

TESTIMONY of Martin J. Mulvihill, Ph.D.  
Safer Made

*before*

The Assembly Committee on Environmental Safety and Toxic Materials  
Honorable Bill Quirk, Ph.D., Chair

*and*

The Senate Committee on Environmental Quality  
Honorable Ben Allen, Chair

### **Green Chemistry: Making consumer products safer in California**

Chairman Quirk, Chairman Allen and members of the Committees, thank you very much for giving me this opportunity to speak with you today the importance of supporting Green Chemistry.

I am a chemist. I know and love thinking about the fact that everything that we can see, smell, or touch is made from molecules. Since learning about Green Chemistry while in graduate school, I have been committed to accelerating the development and adoption of safer chemistry, first at the UC Berkeley Center for Green Chemistry and now at Safer Made, a venture capital fund I co-founded that invests in companies and technologies creating safer alternatives to toxic chemicals.

I recognize that not everyone in this room shares my love of chemistry. Regardless, I hope to convince you that this is an important time to accelerate the growing movement toward inherently safer chemistry and healthier products and workplaces in California. In our businesses, schools, and communities we have the building blocks we need to usher in a new era in safer consumer products.

The demand for safer products is an irreversible social trend, part of the modern-age shift toward living healthier and more secure lives. Other similar developments include concerns about child safety, building safety codes, lower smoking rates, and a focus on healthy nutrition. These wellness trends are not new, but when it comes to chemistry we are entering a new phase of development.

For many consumers, the material and chemical safety of products has become a new dimension of their purchasing decisions. This change in preference is reshaping entire product categories and sectors. In 2008, about 40% of American adults were classified as identifying with Lifestyles of Health and Sustainability (LOHAS).<sup>1</sup> Health is the biggest concern for both for

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<sup>1</sup> Connecting Values with Consumers, 2008. LOHAS Journal. The Natural Marketing Institute.

these consumers. Some of the big product categories that have been transformed by LOHAS are food, personal care, cleaning products and, increasingly, apparel and building products. Many people start with the food that they consume and then start considering the products they use on their bodies and bring into their homes. Many consumers become sensitized to chemical and material safety issues when they have children. This is a time of significant lifestyle change when people are open to new information, switching brands, and creating new habits.

People’s concern about chemical exposure risks to their families translates into a multi-billion dollar demand for safer products and the chemistries needed to make them. The organic food movement is a great example of what we are talking about. The organic food label is a proxy for safer products. The majority of organic food consumers indicate that, for them, the organic label means the absence of harmful chemicals.<sup>2</sup> Organic food sales have grown at 12% year after year between 2004 and 2014.<sup>3</sup> Similarly companies in other sectors that lead with messages of safety and sustainability outperform their peers (see table 1 below).

Company	Location	Financial Metric (year)
Patagonia	California	Revenue \$600 million (2013)
Method	California	Acquired by SC Johnson (2017)
Seventh Generation	Vermont	Acquired by Unilever for \$700 million (2016)
All Birds	California	Valued at 1.4 billion (2018)
Honest Company	California	Revenue \$170 million, valued at \$1.7 billion (2014)
Burts Bees	Maine	Acquired by Clorox for \$925 million (2007)
Native	California	Acquired by P&G for \$100 million (2017)

Ten years ago when California launched the Green Chemistry Initiative to advance the safer use of chemicals, there was, as there is today, a desire for healthier chemistry in our products and workplaces. At the time, Mike Wilson and others identified three gaps that were limiting the adoption of safer chemistry. It is worthwhile to take a moment to remember those gaps and see how they have proven to be opportunities where relatively small actions can dramatically catalyze the adoption of safer, greener, chemistry.

**The Data Gap: Information is an essential part of promoting safer chemicals.**

Properly functioning markets require the free flow of both information and materials. While we have abundant access to products of all sorts, from building materials to toys and cosmetics, we still have almost no information about what goes in them. It is important to recognize that this

<sup>2</sup> Beyond Natural and Organic, 2010. The Hartman Group.

<sup>3</sup> Organic Trade Association (www.ota.com) Industry Survey.

ignorance often goes beyond the consumer: brands and retailers also struggle to identify and manage potential chemicals of concern.

In the past 10 years, many businesses have been working to secure ingredient-level information about the products they sell. Despite relatively weak regulatory mandates, we are seeing the brands and retailers creating their own chemical transparency and disclosure policies that go far beyond any regulatory requirements. A few examples announced last year include [Target](#) (updating chemicals policy and consumer access to information) [Amazon](#) (new chemical policy), [Home Depot](#) (ban certain paint strippers), [Lowe's](#) (ban certain paint strippers), [Walmart](#) (ban certain paint strippers and updating full chemical policy), [Sherwin-Williams](#) (ban certain paint strippers), [Home Depot](#) (ban nine chemicals) [RiteAid](#) (new chemical policy), [Trader Joes](#) (eliminate BPA/BPS), and [Dunkin' Donuts](#) (eliminate expanded polystyrene). Initiatives like [Mind the Store](#) help create accountability and create a sense of competition as retailers try to improve their grade and give their shoppers a sense of security that they are providing the safest products.

