

Testimony of

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Before the
New Economy & Quality of Life Committee
of the Michigan House of Representatives

“Green Chemistry: An opportunity for innovation, growth, and economic
development”

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I want to begin by commending the committee for your work to drive forward this critical legislative package. Your efforts can serve as a catalyst that will unleash the creativity, innovation, and passion of scientists, engineers, and entrepreneurs across our great state.

You clearly recognize that chemistry is part of the solution to develop new technologies, advance a more sustainable economy and foster job creation. Your challenge is to transition from regulating problems to promoting creativity and innovation. The steps taken by this package of bills chart a course toward an environment that uses green chemistry to drive such innovation.

Chemistry is involved in nearly everything that we touch each day and is fundamental to helping solve some of the world's most pressing challenges such as climate change, alternative energy, increased food production and improved access to drinking water.

The use of green chemistry to identify and develop solutions for these challenges will ensure that the solutions of tomorrow have a lighter footprint on our planet and improve the well being of the generations to come.

Green chemistry is part of the very fabric of our company. In fact, Dow Chemical has won more US Presidential Green Chemistry Challenge Awards than any other company or organization.

Waste reduction and chemical recycling have been part of our company for decades. We have integrated eco-efficiency throughout our operations with one program. Our CEO in the 1990s helped found the World Business Council on Sustainable Development, and another one of our executives literally wrote the book on eco-efficiency in 1997.

Green chemistry is integrated into our corporate strategy where we are committed to Set the Standard for Sustainability through Dow's 2015 Sustainability Goals. I urge you to visit our website to see these goals in detail.

At Dow, I lead our efforts to foster sustainable chemistries and innovations across our company, and our businesses have delivered many great examples of sustainable chemistry from surfactants for cleaners like ECOSURF EH™ that meet EPA's Design for Environment criteria to heat transfer fluids like DOWFROST™ which reduce energy for refrigerated storage in supermarkets.

Other examples include RENUVA™ polyols derived from renewable natural oils, such as soybeans, which are used in adhesives, building insulation and bedding, and two of our Green Chemistry Award winning products, spinosaid and spinetoram are insect control solutions derived through the fermentation of a naturally occurring organism –made right here in Michigan. If I had more time, I could walk you through many more examples.

This package could send a strong message not only to my company, but the world, that Michigan will be a magnet for green and sustainable chemistry, innovation and the economic development that comes along with it.

It is critical that the signals sent by this package are clear, intentional, and lead to economically viable products and technologies for the long-term. Incentives play a critical role to encourage investment, develop new markets, and incubate innovative approaches. However, they should not become lasting subsidies that inferior technologies must rely upon to be viable.

Business, particularly manufacturing, needs continuity and certainty. For example, we are building — here in Michigan — the commercial plant for AERIFY™ diesel particulate filters for use in cleaning diesel engine exhaust. This product meets the most stringent performance requirements for emissions, can enhance fuel efficiency and performance due to a 30 to 50 percent reduction in back-pressure relative to other filters, and enable greater use of diesel engines which can travel 25 to 35 percent further on a gallon of fuel than comparable gasoline models.

Bringing this product to market has taken a long time, thus making stable policies critical to investment decisions. We are evaluating additional exciting opportunities we hope to base in Michigan such as a bio-based material for wire and cable applications, so continuity remains important to us.

This is why your work is so critical, and there are several things I want to highlight for you.

1. You have a great opportunity to transition from regulating problems to fostering an environment where innovation can flourish. California is struggling with this very same policy transition under their Green Chemistry Initiative. The steps taken by this package of bills can promote an environment that uses green chemistry as the engine for innovation.
2. Green chemistry is a design process for innovation. It can flourish in an environment of incentives but does not lend itself to prescriptive approaches. This package can serve as a catalyst that will unleash the creativity, innovation, and passion of scientists, engineers, and entrepreneurs creating new technologies, advancing sustainability and leading to new jobs in Michigan. Please see my written testimony for further suggestions on encouraging a Green Chemistry economy in Michigan.

The following suggestions would serve to strengthen and complement the economic impact from this legislation:

- Establish refundable MEGA tax credits that can be applied against the Michigan Business Tax.
- With any tax incentive targeting Green Chemistry, be sure to establish reasonable and obtainable qualification criteria to encourage job creation and investment.
- Consider amending the State's Brownfield legislation to encourage rehabilitation of existing structures for Green Chemistry uses.

