

# **Climate Initiatives – Where to go after Copenhagen**

How could climate initiatives be financed in developing countries?  
Overview on existing and planned initiatives

## **Part I: Fast Start Financing**

## **Part II: Analysis of Cradle-to-Cradle in Developing Countries**

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## **Preface**

There are a number of climate initiatives, which have been on the table before, at and after the United Nations Climate Change Conference in Copenhagen in 2009. At the centre of climate initiatives often stands the question, how climate initiatives can be financed in developing countries. As an extensive overview on existing and planned initiatives would go beyond the scope of the practical project course assignment, this paper focuses merely on two particular aspects of this vast topic; the fast start financing of the Copenhagen Accord and an analysis of the cradle-to-cradle principle in developing countries. The first gives an innovative approach to the fast start financing agreed on in the Copenhagen Accord. The latter describes the cradle-to-cradle theory and analyses how this concept could be applied in developing countries in order to tackle the problems of climate change and sustainable development.

## **1 PART I - FAST START FINANCING**

Article 54 of the federal constitution of Switzerland reveals the high priority Switzerland gives to the international environmental politics. The high engagement for a strong international environmental regime and the strengthening of environmental concerns within the development assistance is additionally highlighted within the Federal Council's foreign affairs report of 2009 (EDA, 2009).

It is beyond dispute, that people are highly concerned with the effects of climate change upon them and the conservation of nature. Also uncontested is the fact, that in order to adapt to the climate change, especially within developing countries, increased financial sources are needed. The Copenhagen Accord constitutes a political commitment of the community of states to act together in the realm of the climate change and to try to meet the concerns mentioned above.

The following chapter 1.1 Copenhagen Accord, provides a short explanation of the Copenhagen Accord and reveals the importance of a high engagement of Switzerland within the international environmental politics. Chapter 1.2 presents additional funding propositions in order to both, enable the fast start finance to work and to meet Switzerland's high engagement within the international environmental regime stated in Article 54 of its federal constitution. The assessment of these additional funding propositions is presented within chapter 1.3 and is followed by a conclusive proposition to the Federal Council in chapter 1.4.

### ***1.1 Copenhagen Accord***

The Copenhagen Accord resulted from the Copenhagen Climate Conference in 2009 and is a legally non-binding document, defining further steps to be taken in order to meet the challenges of climate mitigation and adaptation. Furthermore, it is an important step towards a legally binding document after the expiring of the Kyoto Protocol.

The fast start financing is one part of this accord. Under the terms of the accord USD 30 billion should be placed at the disposal of the less developed countries with immediate effect (2010-2012), in order to finance climate mitigation and adaptation measures (UVEK, 2010). Under this regime, Switzerland has to pay 50 million Swiss Francs a year from 2010 until 2012.

As Switzerland is highly engaged within the international climate regime and in order to keep

its creditability within climate politics and influence within decision-making procedures it is crucial for Switzerland to get involved with stronger financial support in the realm of international climate politics (UVEK, 2009). Thus, its engagement in global environmental regimes should go beyond the Global Environment Facility (GEF), for which Switzerland is committing a maximum value of 176 million Swiss francs (UVEK, 2009). This clearly shows the importance for Switzerland to engage within the Copenhagen accord, and also to keep its influence within other international bodies outside the realm of environmental policy such as the World Bank, the International Monetary Fund, and the European Union (UVEK, 2009).

Based upon the discussion paper of the Federal Department of the Environment, Transport, Energy and Communications (DETEC) of October 20<sup>th</sup> 2009, the DETEC has been assigned, in collaboration with the Federal Department of Finance (FDF) and the Federal Department of Justice and Police (FDJP) to examine new and additional instruments to finance the contributions of Switzerland to the international climate regime. In order to clarify the financial sources and canals, an interdepartmental working group has been formed and is constituted by the State Secretariat for Economic Affairs (SECO), the Swiss Agency for Development and Cooperation (SDC) and the Federal Office for the Environment (FOEN). The aim of this group is to make an proposition for the fast start financing to the Federal Council until the end of May 2010. In the realm of the practical project of the University of St.Gallen, SECO has asked us to elaborate on how to make the fast start finance work. Hence, the following chapters provide propositions to the Swiss government on how Switzerland could raise the additional money to fund the fast start financing.

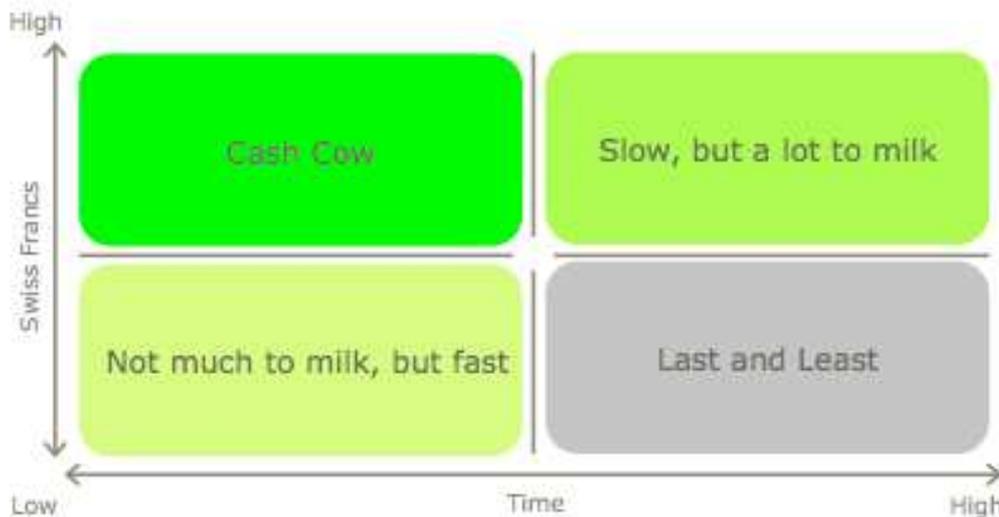
## ***1.2 Additional funding propositions***

When analyzing the propositions in the following chapters, their political feasibility and viability have not been considered in depth because the focus of this paper lies on new and innovative financing sources in order to raise the necessary funds as fast as possible. Considering the political feasibility would have narrowed the horizon of additional funding propositions and probably limited the broad approaches presented in this paper. We are aware of the fact that the propositions do have to meet realistic criteria in order to be more than utopian, though we have followed a rather creative approach in order to give new inputs to the Swiss Federal Council. Since we are not enchained with political and legal restrictions and considerations, some of our propositions might be really new and never thought of by the government.

