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Changing business for good

## Celebrating The Human Footprint

Michael Braungart Makes the Case for Good Chemistry

### Newsflow

**Clariant** has confirmed that it will shed a further 500 jobs; affected plants will be announced in mid February and will include the company's paper and textile units, according to the German newspaper Handelszeitung. The company, which has been hit hard by the downturn in key markets such as automotive and construction, cut more than 3,000 of its workforce last year, and at the end of 2009 employed less than 18,000 people worldwide. A Clariant spokesperson said that employees at Swiss plants could also be affected by the measure. The company plans to announce which plants will be cut by mid February.

**Dow Chemical** has closed the sale of its acrylic acid and esters business and a specialty latex business to Arkema. Dow first announced the \$50 million sale to Arkema in August. The company has been under Federal Trade Commission mandate to divest some of its assets acquired when it purchased the specialty chemicals company Rohm & Haas last year. The sale involves an acrylic acid and esters plant in Clear Creek, Texas, and the specialty latex business.

The supply bottlenecks at two **BASF** sites remain; a group spokesperson confirmed that the plants producing the PA 6 and PA 6.6 compounds of the Ultramid and Miramid ranges meanwhile have restarted. However, BASF would only be able to meet its existing orders and that force majeure remained in place, the spokesperson said. The force majeure declared in August 2009 on hexamethylenediamine from its plant in Seal Sands, UK probably would not be lifted before the end of the first quarter this year.

The polyurethanes division of **Huntsman** has established a new joint venture in China with local partner Jurong Ningwu Chemical to research, develop, manufacture and sell base polyether polyol products. The new company based at Jurong City, in Jiangsu province between Nanjing and Suzhou, will trade as Jurong New Ningwu Chemical

**Air Products** has announced operating results for the first quarter of fiscal 2010. Earnings were up 72% year over year.

**Good Design** – Michael Braungart has something of a celebrity status in countries such as the Netherlands and the U.S., where he has inspired politicians and celebrities alike with his Cradle to Cradle concept. In his home country of Germany, however, the chemist is often labeled as an enviro-nut – a monicker usually reserved for the Birkenstock-loving, health-food store frequenting population. But Braungart is more realist than idealist, and his idea is simple: **Make products that are not "less bad," but rather products that are good for the environment. "We want to make triple top line designs: simultaneously good for the economy, good for society, and good for the environment,"** he says. In an interview with Brandi Schuster, Braungart takes the European chemical industry to task and encourages a new line of thinking.

**CHEManager Europe: Does green chemistry exist?**

**M. Braungart:** No. There is either good chemistry or bad chemistry.

**What kind of chemistry is the European chemical industry producing?**

**M. Braungart:** The situation is somehow very tragic, particularly after the disasters that have happened over the past few decades, like Seveso, Bhopal, Chernobyl, Exxon Valdes. We nearly lost a whole generation of good engineers, especially good chemists. One time I had a student tell me his girlfriend threatened to leave him if he continued to study chemistry. And so, now we have brilliant MBAs, we have great lawyers, but we don't have enough good scientists; a whole generation is missing. And many of those who did study chemistry did it out of opportunistic reasons. And others did it with a feeling of guilt: "Yes, I like to do chemistry, but it is a bad thing, so I try to make the best out of it."

**Is the European chemical industry being run with a bad conscience?**

**M. Braungart:** Yes; it is a type of guilt management thing. And this is a pity, because the European chemical industry gets marginalized because of this bad reputation. Companies like Akzo Nobel and DSM make about 50% of their profit with products that are younger than seven years. If they don't reinvent themselves every year, they lose the potential for innovation. And this potential means having creative people, having fun, having spirit and optimism. These are the qualities that disappear when chemical industry makes bad stuff or causes disasters.

**For example?**

**M. Braungart:** Take Bisphenol A in polycarbonate, which is used to make bottles for babies. Or when toys are analyzed and more than 600 problematic chemicals are found. Also, 21 years of analyzing breast milk have shown that it contains over 2,500 different chemicals. When a company makes stuff that accumulates in biological systems, it is simply bad chemistry.

**What does that mean for the industry?**

**M. Braungart:** The consequence is that the chemical industry is losing the brightest minds and people with MBAs are taking over the management; people who don't really understand the brilliance and the beauty of innovation in chemicals. When someone doesn't understand the chemistry, all chemicals end up seeming like bad things. Because of this culture of guilt management, many companies are trying to be less bad by becoming "eco-efficient", trying to be less bad. Instead of seeing the opportunities and potential

of innovation in chemistry, they are wasting their time feeling guilty about existing.

