

CHEMICALS PRACTICE

Innovation in chemicals:

An interview with Dow Corning's CEO and CTO

Dow Corning's Stephanie Burns and Gregg Zank talk about successful approaches to new-product and business-model innovation.

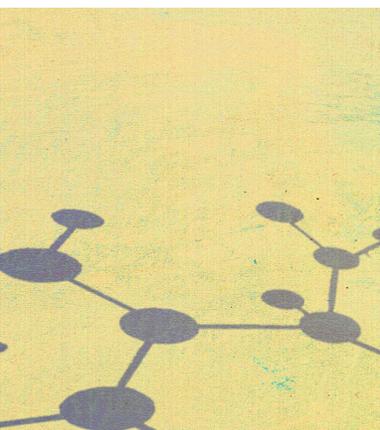
**Bob Frei
and Chris Musso**

Dow Corning's performance in the past decade is one of the more overlooked success stories of the global chemical industry. Privately held by Dow Chemical and Corning, Dow Corning is the world's top silicones producer and, through its majority stake in Hemlock Semiconductor Group, the leading maker of polycrystalline silicon (polysilicon), the raw material for computer chips and solar cells. Dow Corning has historically seen steady growth, but in the past six years, its performance has accelerated dramatically, and innovation has played a key role in this.

Dow Corning has always grown by combining a capability in low-cost bulk silicones with leadership in silicon-based specialty chemicals. It continues to follow this approach, with a new

large-scale plant in Zhangjiagang, China (a joint venture with Wacker Chemie), which will complement its large-scale plants in the United States and the United Kingdom. Similarly, in polysilicon, Hemlock Semiconductor is building a new plant in Clarksville, Tennessee, to maintain its capacity and cost lead.

What is new is the acceleration of the company's sales and earnings trajectory. Part of this is being driven by strong growth in demand in developing markets such as China. Dow Corning's low-cost manufacturing base puts it in a strong position to serve this demand, but the company is not simply sitting back while it rides that wave. Instead, it has made a significant push in innovation to strengthen its



growth momentum. It has drastically redesigned and reenergized its new-product-development approach, and at the same time has emerged as a chemical-industry leader in business-model innovation.

In 2002, in the fading days of the dot-com boom, Dow Corning took a bold gamble when it launched Xiameter, a new business model comprising an online-managed, low-cost, no-frills sales channel for its commodity silicones, offering competitive pricing to customers willing to buy in bulk, without research or technical support. Plenty of other chemical companies were dabbling in e-commerce, but none embraced a business model that effectively divided the company's products into two brands, as in this case, where there was the traditional Dow Corning on the one hand, offering customers specialty silicones backed up by technical support and R&D, and Xiameter on the other.

Dow Corning confirmed the success of the new business model in 2009 when it announced a fivefold increase in the number of products it offers via Xiameter. Meanwhile, sales growth based on new-product innovation has continued to accelerate.

The financial results bear this out. Dow Corning saw sales rise from \$2.49 billion in 1995 to \$3.37 billion in 2004, when it exited from its nine-year Chapter 11 bankruptcy protection linked to breast-implant liabilities, a compound annual growth rate of 3 percent. Net income rose from \$153 million in 1995 to \$289 million in 2004. Its sales then rose 62 percent in the next four years, reaching \$5.45 billion in 2008, a compound annual growth rate of 13 percent, and its net income increased more than two-and-a-half times to \$739 million. After a retreat in 2009, results rebounded strongly in 2010; the company's

sales rose 18 percent to hit \$6 billion, and net income increased 45 percent to \$866 million, in both cases reaching record levels.

Stephanie Burns, a PhD chemist, has been Dow Corning's CEO since 2004 and has led these developments. She and Gregg Zank, the company's chief technology officer and senior vice president, sat down recently at their Midland, Michigan, headquarters with McKinsey's Bob Frei and Chris Musso to discuss their perspectives on successful innovation in the chemical industry.