Additionally, through some adaptations of the propositions, the Swiss government could then adapt them to meet the political and legal framework in detail. We focus on the proposition of solutions whereas the government is asked, in a further step, to implement the ideas.

To raise the 150 Mio Swiss francs over the next three years two important criteria have to be met in order to meet the needs of the fast start financing: the time horizon has been limited to three years and the amount of money to be collected has also been defined. Thus, the propositions presented in this paper will be assessed based on these two criteria. The following matrix (Figure 1) provides the necessary tool to review the propositions in the light of the defined goal.

*Figure 1 - Assessment matrix*



*Source: own illustration*

According to the figure depicted above, the cash cow to look for grazes in the upper left box. These financing propositions allow collecting a lot of money within a small amount of time. Thus, to speak in figures, to make the fast start financing work, we need 50 million Swiss francs within one year.

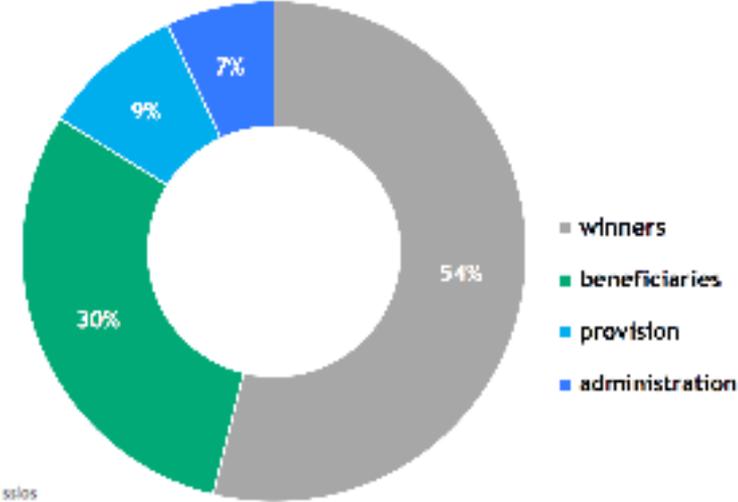
The box in the upper right corner meets the amount of money needed, though it takes a little longer to do so. However, it is still worthwhile to be within this box, although it takes a little longer until the cow can be milked. But when it is milked, it delivers a high amount of milk, i.e. money. The box on the lower left side works the other way around: the cow can be milked quickly, but delivers less milk. For the fast start financing these propositions are still important to consider, as the time is an important factor and crucial to realize the Copenhagen Accord. Last, but not least, the fourth box delivers the fewest amount of money in the longest time. Hence this is not the grazing land we need our fast start financing cow to graze upon.

**1.2.1 Gambling**

As mentioned in the introduction of this paper, we are seeking innovative funding instruments. In order to raise the financial resources needed, gambling could play an important role. In the following paragraphs we are going to present first the idea of the lottery, and secondly how casinos could also contribute to the success of the fast start financing.

Lottery as a financing instrument for development projects is not new. This idea was brought up already in 1972 within the UN, in order to finance its development activities. Marti Ahtisaari, former President of Finland, together with the NGO Crisis Management Initiative and the Ministry for Foreign Affairs of Finland, brought up the idea of a global lottery (Addison, 2003). Furthermore the figures do speak for themselves as the worldwide lottery sales amount to some USD 126 billion (Addison, 2003). The Swiss Lottery, selling within the German speaking part of Switzerland, Ticino and Liechtenstein, reported sales of 323 million Swiss francs in 2008 (Swisslos, 2010b). Thus clearly, a high amount of money is being raised. In order to depict a clearer understanding of how much money can be gained, the illustration below shows, how one played Swiss franc is distributed between administration and provision costs, the winners and the beneficiaries.

*Figure 2 - Allocation of one Swiss franc*



*Source: own illustration based on Swisslos*

Thus, 30% are left for beneficiaries. Within Switzerland, these 30 % are distributed between the Sport-Toto (about 2 %) and the Lottery Fund (28%) (Swisslos, 2010c). The funds are used for several cultural, environmental or social projects in the cantons (Swisslos, 2010a). In order

to raise money through the Swiss Lottery for the fast start financing, the Swiss Lottery Fund would have to be redefining its use, which implies changes of the law, or call for a popular initiative.

Another proposition goes even further and proposes to create a new lottery game, where the player is aware of the fact, that the funds are used for climate initiatives. Basically, the idea is similar to EuroMillions. The national lottery companies run the climate lottery, and they all have identical rules. Through the pooling of the money of all participant countries, high jackpots can be reached – which then increases sales (Addison, 2003). Rollovers raise sales even further, adding to the next drawing and thus attracting more gamblers (Addison, 2003). Furthermore, the climate lottery attracts also risk-neutral individuals to participate in this lottery, because they are aware of the public good provision funded by the lottery (Morgan, 2000a). With CHF 3.20 for a bid, jackpots can amount to about CHF 15 million per week (Swisslos, 2010d)! Thus for the fast start finance funds would sum up to about CHF 8 million per week, based on the figures of Swisslos how one played Swiss franc is allocated (Figure 2). Within a year, the fund could then raise up to CHF 416 million (CHF 8 million x 52 weeks = CHF 416 million).