*Voluntary disclosures and restrictions by brands and retailers are a good start, but more should be done to provide information to the consumer.*

Think about the fact that I can order a toy for my daughter online, track the package down to the minute it left the warehouse, and get a text message the moment it arrives at my door. But once I have the toy, I will have no idea what materials, dyes, plasticizers, or other chemicals are in it. I have a Ph.D. in chemistry, yet I still don't have the information I need to choose the safest products for my 3-year-old daughter.

We are often told that this information is a trade secret, or that it should not be disclosed because consumers will not know how to interpret the information. The reality is that both arguments could be used for food labeling as well, but we have seen that access to this information creates a whole ecosystem of education and competition where government, brands, and consumer education all work to continue raising the bar on nutrition. We should be doing the same for the chemicals in our consumer products.

In the absence of good chemical information, we will continue to rely on bans and poorly defined claims that may be misleading to the consumer. Which brings us to the Safety Gap.

### **Safety Gap: Making sure the information we get is useful.**

In addition to greater chemical transparency, it is critical that there are oversight functions that help ensure that consumers are getting useful information.

Let's start by thinking back to the example of buying my daughter a toy. If it's a "green" toy the package may tell me something about what *isn't* in the toy with assurances like "BPA-free,"

“Organic,” “Natural,” or “Chemical free.” These labels do little to assure me that this is a toy I want to give my child.

As a chemist, I know that if I can hold the toy in my hand it is made from chemicals. But that’s about all I can be sure of.

If the label says “natural,” this may tell me something about the source of the raw materials used to manufacture the toy, but it doesn’t guarantee the materials are safe, or that they were processed without harming people or the environment. Even the term “organic,” a third party certification, tells me little more than how the raw materials (usually cotton, in the case of toys and clothes) were grown. It doesn’t tell me anything about the dyes, finishes, or other chemicals added to make the final product. Similarly, many products labeled “BPA-Free” don’t mention the chemicals that *are* in the toy and could be just as harmful as what was left out. Instead of BPA, it may have been made with BPA’s close chemical cousin BPS, which studies have shown could be just as dangerous. There’s no way of knowing. These “regrettable substitutions” happen more often than we would like, because when we ban specific chemicals the easiest solutions are drop-in substitutes, which are likely compounds with similar structures that have a similar health impact.

Safer Made was created to ensure that as hazardous chemicals are phased out that there will be a viable pipeline of safer alternatives. At Safer Made we have developed strategies to identify and support inherently safer chemicals and products.

First, we take a functional approach to identifying safer chemicals and products. A functional approach re-focuses chemicals management from the risks of single chemicals to evaluating all the available options to deliver specific functions.

The functional approach comes from a recognition that *People do not buy chemicals; they pay for function*. People do not want perfluorinated surfactants that are known to persist in the environment for thousands of years, but they do like having a breathable rain-jacket that keeps them dry.

A functional approach encourages materials and system-level changes that provide an opportunity to address additional sustainability goals including the reduction of energy and water use more effectively than chemical substitution.

The other thing that we do at Safer Made to avoid regrettable substitution is use a class approach. We look at chemicals of concern as members of larger chemical families which are likely to share some of the similar physical and chemical properties. Chemicals that fall into known classes of concern like bisphenols or polyfluorinated substances should have to pass a higher bar for safety before being used.

Grouping chemicals by class based on chemical structure and physical properties is something that chemists often do to quickly evaluate chemicals. Grouping chemicals of concern by class

helps us make sense of the tens of thousands of chemicals that in commerce and allows us to avoid wasting time with know classes of harmful chemicals.

### **Technology Gap: An opportunity for California to continue leading in education and innovation.**

Increased transparency and accountability both create demand for safer products. Now we will shift our attention to the ways that we can grow the supply of safer chemicals and products.

The good news is that California already has the educational infrastructure, industries, and innovation ecosystem to support and accelerate innovation in safer chemistry.

California is home to some of the top schools for studying chemistry in the nation including three of the top five schools according to US News and World Report. California is home to a three billion dollar chemical industry as well as many leading brands. California attracts more venture capital funding than any other state, regularly attracting about half of all venture capital dollars in the nation to support startups across all sectors. Clearly, we have all the building blocks needed to lead the nation in the development of the next generation of chemistry that is better for human health and the natural world.

Let's talk about what needs to be done to focus more of these resources on green chemistry, the biggest technology opportunities to improve human and environmental health in recent times.

To create safer materials and consumer products, innovators, entrepreneurs, investors, product developers, marketers, researchers, and scientists will be helped by:

- *A common language* to adequately describe the innovation opportunities in each sector
- *Clear signals* from the government, industry, and NGOs about what innovation is needed
- *Partnership models* that illustrate how preferred chemistries and products can be brought to market.

### **Creating a common language**

As an investor in safer chemistry and materials I often find myself describing the green chemistry innovation opportunity to people who are not familiar with the need for safer chemicals. Finding the right level for this conversation is important.