Such legislation would seriously signal the business world that Michigan means Green Chemistry business.

3. The need to have a clear and consistent definition of Green Chemistry is critical. I would strongly encourage you to use the same definition set forth in Michigan Executive Order No. 2006-06 replacing the current definition in HB 4817 page 2, lines 22-27 to page 3 line 1 and in HB 4818 page 8 lines 1-8. This would provide continuity across various state programs, and specifically including the twelve principles that are widely accepted, provides important and clear guidance for implementers.

The definition of green chemistry from Michigan Executive Order No. 2006-6 is as follows:

"Green chemistry" means chemistry and chemical engineering to design chemical products and processes that reduce or eliminate the use or generation of hazardous substances while producing high quality products through safe and efficient manufacturing processes. Green chemistry is based upon the following 12 principles:

1. Prevent waste: Design chemical syntheses to prevent waste, leaving no waste to treat or clean up.
2. Design safer chemicals and products: Design chemical products to be fully effective, yet have little or no toxicity.
3. Design less hazardous chemical syntheses: Design syntheses to use and generate substances with little or no toxicity to humans and the environment.
4. Use renewable feedstocks: Use raw materials and feedstocks that are renewable rather than depleting. Renewable feedstocks are often made from agricultural products or are the wastes of other processes; depleting feedstocks are made from fossil fuels (petroleum, natural gas, or coal) or are mined.
5. Use catalysts, not stoichiometric reagents: Minimize waste by using catalytic reactions. Catalysts are used in small amounts and can carry out a single reaction many times. They are preferable to stoichiometric reagents, which are used in excess and work only once.
6. Avoid chemical derivatives: Avoid using blocking or protecting groups or any temporary modifications if possible. Derivatives use additional reagents and generate waste.
7. Maximize atom economy: Design syntheses so that the final product contains the maximum proportion of the starting materials. There should be few, if any, wasted atoms.

8. Use safer solvents and reaction conditions: Avoid using solvents, separation agents, or other auxiliary chemicals. If these chemicals are necessary, use innocuous chemicals.

9. Increase energy efficiency: Run chemical reactions at ambient temperature and pressure whenever possible.

10. Design chemicals and products to degrade after use: Design chemical products to break down to innocuous substances after use so that they do not accumulate in the environment.

11. Analyze in real-time to prevent pollution: Include in-process real-time monitoring and control during syntheses to minimize or eliminate the formation of byproducts.

12. Minimize the potential for accidents: Design chemicals and their forms (solid, liquid, or gas) to minimize the potential for chemical accidents including explosions, fires, and releases to the environment.

4. In HB 4817, page 5 line 2 and page 8 line 12, I suggest replacing the phrase “development of green chemistry” with “use of green chemistry as design guidance” since green chemistry is a tool to inform the design and development of new products, processes and technologies.

5. In HB 4819, page 7 line 18, I suggest qualifying the term “green chemistry” with the following “or green chemistry related to the development of energy excellence centers.” Green chemistry has much broader applicability than to energy technologies. This language would be consistent with that of water technology.

In closing, the most important thing to remember is this package of bills will have a lasting and real impact on companies like Dow and the citizens of the State of Michigan.

Thank you.



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Dr. Anne Wallin is the Director of Sustainable Chemistry for Dow. In this critical role, Anne leads the 2015 Sustainable Chemistry Goal project team which is integrating Sustainable Chemistry across all disciplines, functions, and businesses in Dow. She also leads the company's Life Cycle Assessment Expert Group. Sustainable Chemistry is a corporate critical program which will guide and inform Dow's portfolio and investment decisions over the coming decade.

Anne began her career at Dow in Research and Development as a process chemist in the Agricultural Chemicals department. After several years, she moved to Environment, Health and Safety where she held a variety of roles in both research and development and manufacturing. Anne joined Dow Public Affairs in 1999, becoming the issue leader for Dow's chlor-vinyl businesses and leading a leveraged global network and representing Dow in several major trade associations.

Anne is a native of Wyoming and holds a bachelor's degree in chemistry from Carleton College. She received a doctorate in organic chemistry from the University of Illinois at Urbana-Champaign and was a post-doctoral fellow at G.D. Searle. She is a member of the External Advisory Boards for the Graham Environmental Sustainability Institute and the Center for Sustainable Systems at the University of Michigan. Anne is also a member of the California Green Ribbon Science Panel. She is a co-author of several publications and patents.