Secondly, casinos could also contribute to the fast start financing. Switzerland has a high concentration of casinos and this gives another opportunity to collect the money needed. According to the Swiss Casino Association, 19 concessionary casinos are operative (Schweizer Casino Verband, 2010b). These concessions are split into A and B concessions, which differ in terms of the range of games offered and the appropriation of the concession tax. Casinos with A concessions on the one side have no restrictions on the highest gains and are allowed to have as many table games and gambling machines as they wish to. On the other side, B concession casinos, making up 12 of the 19 distributed concessions, face restrictions on the amount of table games, gambling machines and the maximum size of the pools. Though both face a concession tax, the appropriation differs. Only A concession taxes flow 100% into the retirement insurance (AHV). B concession taxes contribute only 60 % to the retirement insurance, the rest flows to the Cantons. Thus the Swiss retirement insurance generates through the concession tax half a milliard Swiss francs a year (Schweizer Casino Verband, 2010a)!

Even though political viability is not being considered, a realistic and non-utopian assessment and consideration of the propositions to raise money is crucial. Thus, we are not going to propose to divert these concessions taxes, as we are aware of the fact that the retirement insurance faces several issues and needs additional money too in order to meet the challenges of

our society and its increasingly aging population. However, the Swiss government itself already created an incentive for the Swiss casinos to engage in charity or public interest issues. If they do so, the casinos are awarded with a lower fiscal charge. Hence, the Swiss government could encourage the Swiss casinos to consider a contribution or engagement in the climate change issue. On the one hand, this could imply a donation to help finance the fast start financing. On the other hand, the casinos could also organize a charity gambling event for climate initiatives. The money gained on that event would then flow into the fast start financing project. However, how much money can be raised through such an event or how high the contributions of the Swiss casinos will be for the fast start finance is difficult to estimate and figures are lacking.

### ***1.2.2 Taxing***

According to the Federal Statistical Office and the “Transportrechnung Jahr 2005” (2009), road traffic leads to ecological costs (defined by the Federal Statistical Office as: atmospheric load, noise exposure, impact on the environment, risks to the climate due to the CO<sub>2</sub> emissions of the road traffic) of CHF 6.1 billion. Passenger cars contribute even strongest to this figure. Thus, following the principle that the polluter should pay, the car drivers should also contribute to the initial fast start financing in order to make Copenhagen happen. The following proposition will thus elaborate on these considerations.

The ecological costs caused by traffic are covered by several financial sources. One of the incoming sources is the road tax sticker. In order to be allowed to use the Swiss highways, automobile drivers need to purchase the road tax sticker since 1985 (EZV, 2010). Effective for one year, this tax sticker costs CHF 40. Sales of the road tax sticker amount to 7,6 million a year (EZV, 2010). Thus, the funds raised today amount to CHF 304 million. If the price of the road tax sticker is raised by CHF 6.60, the initial fast start finance could easily be met as this raises CHF 50 million more, calculated with the sales figures of 2005 (Figure 3).

Figure 3 - Costs and money raised by road tax sticker



Source: own illustration

Furthermore, the price of the road tax sticker has not been changed since 1995 (EZV, 2010). Thus, a price rise would be appropriate and legitimate not only since it has been the same price for the last 15 years but also because it would be financed by those who contribute to the CO2 emissions and thus to climate change. The increase of the road tax sticker price would also have to meet the inflation of prices, which has taken place since 1995. Since its implementation in 1985, the road tax sticker has only faced one price rise of CHF 10 in 1995 when the price was increased from CHF 30 to 40. Based upon these figures, we would propose a price raise of CHF 15 on the one hand to include the inflation, which has taken place over the last 10 years and to raise enough for the initial fast start finance (Figure 4). Thus the road tax sticker would then amount to 55 CHF a year, which allows financing both, the costs of traffic and the fast start financing.

Figure 4 - Funding the fast start finance with road tax sticker



Source: own illustration

**1.2.3 Activating**

In order to activate and mobilize the population and private sector stronger, this chapter presents two ideas to broaden the awareness of the population for the climate issue. Even though citizens seem to be sensible for the climate change and its issues, people need to become cognizant of the political implications and policy decisions involved. Thus, the activating of the population should go beyond the conscious use of their vehicle or their knowledge about how much CO2 emission their daily life involves. Furthermore, the proposed initiatives below not only activate the people but also their money.

The first idea stems from the “Serious Request” initiative from the Netherlands. Since 2003, every year, the state radio of the Netherlands raises money for a charity purpose. The idea of putting up a glass box, and broadcasting five days in a row from there was implemented in the second year of its existence. Additionally, the radio station collaborated with the Netherlands’ Red Cross, and out of solidarity the moderators renounced to eat throughout the initiative (JRZ, 2010a).

The experienced solidarity of the population for the different initiatives (Table 1), such as the Darfur-Conflict, was overwhelming. Thus the charity project was not only continued, but grew even bigger as three additional European radio stations came on board of the project, followed by Ghetto Radio in Africa. Furthermore, as depicted in table 1, the donations grew also every year.

*Table 1 - Projects of Serious Request and amount of money raised*

Topic	Year	Donations in Euro
Hunger in Darfur	2004	916'000
Children in Congo	2005	2'203'549
Victims of landmines	2006	2'648'495
Potable water for the world	2007	5'249'466
Refugees of the world	2008	5'637'961

*Source: own illustration based on JRZ (2010a).*

In Switzerland this idea was broadcasted for the first time in December 2009 under the name of “JRZ – Jeder Rappen zählt” (every dime counts). DRS 3, the national radio station of Switzerland, did not only raise CHF 9'114'335, but also public awareness about malaria, the forgotten illness. The concept was copied from Serious Request: one week, broadcasted out of a glass box stationed on the Bundesplatz and involving the population with several initiatives

and projects. Participating partners were DRS3, SF (Swiss television) and the Swiss Solidarity (JRZ, 2010b).

