associated with manufacturing as applied to each process of interest.
4. Investigate the root cause of any identified problems to establish a basis for addressing them based on their impacts.
5. Identify decision makers with the capability to affect positive change or establish organizations with the ability to institute solutions.

Click here for the full report
3.4 Supplier Evasion of a Buyer’s Audit:
Implications for Auditing and Compliance with Labor and Environmental Standards

Prof. Terry Taylor

Deadly factory fires. Illegal pollution. Injured workers.

Many brands have recently been tarnished by the publicity of their suppliers’ labor and environmental violations, and have responded by increasing their auditing efforts. Anecdotal evidence suggests that “hiding”—supplier efforts to pass an audit through deception or corruption—is prevalent.

Under that condition, the research analysis shows that increasing auditing backfires, by increasing suppliers’ motivation to hide and reducing their effort to comply with labor and environmental standards. Increasing a supplier’s margin (by paying a higher price or providing training that improves its productivity) and the increasing attempts by NGOs to publicly expose violations also promote hiding and reduce compliance efforts. To promote compliance, NGOs and buyers should collaborate to make hiding more costly and difficult for suppliers.

More generally, the research provides guidance for a buyer on how the optimal level of auditing varies with 1) a supplier’s hiding and compliance capabilities, 2) both firms’ contribution margins, 3) the likelihood that an NGO will publicize a violation, and 4) other salient aspects of the business environment. A first white paper is available for discussion while a more comprehensive report is due at the end of Fall 2013.

Click here for the white paper.
Throughout the year, the SPS Program funds and organizes events that encourage people to meet, talk and learn about sustainability. They provide opportunities for students, faculty, and companies to come together to share perspectives and insights on the latest sustainability issues.

Water is one of the most precious resources on our planet, but as the global population grows, there is an increasing need to develop different water systems and technologies to ensure optimal resource allocation and availability to all. On March 15, 2013, The Berkeley Energy and Resources Collaborative (BERC) presented the Resources Roundtable 2013: The Future of Urban Water. UC Berkeley is a recognized leader in research associated with the assessment of urban water problems and the development of innovative policies and technologies for water supply, urban drainage, and waste treatment. A cross-disciplinary set of panelists from academia and industry were in attendance, shedding light on current and anticipated challenges related to urban water systems as well as market opportunities linked to urban water renewal.

The event was held at the David Brower Center in downtown Berkeley. The discussion opened with a keynote by Peter Gleick, President and Co-founder of Oakland’s Pacific Institute. The first panel addressed the challenges urban water systems face, while the second offered solutions to those challenges.

The roundtable was a very fruitful discussion culminating in the exchange of new ideas on how to more effectively tackle the shortcomings of our current water systems and to create a better network for the future. Click here to view the full event.
From April 29 to May 1, 2013, the Center for Responsible Business hosted the 5th Annual Alliance for Research on Corporate Sustainability (ARCS) Research Conference, supported by The Dow Chemical Company and California Management Review. ARCS is a professional society of scholars studying the interface between business and sustainability.

To bring together different perspectives, the conference was preceded by a one-day Forum. Researchers and practitioners shared and compared their evidence-based findings and real-world experience on business models for sustainability.

The morning session kicked off with an overview of emerging sustainability trends by Mark Lee, Executive Director of SustainAbility, and James Morris, Associate Director of GlobeScan. The day’s panels dove deep into examining new practices in the areas of market-based approaches, customer engagement, and entrepreneurship.

The forum’s keynote was a thought-provoking conversation between Neil Hawkins, Vice President, Global EH&S and Sustainability at The Dow Chemical Company and Glenn Prickett, Chief External Affairs Officer at The Nature Conservancy, moderated by Berkeley-Haas Dean Richard Lyons. They discussed their partnership projects and demonstrated how collaboration between their two organizations is a win-win proposition for both business value and environmental protection.
Harvesting Sustainable Energy, One Fiber Optic Cable at a Time

Mozziyar Etemadi and Kayvan Keshari were named grand prize winners of the 2012 Dow Sustainability Innovation Student Challenge Award (SISCA) competition. Etemadi, a MD/PhD student in Bioengineering at UC Berkeley/UCSF, and Keshari, a postdoctoral scholar in Radiology and Biomedical Engineering at UCSF, are using fiber optic cables to develop a new technology for harvesting biofuel from algae, one that is much more energy- and space-efficient than traditional methods.

Their project, "LifePipe: Blue-green Algae + Fiber Optics for a Sustainable Future," is housed within one department at two UC campuses, bringing together the state of the art in medicine, engineering, and biology. Commended for its collaborative nature, the project was recognized with a $10,000 award by the interdisciplinary UC Berkeley faculty judging committee. Caroline Delaire, a PhD student in Civil and Environmental Engineering, won the runner-up prize of $2,500 for her project on pathogen and arsenic water decontamination.

The criteria used to score projects included potential for sustainability impact, scalability, and the extent to which projects were innovative and interdisciplinary.

The CRB has managed the SISCA competition at UC Berkeley since its establishment in 2010, as part of an ongoing partnership with The Dow Chemical Company and effort to increase sustainability research on campus.
Businesses are operating in an increasingly resource-constrained world. From water shortages to climate change impacts and energy crises, business managers will have to understand not only the immediate risks from these trends but also the strengthening regulations that will inevitably result. Companies that understand these imperatives will be able to better navigate an increasingly complex world and the major environmental risks it faces.

A new course was jointly designed and delivered by the Haas School of Business and the College of Natural Resources that incorporates business and sustainability aspects into the field of natural resource management. Using both economic and ecological concepts, students develop and use tools to solve practical natural resource management problems relevant to business and society at large.

The goal of this course is to helps students understand the decision-making process related to the use and conservation of natural resources and its inextricable link to competitive advantage.
Instructors: Prof. Jeffrey Reimer, Prof. Berend Smit, Prof. Curt Oldenburg, Prof. Ian Bourg

UC Berkeley and the Lawrence Berkeley National Lab (LBNL) have large research programs addressing Carbon Capture and Sequestration (CCS). If employed on a global scale, CCS can sustain the world’s energy use and help mitigate alarmingly high CO₂ levels in the atmosphere.

This class, part of the Berkeley Energy Lectures, aims to introduce these research programs to undergraduate and graduate students in the Sciences and Engineering. Topics include current understanding of CO₂ in and around the planet, the geological storage of CO₂, and the science and technology of carbon capture.

Through this series of lectures, students learn about the state of the art and science related to CCS, and learn to develop, analyze and compare various CCS solutions as part of a multidisciplinary team. This course is being offered for the second year in a row. [Click here for the course flyer.](#)
We welcome your feedback!

Please send us your comments regarding the Sustainable Products & Solutions Program Annual Report and let us know what you would like to see us address in future reports.

You can also keep updated with the SPS Program opportunities and projects throughout the year by visiting our website and emailing us with your questions.

Website: http://responsiblebusiness.haas.berkeley.edu/programs/index.html

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