McKinsey: *Where does innovation stand among your priorities?*

Stephanie Burns: Innovation is definitely one of the very top priorities for the company. It's our future—it's the way we're going to grow. We divide the very substantial growth we have achieved over the past nine years into three categories, and there's been a major innovation component to all of them. The first is momentum growth, which is directly linked to GDP expansion around the world, and Xiameter has brought us a lot of growth there. The second is penetrating new geographies with our technology, and innovation plays an important role here because we'll often do formulations that are specific for the geography or employ innovative business models that allow us to expand in a particular region. The third category is more traditional, "pure" innovation—new applications and products. All three categories have contributed to growth, with the biggest shares driven by the second and third categories.

McKinsey: *How has your approach to innovation changed in the past decade?*

Stephanie Burns: Ten years ago, our innovation approach was mostly the traditional, inside-out materials-innovation approach. But we decided

that this approach was not working well—we really needed to deliver greater returns from our strategic R&D investments. Reevaluating our approach to innovation has been part of a complete rethink of Dow Corning’s business. Dow Corning has always enjoyed respectable growth rates across most of its businesses, and for better or worse this led to an attitude in the company that every business is a growth business, and an attitude to R&D spending where everyone gets the same level of investment, and people across the company felt almost entitled to a certain level of investment.

But in the early 2000s, we could see that parts of our portfolio were maturing and becoming less differentiated, and the service-intensive specialty-chemical approach to doing business was no longer wanted by parts of our customer base. Those customers were mainly interested in the most competitive prices for undifferentiated products, backed by reliable supply. Seeing this and recognizing that there was going to be more of this trend coming was a major driver for us in our design of the Xiameter business model. We couldn’t treat those more price-sensitive and innovation-insensitive customers the same as our specialty customers. And so we separated our product offering into two brands: the Xiameter brand and the Dow Corning brand.

Gregg Zank: And at the same time, we recognized that we needed to rethink our approach to new-product innovation across all our businesses. To get better returns, we saw that we couldn’t invest in every market the same, but we needed to be selective and choose those innovation areas where we’re going to get the biggest returns and have the biggest impact on the company.

McKinsey: *How did you deal with the challenges and cultural issues within the company when making this change?*

Stephanie Burns: I think we have been successful in this because we defined a really clear business model—Xiameter—for our undifferentiated business. We have been very clear on what that brand represents and what its goals are for cash generation and contribution to the earnings of the company. That business model is all about efficiency and quality of supply to our customers at a price point that allows them to really be competitive. Customers are not asking for a lot of product innovation in that space, so that would be an area where we are not going to put research dollars, except toward process improvements.

At the same time, we have been very clear on the differentiated side of the company about which areas we wish to invest in and what our customer acceptance and financial expectations are, and we have shifted resources to priority areas.

We had to communicate clearly that it’s just as important to work in area A as area B, and that both are critical to serve our customers. We’re going to create growth in each unit, but they have different mandates and deliverables. It has taken time to get the teams comfortable with this, but now people see the success and so they are buying into it with great commitment.

I think that one advantage we have culturally is that we have employees who are extremely creative and willing to try new things, and who do not resist change the way that perhaps they do in some other companies. We’ve worked hard on encouraging the dynamic that it’s healthy to embrace change. It comes down to leadership and clarity of purpose.

Stephanie Burns



Vital statistics

Born 1955
Married, with 1 child

Education

Graduated with a PhD in organic chemistry, with a specialty in organosilicons, in 1982 from Iowa State University

Pursued postdoctoral studies at Université Montpellier 2 Sciences et Techniques, France

Career highlights

Dow Corning
(1983–present)

(2006–present)
Chairman
and (2004–present)
chief executive

(2003–10)

President

(2000–03)

Executive vice president
for global operations

(1997–2000)

Director of the electronics and life-sciences businesses and of science and technology for Europe

(1994–97)

Director of
women's health

(1983–94)

Positions in laboratory research, product development, science and technology, and business management

Fast facts

Incoming chairman of the American Chemistry Council

Member of the board of GlaxoSmithKline and of the Society for Women's Health Research

Appointed to the President's Export Council in 2010

Named to Forbes.com's list of the world's 100 most powerful women

This certainly has required changes in behavior. Take the salespeople in our specialty-chemical business: their job out in the field is to do new-business development and work with customers on new areas of growth—it's not to go in and sell existing products to existing customers with the same application that they've sold for the past five years. So they've had a real change in their mandate.