Thus, in order to raise public awareness for the need of financial resources for the climate change initiatives, and moreover for the fast start financing, which this paper focuses upon; JRZ could thus be used to raise money for this purpose and hence, devote the next JRZ to the issue of climate change and to raising money for the fast start financing.

Another instrument to achieve the goal of the fast start financing could be Open-Air concerts and festivals. This proposition is inspired by several charity-concerts, which have taken place over the past few years and which were of great interest for the population. Furthermore, most Open-Airs attract a young audience. Hence, the youth will face the challenges of the climate adaptation and mitigation, which start becoming noticeable already today and even stronger within several years. Thus, the young will be the most affected by the issue and need to be taken into account and integrated within the solution. Of course, one could argue that young people do have less money available, but in the long term it is also crucial to mobilize the youth, as they are the leaders of tomorrow.

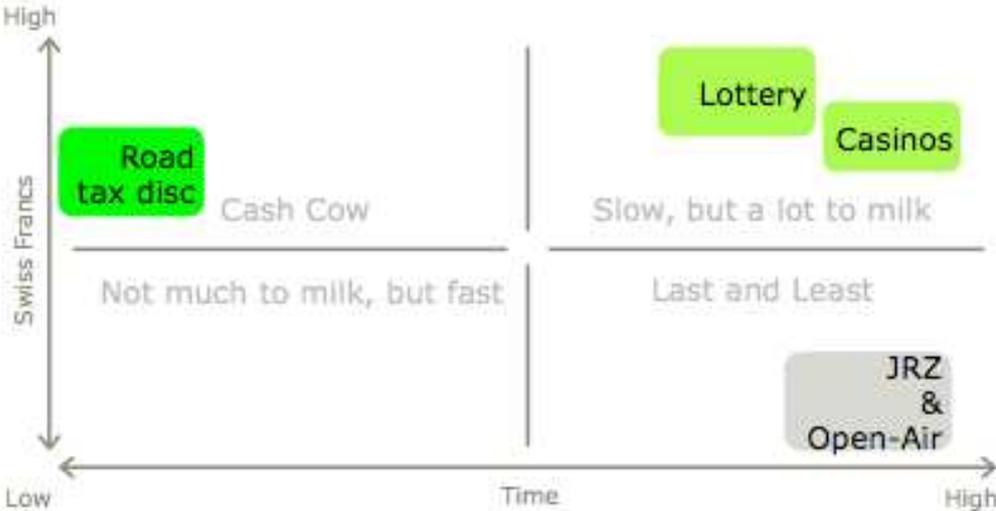
But how can Open-Airs contribute to finance the fast start finance? Similarly to its charity partner and involved initiatives and actions, the approach of the Open-Air St.Gallen could be implemented for the fast start initiative (Open Air St.Gallen, 2010). Thus, instead of having as charity partner Médecins Sans Frontiers (MSF), the Open Air St.Gallen could be taken on board of the fast start financing issue whereas the Swiss government could be the collaborating partner. On the one hand they could raise public awareness for the issue and on the other hand, through donations, purchasing of articles, or other similar activities, they could collect money. Additionally, musicians could also be asked to contribute their salary for the performance on stage to the fast start initiative. As an example, Stress, a rapper from Lausanne, already performed a song about the issue of climate change and thus reveals potential to be interested in contributing even more to help in the realm of climate change.

Nevertheless, the costs of organizing such promotions and activities mentioned above are not transparent and available to us and are thus not taken into account within this paper. The thorough assessment of these propositions, as well as the ones presented within chapter 1.2.1 and 1.2.2, based on the criteria presented at the beginning of chapter 1.2 will be provided within the next chapter.

1.3 Assessment of propositions

The propositions of the last chapters have to be assessed based upon the criteria of chapter 1.2: the amount of money raised and the period of time needed to collect it. Thus, in order to fulfill the defined requirements for the fast start finance, propositions, which are not able to raise CHF 50 million within a year, fail. However, if they manage to achieve this target and if they are to be implemented by the government and this will still raise several legal and economic issues and questions, which were not considered within this paper. In this section we will analyze the propositions according to the two criteria.

Figure 5 - Assessment of the propositions



Source: own illustration

First, lottery provides both, a chance to win a private prize and a contribution to a public good. Hence, it can be considered as a joint public-private good (Morgan, 2000b). However it does not meet the criteria of the fast start finance, as it takes too long to become operational. It could though, like the casinos, be kept in mind to provide additional financing sources for Switzerland’s increased support in the field of official development assistance.

Second, the initiatives presented within chapter 1.2.3 about activation and public awareness are failing in the realm of the fast start finance criteria. They fail to raise enough money in due time. Furthermore, because the contributors do not take into account the benefits for other citizens, when deciding how much to contribute to the public good, the public good becomes underprovided (Morgan, 2000b). Because it is difficult for Swiss citizens to take into account the benefit of the fast start financing to developing countries, or to be aware of the real benefit

to them, not only the public good e.g. clean air, is underprovided but also the financial means to adapt to the climate change.

Thirdly, and evidently the solution to find the means of financing the fast start finance, the road tax sticker is able to collect the necessary money in due time – if the proposed price increase is implemented.

#### ***1.4 Conclusion***

The presented propositions do differ strongly in both, the amount of money raised and the necessary time to implement the proposition and earn the money. Based upon the assessment above we come to the following conclusion:

We would like to propose to the Swiss Federal Council to increase the price of the road tax sticker by CHF 15 in order to fund the fast start finance for the Copenhagen Accord. Additionally, we would suggest him to consider the proposed initiatives of the lottery and the casinos in order to meet the long-term commitments of Switzerland in the realm of the international climate regime.