**Have you found that innovation in chemical companies has slowed**

**down since the economic downturn, something that has also generated fear in the industry?**

**M. Braungart:** Yes, but it's not only that. Companies are also laying off people who are not directly involved in production, because they cannot measure creativity in productive terms so easily. For example, EDTA can be made much cheaper in China and Korea than here in Europe. So when it is produced here, companies end up laying off all the people who aren't involved in the manufacturing. This means that innovations that are there don't reach the market, because the highly optimized wrong systems are dominating the market, and these highly optimized wrong systems can be done much cheaper in China.

With Reach, the erosion will go even faster. If you look at black dyes for T-shirts, for bras, etc., they need to go through Reach. When the same bloody T-shirt comes with the most toxic dye from China, it doesn't need to go through Reach. The legislation basically forces problematic production into other countries and makes extra costs for innovation here. Reach basically means regulating the past instead of organizing the future; it doesn't celebrate innovation. It just means stagnation on the existing level.

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**What about programs like Responsible Care or the use of the word "sustainability" as proof of environmental stewardship?**

**M. Braungart:** This is also guilt management. Human beings

have rights; they don't need to be taken care of.

It's very simple: When a baby drinks breast milk, that baby has the right not to be harassed by chemicals. I am more into partnership; partnership with nature, with colleagues. Without partnership, people are afraid. When saddled with fear, people are not creative. Without creativity, there is little room for innovation. That is why it is important to celebrate the human genius and to celebrate good chemistry – without romanticizing.

A real partnership is learning from nature and being proud of your own creativity. It's easy to forget about romance and ethics when you are under stress. That's why things like Responsible Care should not be made into an issue of ethics, but rather an issue of quality. A product that accumulates in breast milk is just a bad product. That is enough. With this line of thinking, the young scientist who doesn't want to be stupid can just say, "Hey, I am not an

idiot; I don't make stuff that accumulates in breast milk." Self-esteem is far more innovative than ethics in that case.

The concept of Cradle to Cradle celebrates good chemistry, chemistry which really supports people to be partners with nature – not just being victims of it. We have been destroying nature, because nature was not nice to us. There is no reason to romanticize. There is no Mother Nature.

There are many companies who are champions in eco-efficiency, but if you make the wrong things perfect, they are just perfectly wrong. It's typical for many chemical companies to try to be less bad, to minimize, reduce, avoid, doing all this carbon footprint calculation. Many companies are now trying to be to be carbon neutral. But you can only be carbon neutral when you don't exist. Mere existence means that you are not neutral. Take a tree, for example: no reduction, no avoidance. Trees make oxygen, which means that the concept of zero emissions does not exist in nature. It is, however, positive emissions, healthy emissions.

**You once said that Germans are a danger for your Cradle to Cradle concept.**

**M. Braungart:** It's not just the German way of thinking; it's more of the Northern approach. In Northern countries, if you walk through the tundra, your footprint means damage, erosion. That's why people try to minimize their footprint. If you throw a banana peel away on the tundra, it will stay there for 500 years. So that's why people put everything into incinerators. And that is such medieval behavior, to take fire to things whenever you feel intimidated. But that is not rational, because you end up losing materials that should go back into either technical or biological cycles. This is simply not related to real material flow management that supports good chemistry.

It is the Northern approach of guilt management to say: "Oh, I am so sorry that I am here, and I will try to be less bad." In reality, eco-efficiency and sustainable development are just different words for stagnation. If someone described their relationship with their partner as sustainable, I would feel really sorry for them. Innovation is



Michael Braungart, Founder, Environmental Protection and Encouragement Agency (EPEA)

(Picture: Enith Stenhuys)

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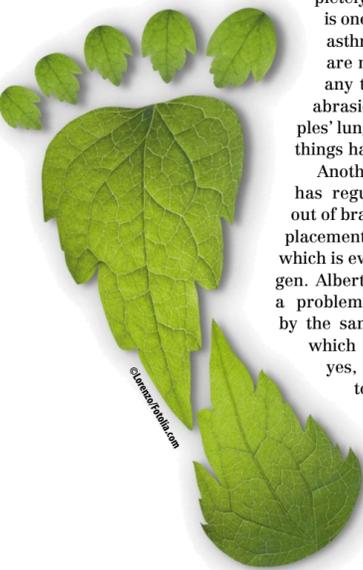
# Celebrating The Human Footprint

Michael Braungart Makes the Case for Good Chemistry

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never sustainable – otherwise it wouldn't be innovative. That is why feeling guilty for being on the planet means you are not creative.