With our relaunch of Xiameter in 2009, not only did we put more products into Xiameter but we also continued to fine-tune these two business models—Xiameter and specialty-oriented

Dow Corning—and add more clarity. We still had some undifferentiated products managed by our specialty business, and by moving them to Xiameter, we have been able to serve our customers with more clarity.

We will do that kind of fine-tuning constantly in the future. A product may currently be managed by our life-sciences business or industrial-intermediates business, but as the products mature, we're going to challenge the business every year: should that be a Dow Corning-branded product or should it be managed by Xiameter? And we'll move products over as appropriate.

Gregg Zank



Vital statistics

Born 1958
Married, with 2 children

Education

Graduated with a PhD in inorganic chemistry in 1985 from the University of Illinois at Urbana-Champaign

Career highlights

Dow Corning

(1985–present)

(2009–present)
Senior vice president

(2003–present)
Chief technology officer and executive director for specialties and technology

(2002–03)
Program leader for new-business development

(1985–2002)
Positions in research, product development, and new-business management

Fast facts

Holds 30 patents for innovations including those related to advanced composites, rechargeable batteries, and high-temperature thermosetting polymers

Reviewer with the National Science Foundation

Member of the board of directors of the Michigan Molecular Institute

Member of Michigan's Climate Action Council

Recipient of the American Chemical Society's Earle B. Barnes Award in 2009

Meanwhile, we are getting new specialty products from our innovation efforts to expand our Dow Corning portfolio that more than offset what is moved to Xiameter.

McKinsey: *How do you know when a product should move to Xiameter, and what are the challenges and opportunities?*

Gregg Zank: It's not by our definition that a product is no longer differentiated—it's our customers' and the marketplace's. That in turn reinforces the message within the company that we have to embrace this new business model. There are clear signals when a product is in

the undifferentiated area. For instance, do we have intellectual property protecting our product, or are there a lot of similar products on offer from the competition? And when we go to visit the customer, are we meeting with the new-business developer or only with the procurement team? That's a pretty strong signal right there.

Stephanie Burns: But it's important to recognize that there is a huge opportunity in the Xiameter model, not only in providing customers with reliable supply at a certain price point but also for the company overall as the low-cost, highly efficient supplier. We are winning at that low-cost game, and we're going to continue to

win. We've got fully utilized assets and efficiencies in our manufacturing operations that we believe are the most competitive in the industry.

The offtake of the large, low-cost plants also goes into our specialty business, where we develop finished, formulated products, and we get a lot more value than just selling the basic intermediates. So the innovation that goes on in our specialty plants that leverages this low-cost position is a wonderful synergy.

And at the same time, there are a lot of innovation challenges posed by the Xiameter side of the business. For instance, how do we get a product line's cost down to stay competitive and make the right level of return? There's a lot of energy and excitement going into improving manufacturing and process efficiency, as well as on the business and commercial side. It can be just as exciting as new-product innovation.

McKinsey: *What are your thoughts on new-product versus business-model innovation?*

Gregg Zank: It's not black-and-white. The days are gone when you could just make a new product and customers would beat a path to your door. To be successful in the marketplace and establish a sustainable competitive advantage requires a combination of approaches. The key for us is customer intimacy, which guides us as to which levers of innovation we should employ—how much new product and new technology, how much new solutions, and how much business-model innovation. It's also important to consider regional differences: mature products in one region may be innovative products in another. At the same time, there may be a need to explore a

new business model, packaging, or delivery method, for example, to successfully deploy a product line in a certain region.

Stephanie Burns: In business-model innovation, our big "aha" came with Xiameter. That really opened the door for us to think differently, and we've realized that new business models are just as critical for new-product development as they are in the more mature parts of our business. We deployed new ways of working with our partners: for instance, faster prototyping or finding different ways to more quickly establish profitability. And in our polysilicon business, we have implemented new business models designed to ensure that we meet our needs and our customers' needs.