## **2 PART II - ANALYSIS OF CRADLE-TO-CRADLE IN DEVELOPING COUNTRIES**

Climate change is one of the major global challenges we face in today's world. A coherent global strategy to fight this evolution and its impacts is therefore crucial. However, at the United Nations Climate Change Conference in Copenhagen in December 2009 the participants did not succeed in concluding a binding agreement. Hence there is no global strategy for fighting climate change after the Kyoto Protocol expires in 2012. The main sticking points of the negotiations were the financing of climate initiatives and the pledge to binding emission reduction targets. Especially in a time of economic crisis, as we are experiencing it right now, it is difficult to agree on further substantial financing or on binding reduction targets. Developed countries are afraid that their economies could lose ground in terms of wealth and competitiveness if a strict and effective climate regime is installed. Developing countries fear that both, binding emission reduction targets and the impacts of climate change would hinder their economic development. On these grounds they strongly emphasize the principle of "common but differentiated responsibility" and demand that fighting climate change does not interfere with their right to development.

Having in mind these fears, the cradle-to-cradle concept seems like a godsend. Its main idea is that all product life cycles could be designed in a closed loop, in which all resources could be reused and therefore nothing would be wasted. Under this assumption, fighting climate change would not hinder economic development in developing countries, and developed countries would not need to cut down on their wealth and their consumption. In the following chapters we attempt to answer the question whether cradle-to-cradle is a concept that could also be used in the context of SECO's development cooperation and what requirements would have to be put into place in order to render cradle-to-cradle feasible and sustainable in developing countries.

In the first two chapters of this section we will present and explain the cradle-to-cradle theory, its functioning and its certification process. We will then present the approach that UNIDO has taken in applying cradle-to-cradle like strategies in developing countries and why cradle-to-cradle is relevant for those countries. We will address the idea of eco-leasing more in detail and analyze then the requirements needed for a successful implementation of cradle-to-cradle in developing countries as well as identify the critical points and open questions concerning such an implementation. To conclude this paper we will formulate a recommendation for the

Swiss State Secretariat for Economic Affairs (SECO) on how to integrate the idea of cradle-to-cradle into its development cooperation strategy.

## **2.1 *Life-cycle assessment and the cradle-to-grave legacy***

As environmental awareness is growing and society is becoming increasingly concerned about the issues of natural resource depletion and environmental degradation, many businesses provide “green” products, using “green” processes. Many of today’s consumers are not satisfied by merely buying the cheapest available products which fulfill their needs. Non-price factors such as service features, design, quality and the environmental impact of the product influence consumer behavior (Lee, O’Callaghan & Allen, 1995). Besides this growing awareness and interest in the environment on the consumer’s side, legislative regulations are influencing the commercial world. Most developed countries have environmental regulations prescribing the responsibilities of manufacturers, generators and users of resources. Product design teams are requested to assess the environmental impact of the products they are developing. They have to take into account the environmental impacts that the products they design and manufacture cause during their entire life-cycle. One tool they can use is the “life-cycle assessment” (LCA), also called “life-cycle analysis” or “environmental impact assessment”. The term “life-cycle” refers to the major activities in the course of the product’s life-span from the raw material acquisition to the manufacture, use, maintenance and the disposal of the product (EPA, 2006).

Although the term of life-cycle assessment is frequently used, its meaning remains vague. J. William Owens (1997) proposes the following definition: “Life-cycle assessment (LCA) is an analytical methodology used to provide information on a product’s energy, materials, wastes, and emissions from a life-cycle perspective along with an examination of associated environmental issues” (p. 38).

LCA is deemed to consist of three sections (Lee et al., 1995):

1. The *life-cycle inventory* (LCI) which aims at quantifying the energy and raw material requirements, air emissions, water borne effluents, solid waste and other environmental releases incurred throughout the life-cycle of a product.
2. The *life-cycle impact* analysis which is a technical, quantitative and/or qualitative process to characterize and assess the effects of the environmental loadings identified

in the LCI. This part of the assessment should address ecological as well as human health considerations.

3. The *life-cycle improvement analysis* which is a systematic evaluation of the needs and opportunities to reduce the environmental burden associated with energy and raw material use throughout the whole life-cycle of a product. This analysis may include quantitative and qualitative measures of improvement, such as changes in product design, raw material use, industrial processing, consumer use and waste management.

Since its beginnings in the 1960's, LCA has been frequently used as a tool for environmental analysis. There is however, no single established method which is universally acceptable. Each LCA needs to be individually assessed since no situation occurs twice in the same manner - this leads to a resource and time intensive LCA. Gathering the necessary data can be problematic, and thus can impact the accuracy of the final result. Therefore, "it is important to weigh the availability of data, the time necessary to conduct the study, and the final financial resources required against the projected benefits of the LCA" (EPA, 2006, p. 5).

In summary, a life-cycle assessment aims at assessing industrial systems and providing a comprehensive view of the environmental aspects of the product throughout the life-cycle, from the cradle to the grave of the product.

Cradle-to-grave designs dominate modern manufacturing. Thus most of the things we buy today are the products of an industrial system that is designed on a linear, one-way cradle-to-grave model. A model that "takes, makes and wastes" (MBDC, 2003, p. 2). Resources are extracted, shaped into products, sold and sooner or later disposed in "a grave" – usually a landfill or incinerator. Each of these steps typically creates unintended environmental and health impacts (MBDC, 2003).

In response to the growing awareness of environmental degradation, governments and industries have adopted a strategy known as "eco-efficiency" that aims at "being less bad". Reduce, avoid, minimize, sustain, limit, or halt are frequently used words when it comes to this approach. In 1987, the United Nation's World Commission on Environment and Development (WCED) published a report entitled "Our Common Future" (also known as Brundtland report) in which it stated that: "In general, industries and industrial operations should be encouraged that are more efficient in terms of resource use, that generate less pollution and waste, that are based on the use of renewable rather than non-renewable resources, and that minimize irreversible adverse impacts on human health and the environment" (WCED, 1987, p. 214). Since then, eco-efficiency has been working its way into different industries and its

famous three Rs – reduce, reuse, recycle – are steadily gaining popularity (McDonough & Braungart, 2001).