*Is the impulse for change in the chemical industry more likely to come from outside – for example from companies such as Nike, who are using a particular kind of rubber that can be put back into the ecosystem – or do you think the impulse for change really will come from within the chemical industry itself?*



**M. Braungart:** Within the Nike project, we made a profound analysis of rubber, and it is really amazing: There are about 500 chemicals being used to make rubber, but about 400 of them are basically dangerous for the environment or for human health.

Consider this: Tires last twice as long as they did 20 years ago, and everybody thinks that this minimizes impact. But now the problem is that tire dust has become much smaller, and in the combination with all the other chemicals you have a permanent inhalation of highly irritating latex dust. I am completely convinced that this is one of the key causes of asthma today. When tires are made without giving any thought to what the abrasion means for people's lungs means the wrong things have been optimized.

Another example: The EU has regulated the asbestos out of brake pads, but the replacement is antimony sulfate, which is even a worse carcinogen. Albert Einstein said that a problem cannot be solved by the same type of thinking which generated it. So, yes, the impulse needs to come from the outside, but I am very optimistic when companies like Lego say that they want to have the best polymers in their toys, the



## Prof. Dr. Michael Braungart

Prof. Dr. Michael Braungart is the scientific director of EPEA International Umweltforschung GmbH (Hamburg, Germany), which he founded in 1987, and is co-founder of McDonough Braungart Design Chemistry (MBDC) in Charlottesville, Virginia. He also co-founded the Hamburger Umwelt Insitute (HUI) in 1989. These organizations share a common set of values that embrace intelligent, aesthetic and eco-effective design and seek to optimize products within the Cradle to Cradle framework.

Braungart has been a professor of Process Engineering at Universität Lüneburg (Germany) from 1994. Additionally, since autumn 2008 he has been named to hold a newly funded professorship at the Dutch Research Institute for Transitions (DRIFT) at Erasmus University of Rotterdam in collaboration with the TU Delft. A Cradle to Cradle Masterclass is now available.

Through these activities, Professor Braungart has developed the tools to design eco-effective products and business systems and has worked with a number of organizations and companies in a range of industries. In 2002 he has accepted a visiting professorship at the Darden School of Business, lecturing on topics such as eco-efficiency and eco-effectiveness, Cradle to Cradle design and Intelligent Materials Pooling, and he continues to lecture at universities all over the world. *Cradle to Cradle: Remaking the Way We Make Things*, was written by Braungart and architect William McDonough and published in 2002. Since then, the book has been translated into eight other languages: Traditional and Simplified Chinese, Dutch, German, Hungarian, Italian, Korean and Spanish.

best ones that can be used in cycles. The same can be said about Phillips and Nike. If we look across the different industries, it's amazing how fast this is happening. The Netherlands announced to do all their public purchasing by 2012 according to the C2C method. That means innovation – €45 billion of innovation potential.

**What other problems still exist?**

**M. Braungart:** Our systems are still very primitive. A normal glossy magazine contains three to four grams of chlorinated halogenated hydrocarbons that were never designed to go back

in paper recycling. So when toilet paper gets made out of the stuff, three to five million liters of drinking water ends up contaminated by just one kilogram of toilet paper.

One time, a printing company showed me a printer that could print twice as fast and uses 20% less energy. But could I eat the paper that comes out of the machine? Could I compost it and use the compost in my garden? Could I burn it and use the ash in my garden? No. This is another situation where the wrong thing got optimized. The good news is that the Dutch government announced that in five years, they will only pur-

chase paper can be burned in a normal fireplace and the ashes can be put in a garden. Now there are 16 players in the Netherlands who all are looking to make paper for biological cycles.

**C2C has a significant following in the Netherlands and in the U.S. Does culture play a significant role in the acceptance of the concept?**

**M. Braungart:** It's not just that. C2C is so successful in the U.S. because of George W. Bush. With him in power, it was clear: He basically signaled to the industry that he was not very intel-

ligent and they shouldn't wait for him to do anything. That stimulated so much innovation within all these giant companies like Nike, BASF, Ford, Herman Miller, Steelcase, Hewlett-Packard, S.E. Johnson, etc. In Europe, the government is always pretending to do something, and everybody sits back and waits. However, we see the same happening in some European countries: There are fast developments in Italy because of Berlusconi, because every-

body says, "Oh, my God, what an idiot we have for a president! It is up to us; we cannot wait for them anymore."

