Background:
Business corporations play critically important roles in the development of green chemicals, products, and public policy – for good as well as ill. Not only do they lobby aggressively to influence the development public policies in this area. Equally important, they finance and conduct much of the R& D needed to identify hazardous chemicals, develop substitutes, and reformulate products. They also manufacture and market green chemistry products and may play a role in taking them back at end of life and recycling or disposing of them.

Innovation in the green chemistry arena is inherently challenging. It is costly as well as risky. It can be very difficult to properly assess the cost and benefits of new products and processes, to gauge consumer demand for them, to ramp up production quickly enough to obtain economies of scale, to negotiate regulatory hurdles, and to bring products to market at prices that will generate sufficient profit. This is true of all product innovation, of course, but it is particularly challenging where green chemistry is concerned, because so little is known about the possibly toxic effects of the tens of thousands of chemicals in use, and because consumers often have little knowledge of or interest in these issues -- and because the regulatory environment is changing very quickly, but only in certain parts of the world. In Europe and some other places, manufacturers are having to come into compliance with new forms of regulation that require them to evaluate tens of thousands of chemicals, develop substitutes for those that pose the most serious threats to human and non-human health, and reformulate existing products. In contrast, in the U.S., where regulation is much weaker, firms face cross pressure from interest groups of many kinds. These include investors demanding that they meet profit targets quarter after quarter, as well as public interest NGO’s calling on them to get the toxins out regardless of the cost, and consumers, including self styled “greens,” who might (or might not) pay more for safer products as well as “basic browns,” who don’t care about such abstractions as environmental health and safety risks, don’t know what hazards may be associated with products, and often insist on paying the lowest prices possible for goods or who put comfort, convenience, style first when deciding what to buy. To further complicate matters, environmental sustainability is highly politicized, especially in the U.S. Within firms, some business managers actively champion environmental health and safety as a matter of personal conscience and corporate social responsibility (or job description), while others are unconcerned - or consider such concerns to be unacceptable on ideological grounds.

As a result of these and other problems, innovation in the green chemistry tends to be a contested area in industry, fraught with difficulty and conflict, particularly for U.S. firms. Yet U.S. companies have made investments in this area, some which have become economic successes and some which have failed. They will have to make many, many more such
investments if society is to significantly improve the safety and environmental quality of the myriad products that make modern standards of life possible.

**Purpose:** The purpose of the following projects is to give you the opportunity to investigate the issues and cross pressures that shape and complicate industry’s participation in green chemistry innovation, to analyze and assess these issues from the perspective of those inside business --- as well as to situate them, analytically, in the broader context of the public interest concerns that frame this course.

**Project: Green Chemistry from the Business Perspective: Making the Business Case for Green Chemistry Investments**

**Questions:**
1. Why and how do firms decide whether or not to invest in developing green chemicals and green chemical products?
2. What organizational/market/regulatory/political/public interest/technical/and other factors encourage firms to develop and implement green chemistry projects? What are the factors that discourage them from doing so?
3. How do advocates of green chemistry make a persuasive business case for moving ahead with a green chemistry project?

**Report Structure (basic report):** Identify a firm that has worked or is working on an interesting green chemistry project that you can use as your case study. Based on interviews with individuals at the firm and in relevant NGOs and government regulatory agencies and other research:

1) **analyze the chemical or product that is being developed or reformulated, taking into account the informational gaps, mistaken assumptions, and other problems those involved faced and how they overcame them (or tried to):**
   - from a scientific standpoint as a chemistry problem,
   - from the perspective of the toxicological, public health or environmental concerns at stake;
   - from the perspective of the regulatory and/or legal issues that affected the project
   - and from the perspective of the managers who had to decide whether or not to go forward with the project

2) **Explain how the employees and managers involved with the project assessed its pros and cons.** Were the advocates able to make a persuasive business case for moving forward? Why or why not? Do you agree with their assessment(s)? With management’s decisions? Were the main challenges informational? Organizational? Economic? Regulatory?

3) **What happened? Why?**
4) Assess the outcome from the perspective of the public interest. Was this a good outcome? What insights does the case provide into the opportunities, challenges, and dilemmas facing green chemistry? Does it provide any suggestions about how to improve public policy in this area?

**Alternative Report Structure (teaching case):** A more complicated way to structure your research and report involves developing a “business teaching case” along the lines of the Harvard business cases assigned as readings in this course. The advantage of writing your report up as a teaching case is that if you do an excellent job of it, we may be able to persuade Harvard Business Press to publish it as a Harvard Case, thus generating revenues for the Berkeley Center for Green Chemistry!

As with all such cases, the goal of your report would be to provide a provocative way for students to enter the minds of business managers and gain understanding of a business problem from their perspective, while illuminating broader issues. You would conduct the research in the same way as you would for the basic report, incorporating description and analysis from the scientific chemistry, public health, and regulatory perspectives, as well as the internal organizational and managerial perspectives. The difference is in how you write up your findings. Case reports are designed to enable students to work through a problem and reach a decision in much the same way they would in real life, with a great deal, but not perfect information and many trade-offs to consider. Such cases provide students with the information they need to make and explain a decision and discuss it in class, without knowing what decision was actually made. This is left to the follow up “B” case or the professor. Since this a class project and we want you to provide your thoughtful analysis and assessment of the actual decision, part of the assignment includes writing up a brief “Teaching Note, in which you provide this analysis and indicate what you think are the most important point points and insights you would like students to derive from reading and discussing your case. You should also suggest some “leading” questions that could be used to stimulate class discussion and move it in your desired direction.

**Deliverables:** The “A” or main case, the “B” case, and the teaching note, complete with documentary appendixes.

Tony Kingsbury, a Dow Executive “in residence” at Haas in the Center for Responsible Business has offered to help advise student group(s) interested in investigating Dow Chemical Co. or other company green chemistry cases. He has many ideas about possible topics, including an economically successful, Presidential Green Chemistry Award winning new pesticide, and less well known products, including new plastics, flame retardants and large scale commodity chemicals that have succeeded and/or have run into unexpected problems. He can help you identify Dow and other industry people to interview for your research and help you get in touch with them once a project has been agreed upon. You can contact him at tkingsbury@haas.berkeley.edu, 643-6013, F414 Haas.