## **2.2 A new paradigm: cradle-to-cradle**

Although eco-efficiency is certainly a well-intended concept, it does not reach deep enough. According to William McDonough and Michael Braungart (2001), the initiators of the cradle-to-cradle concept, eco-efficiency “works within the same system that caused the problem in the first place, slowing it down with moral proscriptions and punitive demands” (p. 141). McDonough and Braungart argue that reduction, reuse and recycling slow down the rates of contamination and depletion but do not stop these processes. They continue in saying that “relying on eco-efficiency to save the environment will in fact achieve the opposite – it will let industry finish off everything quietly, persistently and completely.” They sum it up by saying that “being less bad is no good” (McDonough & Braungart, 2001, p. 141).

McDonough and Braungart also disagree with the widespread current opinion that environmentalism is an obstacle to production and growth, that nature is inevitably destroyed by human industry and that excessive demand for goods and services causes environmental ills. Furthermore, they argue that people do not need to reduce their standard of life or cut back their consumption of goods in order to solve the environmental problems we face today (McDonough & Braungart, 2002). How can that be possible?

The solution lays in a whole new approach called “cradle-to-cradle” which aims to solve rather than alleviate the problems of waste and pollution.

The central idea behind cradle-to-cradle is to “remake the way we make things” (subtitle of McDonough and Braungart’s book “cradle-to-cradle”). Inspired by the flows and cycles in ecological systems, products have to be designed in a way that once they are not useful anymore, they can provide nourishment for something new. McDonough and Braungart take the cherry tree, which makes thousands of blossoms, as an example. After falling to the ground another tree might germinate, take root and grow or the blossoms return to the soil and become nutrients for the surrounding environment. Although the tree actually makes more of its “product” than it needs for its own prosperity within the ecosystem, this abundance is not inefficient or wasteful. “The cherry tree is just one example of nature’s industry, which operates according to cycles of nutrients and metabolisms. This cyclical system is powered by the sun

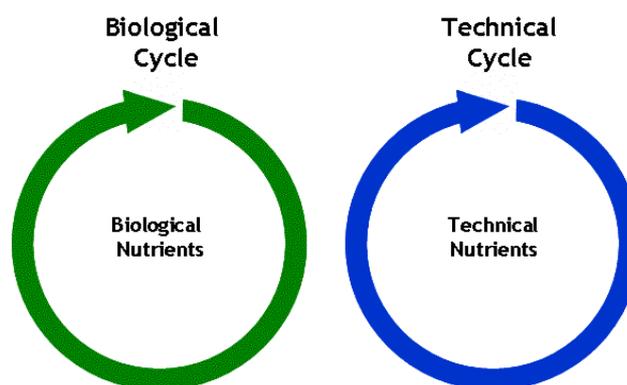
and constantly adapts to local circumstances. Waste that stays waste does not exist” (McDonough & Braungart, 2001, p. 144).

Instead of being eco-efficient, or in other words being less bad, this way of thinking allows both business and nature to be fecund and productive. McDonough and Braungart define this as “eco-effectiveness”. Eco-effectiveness leads to a human industry that is regenerative rather than depletive. Within cradle-to-cradle life-cycles rather than in cradle-to-grave life-cycles products would meet nature’s design criteria: “waste equals food”, “use solar energy” and “respect diversity”. These criteria are inspired by nature and shall also be applied to cradle-to-cradle production. They will be presented in the following chapters.

### ***2.2.1 Waste equals food***

Cradle to cradle is based on the idea to learn to imitate nature’s highly effective system of nutrient flows and metabolisms, in which the very concept of waste does not exist. Products and materials manufactured by the industry must therefore, after their useful life, provide nourishment for something new. As illustrated in Figure 6, products are either composed of materials that biodegrade and re-enter the soil or water as “biological nutrients” or they become valuable “technical nutrients” in closed-loop technical cycles (McDonough & Braungart, 2002).

*Figure 6 - Technical and biological cycle*



*Source: Braungart, n.d., n.p.*

Biological nutrients are to be designed in a way that they can be dumped on the ground or a compost heap where they biodegrade after use.

A technical nutrient on the other hand is intended to be reintroduced into the technical cycle. McDonough and Braungart give the example of an average television, which is made of 4360 chemicals and various other parts. These parts and chemicals are valuable resources for the industry that are wasted once the television ends up in a landfill. If they are disaggregated after use, they can remain in the closed-loop industrial cycle and retain their high quality. This is a crucial condition for an eco-effective cradle-to-cradle life-cycle: technical nutrients have to be “upcycled” rather than “downcycled”. McDonough and Braungart characterize “downcycling” as the practice of recycling in a way that much of its inherent value is lost (McDonough & Braungart, 2002). A current example is the downcycling of steel. The high-quality steel used in automobiles for instance is melted down with other car parts, including copper, paint and plastic. These materials lower the recycled steel’s quality, and it will therefore not have the material properties to make new cars again. Currently, there is no technology to separate paint coatings from automotive metal before it is processed. Consequently, it is not possible to close the loop for high-quality steel. Since downcycled materials are of lower quality than their predecessors, chemicals are added to make the material reusable. Therefore, besides loss of value and material, downcycling can also increase contamination of the biosphere with harmful chemicals. One example to illustrate this is paper: Because originally it was not designed with recycling in mind, paper requires extensive bleaching and other chemical treatments to make it blank again (McDonough & Braungart, 2002).

Furthermore, it is crucial to avoid cross-contamination within the technical and the biological metabolism (McDonough & Braungart, 2001). Thus, things going into the organic metabolism must not contain substances that damage natural systems (e.g. toxins). On the other hand, biological nutrients shall not enter the technical metabolism because they would not only be lost as food for the biosphere but would also weaken the quality of technical materials (McDonough & Braungart, 2002).

