

November 8, 2007

To: Linda Adams, Secretary
California Environmental Protection Agency
1001 I Street
Sacramento, CA 95814

Re: Green Chemistry Initiative Comments on Educational Programs

Dear Secretary Adams,

The Dow Chemical Company (Dow) is pleased to provide the attached paper on the role educational programs could play in California's Green Chemistry Initiative (GCI). We have appreciated the open, collaborative environment utilized for this process and have taken advantage of opportunities to participate in a variety of ways.

Attached is a brief paper on educational programs where Dow has been engaged with the objective of improving science education and understanding of sustainability. This is intended to catalyze DTSC's thinking about the role education can play and the types of programs to consider. Dow believes that education must play a key role in California's Green Chemistry Initiative for the effort to reach its full potential.

If you would like to discuss any of the education initiatives in more detail, please feel free to contact me. Dow would be pleased to participate with the state and other stakeholders as the proposals of the Green Chemistry Initiative are further developed and the implementation begins. I can be reached using the contact information below.

Sincerely,

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Cc: Maureen Gorsen, DTSC
Jeff Wong, DTSC

attachment

Education

Education plays a key role in effective decision-making, uncovering new innovations, and training the next generation of society's leaders in science, business, health and public policy. With a topic like green chemistry, where effective decisions will require collaborative approaches and solutions not yet imagined, education needs to play a key role. Green chemistry requires integrated, systems approaches and knowledge on a broad range of topics. For example, chemists need an understanding of toxicology, while policy makers need to understand business processes and markets to develop efficient and effective policies. Successful implementation of green chemistry requires a level of collaboration not often taught or practiced today.

Schools (primary, secondary, colleges and universities), as the trainers of tomorrow's leaders and the institutions conducting foundational research, can and should play a critical role in California's Green Chemistry Initiative. In addition, education of consumers and other organizations will be critical to driving change and fostering innovation within other groups. We challenge DTSC to develop educational components as a part of the overall approach to California's Green Chemistry Initiative.

Described below are a few examples of education programs where The Dow Chemical Company (Dow) has been engaged which can be illustrative of approaches that California should consider as part of its Green Chemistry Program. We encourage DTSC to consider the full range of educational opportunities for green chemistry: sponsored research, collaborative grants, modules for courses K-12 and at the university level, programs to educate consumers, media and policy makers.

Dow has a longstanding passion for improving education in the areas of science and sustainability. We have supported programs directed at teachers, research to advance challenging technical problems, programs designed to "cross-train" business leaders, and educate the public to name a few. Highlights from these programs are provided here, but we are happy to provide more detailed information.

- In addition to sponsoring technical research, endowed chairs for professors, and a variety of collaborations between Dow researchers and universities, Dow has been supporting efforts at universities to cross-fertilize disciplines and advance sustainability.
- The University of California at Berkeley recently announced the Sustainable Solutions and Products Program at the Haas School of Business in partnership with the School of Chemistry seeded by funding from Dow. The program will focus on sustainability issues involving society, science, engineering, the environment and finance utilizing a faculty steering committee to make funding decisions. More information is available at <http://www.haas.berkeley.edu/responsiblebusiness/>.
- Dow is a sponsor of the Frederick A and Barbara M. Erb Institute at the University of Michigan which through the degree programs (bachelors, masters and doctoral), research initiatives and work with other partners, the Institute

fosters professional education, public outreach and scientific scholarship supportive of the transition to sustainability (<http://www.erb.umich.edu/>).

- The Erb Institute also features an internship program sponsored by Dow and Environmental Defense where recipients work in both organizations over two summers and compare experiences within a business and NGO setting.
- The Keystone Center (http://www.keystone.org/general_section/center%20for%20Ed.html.) has developed high school level curriculum on sustainability using drinking water availability as the case study. These modules are novel approaches to help students appreciate the technical challenges we face, and the frameworks (scientific, social, business, environment, ethical) that are used to make choices and decisions.
- Keystone Center conducts training workshops for teachers to further the professional education and leadership development of teachers. These teachers are not only better equipped to teach these new approaches and examples but are able to share their experiences and knowledge with their colleagues.
- Working with the National Science Teachers Association, teachers participate in a two-week, hands-on seminar and work side by side with Dow scientists to learn about the latest developments in advanced chemistry, engineering, biotechnology, ceramics, and composites. Workshop teachers also attended the following year's NSTA national convention to demonstrate what they learned at the workshop and distributed free chemistry lesson plans that had been developed as a result of these workshops with Dow.
- Working with National Academy of Sciences and the Smithsonian, The Dow Chemical Company Foundation has supported the National Science Resources Center and its Science and Technology for Children® (STC®) program which is a comprehensive, researched-based K-6 science curriculum consisting of 24 instructional units that explore the life, earth, and physical sciences and technological design.
- This K-6 program lays the groundwork for Science and Technology Concepts for Middle Schools™, an eight module research-based science program developed by the NSRC for students in grades 6-8. Both programs were developed with major support from the National Science Foundation.
- Dow has been a sponsor of several teacher institutes. As an example, last summer Dow sponsored teachers at the 2007 Smithsonian Science Education Academies for Teachers which provide professional development for middle school science teachers with graduate credits available. The topics this summer included: Energy and Motion Academy, Biodiversity Academy, Ecological Field Studies Academy, and Electricity and Magnetism Academy.
- Another organization is Presidential Classroom, a nonprofit, nonpartisan civic education organization that provides junior and senior students in high school an unprecedented access to the federal government and the leaders who shape public policy related to science and technology.
- Organizations which put accurate, unbiased information into the hands of consumers are also an important component, and the International Food Information Council (IFIC) is one successful example. IFIC operates the IFIC

Foundation which is focused on linking science and communications by collecting and disseminating scientific information on food safety, nutrition and health. Using a network of scientific experts and partnerships, IFIC puts scientific information into understandable language for use by non-experts. Key audiences for IFIC are not only consumers, but educators, students, journalists, government officials, and professionals in the food value chain.

We hope these examples have shown the potential role that educational components could have in the California Green Chemistry Initiative. Educational programs, to not only fill technical gaps identified by the Green Chemistry Initiative but also to train leaders and improve understanding among consumers, should play an important role in California's Green Chemistry Initiative. These programs should work at a variety of levels and engage a broad range of institutions. Fostering collaborations between non-profits and public schools, among university departments and disciplines, between the private and non-profit sectors, and with the public are all key components. Without these educational components, the Green Chemistry Initiative is unlikely to reach its full potential. Dow strongly encourages DTSC to make educational programs a key component of its Green Chemistry Initiative.