

Media Backgrounder: Cradle to Cradle at DSM

Introduction:

Described as a precursor to a potential new industrial revolution, the development of the Cradle-to-Cradle (C2C) philosophy is one of the most innovative attempts in recent years to come up with a solution to the world's quest for a sustainable system.

Modeled directly on nature's *effectiveness*, or ability to renew itself cyclically without generating any waste, the Cradle to Cradle framework governs the design of manufacturing systems that are able to go beyond classic 'Cradle to Grave' thinking, whereby concern is only given to what happens in the time between when a product starts and ends its working life.

Instead, Cradle to Cradle systems form a closed 360-degree cycle, starting with the extraction of a raw material, through the manufacturing process, its working life and final re-entry into the value chain as a raw material. And while close attention is given to ensuring that the value chain is sustainable from a raw material perspective, it also must comply with other exacting environmental criteria, such as Material Health, Renewable Energy Use, Water Stewardship, and Social Responsibility.

DSM, the global leader in material sciences and life sciences, has been leading the way in terms of sustainability for many years. Recognizing the growing interest in recycling with the ultimate goal to achieve closed loop systems, DSM has adopted the Cradle to Cradle concept as part of its corporate sustainability strategy.

The rise of cradle to cradle

First coined in the 1970s by W.R. Stahel, founder of The Product-Life Institute, Geneva, the term Cradle to Cradle began to gain currency in the 1990s, mainly as a result of the work of two academics, Michael Braungart and William McDonough, and more recently in the current decade following the two's application of the principles of Cradle to Cradle into a holistic, globally recognised, business certification.

Today, Cradle to Cradle® certification's value as a business tool stems from its measurement of *eco-effectiveness*, i.e. a material's ability to recycle itself in a way that mimics nature with absolutely no wastage. This differs from other sustainability measurements in circulation today which tend to focus on *eco-efficiency*.

C2C Today

Today, MBDC (McDonough Braungart Design Chemistry), the consultancy business set up by Michael Braungart and William McDonough to conduct assessments of materials, has awarded Cradle to Cradle® certification to over 100 companies and 350 products. Every company that applies for certification must push their products through a vigorous and time-consuming analysis based around five major criteria: the health and environmental effectiveness of the material concerned; its capacity for re-utilisation 'beyond the grave' and the effects its usage has on energy, water and social responsibility.

Demand for Cradle to Cradle certification is accelerating rapidly, driven mainly by

increasing awareness of climate change, resource scarcity and the reputational damage an organisation can fall vulnerable to should it fail to protect its stakeholders adequately.

Cradle to Cradle certification today comes in four forms; basic, silver, gold or platinum. Platinum certification, the most demanding, requires fully optimized material chemistry, a recycled/re-manufactured value equal or higher than that of the original product, a minimum 50% renewable energy footprint, innovative water use/discharge policies, and third-party social accreditation. Platinum is considered the ultimate objective and no platinum certification has been awarded as yet. Basic accreditation also requires considerable commitment, with holders having to prove they have indexed and assessed all materials, phased out any black list materials and formulated a strategy to deal with problematic substances.

The Cradle to Cradle movement also appears to be gaining recognition in mainstream public policy. In California in May 2010, for example, the state government established the Green Products Innovation Institute with the aim to create standards for products based on C2C protocols.

DSM and C2C: a growing partnership

DSM's involvement with the Cradle to Cradle philosophy is well-established. Before the concept was popularised by the efforts of Michael Braungart and William McDonough, the company has been leading the industry in terms of innovations for closing the loop. A leadership position in sustainability has been maintained, with the company adopting a 'Triple P' strategy of focusing on - and more importantly measuring itself against - the three criteria of people, planet and profit. DSM's sustainability focus has evolved to the point where, today, it is the leading paradigm for innovation within DSM's performance materials portfolio.

Perhaps DSM's earliest contribution to the Cradle to Cradle concept was the active role it played in closing the loop to recycle post-consumer nylon-6 carpets back to their chemical raw material caprolactam. DSM was one of the pioneers to develop technologies to recycle in order to reuse the recycled material in the same demanding applications without any loss of quality.

DSM's direct collaboration with the Cradle to cradle movement, however, came in 2008, when the company began working with EPEA (Environmental Protection and Encouragement Agency), the consultancy organisation of Michael Braungart. The collaboration saw several DSM products and innovation ideas scrutinized from a cradle to cradle point of view

While EPEA and DSM were collaborating on C2C product designs, DSM was embarking on a parallel mission to build relations in their value chains that were interested in designing cradle to cradle products. The efforts proved well-founded, and it was quickly discovered that cradle to cradle was an excellent way to start discussions throughout a whole business chain on the kinds of products and innovations that were needed to meet industry sustainability needs.

As well as helping build links with the wider industry value chain, DSM identified two major benefits from its ongoing work with cradle to cradle. The first was that a very powerful and positive motivational message was being generated: that through Cradle to Cradle, businesses can actually make a positive impact on the environment, in addition to their existing efforts at minimizing the environmental footprints of their products. This message became important, both within DSM's internal workforce but

also externally, as a focal point for entire value chains to work on sustainable products and processes.

Secondly, the company found that the exacting demands of Cradle to Cradle product design provided an excellent trigger for innovation in its own right. This insight, as well as the expertise of EPEA, Michael Braungart's Hamburg-based consultancy that was analyzing DSM's products, provided a real and valuable focus for improvements in next generation innovations.

Innovation in business models

Cradle to Cradle has led to improvements in product quality through enhanced expertise and greater awareness and communication with suppliers, customers and end users. It is also quite likely that Cradle to Cradle will help lead to innovation in new business models. As materials become recycled and reused in a 'closed loop' system, it is anticipated that this could lead to new, 'service' structures developing, whereby ownership of the material remains with the producer, who then leases it out to the user in return for regular service payments.

From a materials perspective, the benefits of this system are that, rather than focusing on the initial investment cost, producers and consumers now focus more closely on total cost of ownership, i.e. the other payments that occur during a product's lifetime, including maintenance and disposal. In this way, new ways of creating added value, such as collection systems and logistical services, can also be created.

DSM's C2C-certified Engineering Plastics

The fruit of DSM's labour since 2008 has been the recent certification of five materials of DSM Engineering Plastics:

- Akulon K224-G6 (a 30% glass filled polyamide 6 resin)
- Arnitel EM400 (an unfilled thermoplastic copolyester resin)
- Arnitel XG (a halogen free flame retardant thermoplastic copolyester resin)
- Arnitel T-XG510 (a halogen free flame retardant PBT resin)
- EcoPaXX UF: (an unfilled 70% bio-based polyamide 4.10 resin)

Cradle to Cradle as a long-term business driver

Interest in Cradle to Cradle is growing, and indeed Cradle to Cradle is already happening in certain industries, for example, office furniture. Other industrial areas, such as consumer electronics, are following rapidly.

DSM believes Cradle to Cradle's main value in driving business in the medium term goes beyond the marketing power of certification. Instead, it comes from the fundamental changes that Cradle to Cradle is expected to bring about in the way that companies design their products. And while DSM acknowledges that performance, functionality and price remain the most important factors governing materials purchasing today, it also believes its work towards Cradle to Cradle, as part of its overall sustainability strategy, leaves it well-positioned to exploit expected increases in demand for these products in the future.