The best way to make the need for safer chemistry innovation clear is to focus on the specific challenges and opportunities in each sector of the economy. The chemistry and performance requirements are vastly different for materials used in clothing, compared with shampoo, or in building products.

The best way to understand both the challenges and the opportunity for innovation is to work with partners who have experience bringing products to market in a specific sector. Companies selling products to the public are always going to be more open to new solutions than if you try and start back at the chemical companies who are providing the current chemistry.

Within each industry, you will find that there are known chemicals of concern that currently provide important end-use or manufacturing functions that companies would be willing to change if competitive alternatives were available.

The identification of priority products by DTSC take a first step in this direction, but more needs to be done to both identify and broadcast specific innovation needs to a broader audience.

### **A clear signal**

It takes resources and time to innovate, and clear signals for where efforts should be focused to help unlock creative potential as well as funding for new products. The current focus on single use packaging in the food packaging sector is a great example of the ways that concurrent action by advocacy groups, state and local government, and businesses are driving innovation in a sector to address concerns related to human health and plastic pollution.

People are seeking safer packaging, such as multi-layer packaging, instead of coated metal cans or paper, and paper coffee cups instead of Styrofoam cups. Once information about various materials and chemicals is public, compliance with FDA guidelines on food-contact materials is no longer sufficient to address consumer needs.<sup>4</sup> We will likely see the packaged food industry adopt voluntary restricted substance lists to keep up with consumer demand for transparency and healthier options.

Likewise, efforts to phase out polluting plastic packaging, as illustrated by the work of the Ellen MacArthur Foundation who managed to get 250 organizations representing 20% of the global plastic production to sign a pledge to eliminate plastic pollution, are causing companies to rethink packaging.

Finally, There have also been a number of state and local actions related to packaging including: [Washington](#) State (banned fluorinated chemicals in food packaging), [California](#) (identified certain classes of hazardous chemicals in food packaging), [New York](#) (banned expanded polystyrene in food service), EU ([restricted single use plastic](#) and [marine polluting plastic](#), announced plans to increase [recyclable packaging](#)), and several states (including CA, HI, FL, NL, and WA) banned plastic straws.

These pressures set the stage for the adoption of new packaging materials, designs and even business models that will provide consumers with the convenience and benefits of single-use packaging without the unintended harm to human health and the natural world.

### **Partnerships for Innovation**

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<sup>4</sup> Munke, et al. Retrieved from <http://www.tandfonline.com/doi/full/10.1080/VBmKOUvvcM> and <https://www.greenbiz.com/article/when-it-comes-food-packaging-what-we-dont-know-could-hurt-us>

Active partnerships between brands and retailers on one side and researchers and innovators on the other have the potential to bring new products and technologies to market that have both superior performance and safety.

Connecting students and researchers with organizations looking for safer chemistry can have a profound impact on everyone involved. The Greener Solutions course at UC Berkeley is one example of universities playing an active role in promoting the development of safer chemistry. Interdisciplinary teams of three to five students work with host organizations on a topic related to the design, manufacture, use, and/or marketing of safer chemicals in products, materials, or manufacturing operations. This project-based course draws graduate students in public health, chemistry, environmental studies, engineering, architecture, business, and law. Students have provided guidance for organizations including Levi's, Method, Seventh Generation, Patagonia, Autodesk, and HP, and some of these projects have turned into ongoing research collaborations and new technologies. In a number of instances, the students involved went on to work within the field of safer chemistry including graduates who went on to work at DTSC, C2C, USDA, HP, and Gensler.

Accelerators, incubators, and early-stage investment funds like Safer Made provide platforms and structures for young companies to share information about their new technologies and products but also for brands to keep up-to-date with new technologies and to share their innovation priorities. This two-way collaboration can guide the development of new technologies to make them more compatible with industry needs and accelerate their deployment.

There are already government funded organizations supporting green chemistry commercialization activities in California include the USDA laboratory, the Los Angeles Clean Tech Incubator, and the Cal Recycle loan program and at Safer Made we have worked with several startups benefiting from this support. But the amount of support given to these organizations is miniscule when compared with similar efforts in biotechnology and energy research.

## **Conclusion**

I hope that I have convinced you that there is both a clear demand for safer chemistry as well as a growing supply of safer products and chemicals. People are not going to wake up tomorrow and say, "you know what, a little bit of carcinogens is ok in my kids toys today," so this trend is not going to go away. Our focus needs be working together to make the transition to healthier chemistry and safer products happen faster and happens in a way that brings benefits to all consumers.

Significant investments have been made into the current system of production, and commensurate investment will be needed to transition us to a cleaner economy. The good news is that this is being to happen. Safer Made tracked \$1.7 billion invested in young companies

bringing safer chemicals and products to market. With significant increases in both dollars and number of deals in food, consumer products, sensing & tracking, and e-commerce financings.

This is a great time to be working and leading on this issue, when even relatively modest investment and action can make significant impacts on the speed and trajectory of the development of safer chemistry.

Please join me in accelerating a future California that is safer and more prosperous for our children.