### ***2.2.2 Use current solar income***

The International Energy Outlook 2009, an assessment by the Energy Information Administration (EIA), reflects a scenario in which, current laws and policies remaining unchanged throughout the projection period, world marketed energy consumption is projected to grow by 44 percent over the period from 2006 to 2030. The most rapid growth in energy demand is projected for nations outside the Organization for Economic Cooperation and Development

(OECD), whereas the increase in energy use in the OECD countries is expected to be limited to 15 percent (EIA, 2009).

This scenario, combined with the rapid increase in world energy prices from 2003 to 2008 and the concerns about the environmental consequences of greenhouse gas emissions, has led to renewed interest in the development of alternatives to fossil fuels. When it comes to the energy sector it becomes therefore „increasingly evident that the world cannot achieve sustainable economic growth without significant innovation in both the supply (production) and demand (consumption) sides of the market“ (UNEP, n.d. a).

McDonough and Braungart especially highlight the potential of solar energy. They suggest that in the short term hybrid systems can be designed to draw upon renewable energy flows alongside artificial sources. Meanwhile, more optimized solutions in terms of renewable energy use shall be developed. In the long run, the use of natural energy flows as wind, water or solar power provides the solution to ever growing energy needs. Especially the sun, “that tremendous nuclear power plant”, has big potential (McDonough & Braungart, 2002, p. 131).

Furthermore, McDonough and Braungart advocate small energy utilities. While nuclear power plants and other large-scale energy providers throw off tremendous heat energy that is unused, in the case of small fuel cell or micro-turbine this waste heat can be harnessed and feed local needs. Another idea, as foreseen in the “product of service” or “eco-leasing” concept (see chapter 2.2.5), is that utility companies could lease out solar collectors, which can then be installed on the roof to supply the household’s energy needs (McDonough & Braungart, 2002).

### ***2.2.3 Celebrate diversity***

As a third criterion, cradle-to-cradle advances the principal of “respecting diversity”. This means that not only biodiversity but also diversity in place and culture, of desire and needs of people shall be included into the design process. Health and stability of an ecosystem rely on diversity. It relies on the interaction of species, on the exchange of material and energy in a given place. Industries wanting to respect diversity have to engage with “local material and energy flows, with local social, cultural, and economic forces, instead of viewing themselves as autonomous entities, unconnected to the culture or landscape around them” (McDonough & Braungart, 2002, p. 122).

However, the primary aim of design in this century has been to achieve universally applicable solutions and products. Materials such as steel, cement or glass are transported all over the world to construct similar buildings in very different settings – with more or less energy forced into the heating and cooling system (McDonough & Braungart, 2001). Cradle-to-cradle reverses this idea and advocates the use of local materials. Local materials are well understood by the local people and best suited to the predominant climate. Furthermore, the use of local materials avoids the problem of bio-invasion, that is to say the danger that the transfer of materials from one region to another may introduce non-native species to a fragile ecosystem.

#### ***2.2.4 Cradle-to-cradle certification***

If consumers go to a supermarket these days, they can choose from a variety of so-called „green“ products branded with a multitude of “eco-labels” and certificates. Today’s consumers are accustomed to products advertised as „fragrance free“, „phosphate free“ or „lead free“. McDonough and Braungart underline the potential absurdity of this approach. A product may be free of phosphates but often they have been replaced by substances that are even worse for human and environmental health (McDonough & Braungart, 2002).

Cradle-to-cradle instead proposes products that are entirely made from healthy and safe material. Cradle-to-cradle provides manufacturers across industries with the opportunity to verify and market their product’s sustainability attributes by certifying them. “Cradle-to-cradle certification provides a company with a means to tangibly and credibly measure achievement in environmentally-intelligent design and helps customers purchase and specify products that are pursuing a broader definition of quality” (MBDC, n.d.). In 2009, McDonough Braungart Chemistry (MBDC), the consultancy founded by McDonough and Braungart, certified more than 100 products, bringing the total number of products certified to more than 300 since the launch of the program in late 2005 (MBDC, 2010).

The certification process takes into account five criteria:

1. The use of environmentally safe and healthy materials
2. The design for material reutilization, such as recycling and composting
3. Energy efficiency and the use of renewable energy
4. Efficient use of water and maximum water quality associated with the production
5. The institution of strategies for social responsibility

Based on the interpretation of the data for all criteria, chemicals and materials are rated for their impact upon human and environmental health. This score is illustrated by the following scheme:

*Table 2 - Characterization scheme*

<b>GREEN (A-B)</b>	Little to no risk associated with this substance. Preferred for use in its intended application.
<b>YELLOW (C)</b>	Low to moderate risk associated with this substance. Acceptable for continued use unless a GREEN alternative is available.
<b>RED (X)</b>	High hazard and risk associated with the use of this substance. Develop strategy for phase out.
<b>GREY</b>	Incomplete data. Cannot be characterized.

*Source: MBDC, 2008, p. 16*

The positive list or “P list” (green) includes substances that are actively defined as healthy and safe.

The “X list” (red) includes the most problematic substances – which “are teratogenic, mutagenic, carcinogenic or otherwise harmful in direct and obvious ways to human and ecological health. It also includes substances strongly suspected to be harmful in these ways, even if they have not absolutely been proved to be” (McDonough & Braungart, 2002, p. 174).

The “grey list” contains problematic substances that are not urgently in need to be phased out or for which there does not exist a substitute yet. Cadmium, for example, is highly toxic but for the time being continues to be used in the production of photovoltaic solar collectors. This list includes also substances that, because of a lack of data, cannot be categorized (McDonough & Braungart, 2002).

The cradle-to-cradle certification program has four achievement levels: Basic, Silver, Gold and Platinum, with more stringent requirements on each level.

### ***2.2.5 Cradle-to-cradle implementation – the idea of “eco-leasing”***

As already mentioned, McDonough and Braungart are convinced that a more prosperous design would allow solving the problem of downcycling. If a product is designed from the outset to be decomposed after its useful life, metals could be melted with metals and plastic with plastic. Resources could therefore retain their high quality.