McKinsey: *How do you steer your new-product innovation approach?*

Gregg Zank: We want to focus on areas that are driven by large societal trends and needs in the world—megatrends—because we know those trends are going to drive discontinuities in the marketplace. There are a number of areas we are particularly interested in. These include health care and personal care, renewable energy, construction, and electronics—where we are looking at the ever-expanding demand for devices and the merger of electronics with other areas such as photonics and biotechnology. And we are watching how megatrends—such as energy scarcity, urbanization, and others—interact with these.

When you're tied into those discontinuities, it just means the market opportunity is big. You're not in there fighting tooth and nail using price and other levers for a piece of a limited-size market—

instead you're in a market that is expanding rapidly. Light-emitting diodes (LEDs) are a great example—they're now showing up in flashlights, displays, traffic lights, and in automobile exteriors and interiors, and they have the potential to keep growing into areas of commercial and residential construction.

Encapsulants for LEDs have been a great success story for us. We started the work in the late 1990s, and it became a new-business program in the early 2000s that was sheltered even though it was not making any money. We backed it because we knew it was going to be a hit. We had key intellectual property; it's a very enabling technology; and we were ready to go when the market was ready. Our encapsulant business has grown dramatically over the past five years.

We are on the lookout for developments that are truly going to be disruptive and try to tie ourselves to them. We constantly challenge ourselves and refresh that list of the large trends that we should be looking at, and then we ask, how can silicon-based materials provide a solution?

Stephanie Burns: What we've been doing over the past four years is to take these megatrends and apply filters that narrow them down to what really could be the opportunity, and identify how best our technology and competencies match that. We're not just saying there's a wonderful megatrend out there in the demographic of an

aging population and we're going to invest all our projects against it, but instead, we're defining where the opportunities are for Dow Corning. We've been improving that process and have started to integrate it across the company.

McKinsey: *How does the process work?*

Gregg Zank: Our underlying challenge was to improve the way we develop a raw idea into something tangible. The approach we now use is to work very intensively for a highly compressed period of time—10 to 12 weeks. We will take something as large as the societal impact of an aging population and distill that down with numerous interviews outside the company. We dedicate a group of employees around the world to undertake a lot of strategic marketing—both technical people, who are in my opinion very good early-stage strategic marketers because they ask a lot of difficult questions, and commercial folks. Then we have weekly meetings to say, what have we learned about this area? It's got to be a large opportunity, it's got to get marketplace acceptance within a certain time frame, and it's got to be something that is not incremental to what we are already doing. We assess the applicability of our scientific tool kit against the opportunity and create an early proposal.

We pressure-test the proposals from the points of view of technology, the market, the supply chain, and whether it will still be a good opportunity if

There's a level of research expenditure that must be maintained even in tough times—it's not discretionary spending; it's required.

some other external factors change. It is a difficult thing for the team to go through because they want to chase five things and they only have time to get two worked up as full business proposals. But I'm insistent that as we go through this, we capture and document all the things that we leave on the side as well, because they may be relevant for some of our other existing businesses. In addition, the process can help us identify markets that are starting to move and make us check if we are in tune with them. Are they on our radar screen, and how are we interacting in the value chain of those markets?

We undertake this process twice a year. In addition to identifying opportunities, it completely energizes the entire company, because there is not only a core team but also a broader team that gets involved because there are Web calls for information, where people can contribute, so everybody is a part of it. We end up with a pretty robust portfolio of initiatives as the process cycle proceeds.

McKinsey: *Have any cultural issues emerged with the adoption of the megatrends approach?*

Gregg Zank: The danger we have run into is not so much resistance as that everyone reframes what was already going on to be part of a megatrend, and everything becomes a green-energy project or an aging-population project. That's why we have these filters and say, OK, within the aging population, what are the big things that we think we can have an impact on and that have enough discontinuities and opportunities associated with them to represent a large area of growth for a significant amount of time?