In the next two to three years, C2C will become the standard of the chemical industry, because it is a positive agenda. It celebrates human footprint – it celebrates chemistry.

**See also our in-depth article on the C2C Concept on page 10.**

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## Merck Builds New Production Plant

Merck KGaA has announced that it has started construction work at its Darmstadt, Germany, site on a production plant for the manufacture of inorganic salts. This will increase capacity by around 50% compared to the production lines currently being used. The company is investing around €30 million in planning, de-

veloping and constructing the plant, which will produce active ingredients and excipients, products for use in biopharmaceutical production processes, additives for the food industry and laboratory reagents. The plant is scheduled to begin operation in mid-2011, when nearly 70 employees in inorganic chemical production will

move to the new facilities. The modernization measures in inorganic chemical production are part of the growth strategy for Merck's units Life Science Solutions and Laboratory Business, both within the division Performance & Life Science Chemicals. This is one of Merck's largest chemical investments worldwide. ■

## DSM Announces Closure Of DSM Specialty Intermediates

DSM Specialty Intermediates (DSI) in Sittard, Netherlands) has announced the intention to discontinue its operational activities by Dec. 31 at the latest. As a consequence, DSI's production activities at the Chemelot

industrial site in Sittard-Geleen will be stopped with effect from July 1. The closure will result in the loss of 37 jobs at DSI. DSI produces and sells intermediates for the automotive, food and pharmaceutical industries.

Due in particular to increasing competition from China and India, among other countries, prices and margins for these products have been under heavy pressure for a number of years. ■

## Dupont: \$295 Million Expansion for Photovoltaics

Dupont has announced an investment of \$175 million to complete the multi-phase expansion of its high-performance Dupont Tedlar PV2001 series oriented film production line. This investment is in addition to \$120 million in capacity expansions, announced in August 2009, for raw materials used to make the film, bringing the total commitment of these two phases to \$295 million. Tedlar films serve as the critical component of photovoltaic backsheets, providing long-term durability and performance for photovoltaic modules in all-weather conditions. The film line expansion will be located at the DuPont Circleville, Ohio, facility using existing and retrofitted assets. Film production is scheduled to start up in September 2011.

The manufacturing steps for Tedlar oriented film include producing vinyl fluoride (VF) monomer, which is converted into polyvinyl fluoride (PVF)

polymer resins, and extruded into the Tedlar film. DuPont plans to increase monomer and polymer resin capacity by more than 50 percent. Construction is under way for these new monomer and resin facilities at the Dupont Louisville, Ky., and Fayetteville, N.C., sites, respectively, and the facilities

are scheduled to start up in mid-2010.

Dupont said anticipates that the photovoltaic market will grow rapidly over the next several years, and this growth will drive the demand for Tedlar and other new materials that increase the lifetime and efficiency of solar cells and modules. ■



Dupont is a leading supplier of materials and technology to the photovoltaic industry, and expects that overall sales of its family of products into the industry will exceed \$1 billion by 2012.



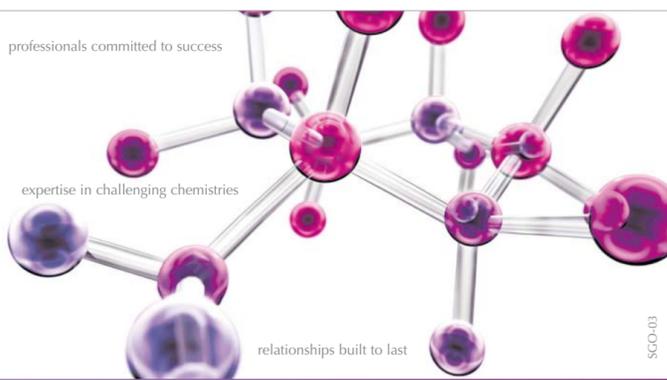
**Sustainable Construction In The Desert** Burj Khalifa, the world's tallest building, stretches majestically towards the sky. For the construction of the tower, BASF developed a special concrete mix that can be pumped to a height of 600 meters without segregating. The admixture Glenium Sky 504 the concrete can be worked for more than three hours and then hardens quickly. This allows for a shorter construction time and gives the building a longer useful life, in this way making it more sustainable. (Photo by BASF)



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