Stephanie Burns: We also have to take some care managing the filtering part of the process—this is the painful part, where you have to let go of ideas early on that you don't think are a hit and stay focused on the ones that look promising. When we started this process, our people got so enthused by innovation and sustainability and improving our planet, and they were buying in fast and looking at things that we knew were not going to fly. But you've got to let them expand the lists of ideas, so that they say, this is new and exciting, and to make sure they're going along the path with you. You can't shut it off prematurely; you have to let it run its course.

McKinsey: *What are examples of megatrend-linked work?*

Gregg Zank: One of the problems with the aging population is diseases that make bones brittle. So you can look at ways to protect the human body from falls or ways to better enhance bone growth in aging people. Since there is research relating bone strength to silica intake, we said, is there a way to help uptake of silicic acid or silica into the body to help bones be less brittle? Another is enhancing aging bodies' efficiency in absorbing medicinal drugs, and so, is there some way to use silicones to help the uptake of drugs?

Stephanie Burns: We also see megatrends intersect. For example, one of the trends with an aging population is that baby boomers want to live in their own homes rather than in a nursing home. To take care of them and make sure they're safe, third parties observe them in their homes, and so there are new electronics applications, as you get to surveillance

cameras and sensors. In other words, the electronics megatrend intersects with the aging-population megatrend.

McKinsey: *Dow Corning seems to have shifted its R&D talent strategy to include more than just silicone chemists, hiring physicists, materials scientists, and even industrial designers. How has this new combination changed the innovation problem-solving dynamic?*

Gregg Zank: It's a great new dynamic. When you combine a silicone chemist with a material scientist, a ceramist, and a metallurgist, you get some very robust technology debates, and you get to a good answer—not yet necessarily the right answer—but one you have a lot more confidence in, because you did not just charge down one path.

Stephanie Burns: Here's an example. We know a lot of our customers buy our materials for the aesthetic properties—the feel, or “hand,” as it's called, the silky touch, the visual appearance. But we realized that there's a whole element in how customers make buying decisions that we did not fully understand. When silicone ends up in a piece of furniture or cookware, we don't know who these people are who are selecting the product. When a maker of handheld electronic devices looks at silicones, they are looking for the customer experience as well as the electronic-circuitry performance, which we always focused on. So we brought in an industrial-design engineer who thinks completely differently from a chemist or physicist, and this brings a totally different dynamic to the team's interactions.

McKinsey: *Is being just in silicon chemistry a limitation?*

Stephanie Burns: I'd argue our chemistry set is probably more complex than most companies', and our expertise in that chemistry set allows us to do so many more things. I am constantly amazed at the potential of silicon technology to meet the needs of current and future advanced applications.

I think we are able to build closer and stronger relationships with customers because our silicon-based expertise can be so enabling for them. Take skin-care product makers: they use thousands of different ingredients to make formulations, but the silicone ingredient enables that formulation to perform, and that gives us privileged access to their research department. And we've deliberately built up a capability we call “application expertise,” where we have scientists who are world-renowned experts in many of our customers' applications. In hair care, for example, we have globally respected experts on how to test products on hair, and our personal-care customers recognize and respect these experts' work.

McKinsey: *How much time do you as CEO spend on innovation?*

Stephanie Burns: As CEO, I would say around 15 percent on a pure innovation basis, but innovation is part of everything we do, so it is difficult to estimate. I do have a very full understanding of the innovation portfolio, which is on all our major executive-meeting agendas.

McKinsey: *What does it mean to have a scientist as CEO?*

Stephanie Burns: When I am out with R&D folks and teams that are bringing projects forward, there's probably an ease of discussion and a connectivity that takes place. The last time I was with our compound semiconductor research team, for instance, I understood exactly what they were doing and the progress they have made in advancing silicon carbide wafer-production technology.

Most important, I think I probably have, compared with a nonscientist, a better understanding that this innovation stuff takes time to come to fruition, and that you've got to keep these investments consistent and you cannot flip-flop. Some of our big successes today had their genesis back in the late 1990s. In tough economic times, you're looking to squeeze anything you can, and innovation is not immune to that, but there's a level of research expenditure that must be maintained—it's not discretionary expenditure. It's required. [o](#)