In order to make this idea practicable, the relationship between the manufacturer and the consumer has to be redefined. McDonough and Braungart therefore introduce the concept of “product of service” or “eco-leasing”. “Instead of assuming that all products are to be bought, owned, and disposed of by “consumers”, products containing valuable technical nutrients – cars, televisions, carpets, computers and refrigerators, for example – would be reconceived as services people want to enjoy” (McDonough & Braungart, 2002, p. 111). In this scenario, customers would purchase the service of a product for a defined period of time (for example ten thousand hours of television viewing or one hundred thousand kilometers of car driving) rather than the product itself. When the time period for the use of the product has expired or consumers want to upgrade to a newer version, they take the product back to the manufacturer. This implies also a new way of thinking on the manufacturer’s side. A producer wanting to meet cradle-to-cradle standards will be obliged to take back his products after their useful life. By taking the old model back, decomposing it and using its parts for new products, the manufacturer can close the cradle-to-cradle life-cycle. According to Braungart, the incentive for a manufacturer to adopt a cradle-to-cradle protocol would be increased if he was obliged to take care of the disposal of his products. To this day, the general public bears the costs of expensive incinerators (“Celebrating The Human Footprint”, 2010). Thus, the advantages of an “eco-leasing” system could be threefold: production of useless and potentially dangerous waste could be avoided, manufacturers could save money in valuable materials and the extraction of raw materials could be diminished by letting them circulate continuously in closed loops (McDonough & Braungart, 2002).

Interface, the world’s largest commercial carpet company, for example, is developing a carpet designed for complete recycling (Interface, n.d.). As indented by McDonough and Braungart’s “eco-leasing” concept, the manufacturer takes back parts or all of the carpet, when the customer wants to replace it by a new one. The carpet company continues therefore to own the material, leases out the carpets and reuses its materials at their original level of quality or even a higher one. The advantages of this system are various: no useless and potentially dangerous waste is generated, downcycling is avoided and the manufacturer can save money by reusing valuable materials (McDonought & Braungart 2002).

### ***2.2.6 A critical view on the cradle-to-cradle and “eco-leasing” theory***

Even though there are various examples of implemented cradle-to-cradle projects, doubts whether cradle-to-cradle can be adopted by every company in every country remain. Even

McDonough and Braungart (2002) admit that despite the fact that a number of products are already designed as biological nutrients, “for the foreseeable future, many products will still not fit in either category, a potentially dangerous situation. In addition, certain products cannot be confined to one metabolism exclusively because of the way they are used in the world” (p. 115).

While Braungart states that production according to cradle-to-cradle criteria saves 20 to 30 percent of production costs (Voight, 2010), it remains unclear whether every company can develop the necessary innovative processes and has the financial resources to convert to cradle-to-cradle protocol.

In order to be reusable as technical nutrients, products have to be conceived in a way that allows them to be decomposed easily after use. This requires technical know-how and the development and implementation of innovative processes. The feasibility of cradle-to-cradle from a technical point of view is therefore still to be proven.

Additionally, the cradle-to-cradle certification remains a critical point because, to date, only the McDonough Braungart Design Chemistry (MBDC) is in the position to distribute cradle-to-cradle certificates (Eberle, 2010). Thus, the certification process lacks objectivity.

Finally, the idea of “eco-leasing” causes some concerns. This concept supposes that materials are taken back to the manufacturer and reused. The return flow of products will have to be efficiently managed and resource planning needs to include both planned and past production activities. Closed-loop life-cycle systems will therefore not only require an entirely new mindset but also sophisticated information and network systems (Barnes, Cao, Drab & Pearson, 2009). Whether this can be realized is one of the critical points of the cradle-to-cradle concept.

### ***2.2.7 Conclusions on the cradle-to-cradle paradigm***

At first sight, cradle-to-cradle sounds like a comfortable solution to many of the environmental problems we face today, especially because it is potentially applicable to all sectors.

Even if there are some cradle-to-cradle projects that have been successfully realized, there are doubts whether the concept can be implemented on a larger scale. In the context of this paper, the question will also be raised how cradle-to-cradle can be implemented in developing countries, which often lack technological know-how and capacity.

Nevertheless, cradle-to-cradle is an inspiring concept. Rather than trying to limit the impact of industrial production through the management of emissions, intelligent design can eliminate the concept of waste. This new design perspective allows attaining ecological, economical and social goals at the same time by creating products that enhance the well being of nature and culture while generating economic value. If the principles of this design could be implemented on every level of the different industries worldwide, we could live in a world of prosperity, health and abundance as the pioneers of cradle-to-cradle imagine it.

### ***2.3 Applying cradle-to-cradle in developing countries***

After the theoretical part on the cradle-to-cradle concept, the following chapters will treat the practical application of cradle-to-cradle. The idea of applying the cradle-to-cradle concept in developing countries has also been taken up by the United Nations Industrial Development Organization (UNIDO). This specialized agency of the UN has the mandate “to promote and accelerate sustainable industrial development in developing countries and economies in transition” (UNIDO, n.d.). In the following chapters we will present the approach that UNIDO has chosen to fulfill its mandate and how its focus shifted from eco-efficient approaches towards eco-effective cradle-to-cradle-like approaches.

#### ***2.3.1 Cleaner Production: eco-efficiency***

Cleaner production is a concept initially introduced by the United Nations Environment Programme (UNEP). Its aim is to change the production patterns in order to meet the goals of environmental protection and economic development. (UNEP, 2002). Cleaner Production aims at reducing emissions and waste to a minimum during the production process. Furthermore, it implies that raw materials and energy are conserved as best as possible and that toxic ingredients are avoided (UNEP, 2002).

Changing production patterns in developing countries, however, requires not only local expertise but also technical and financial assistance to companies. In order to meet these requirements, the UNEP initiated together with UNIDO the so called National Cleaner Production Centers, which offer trainings, financial investment and technical assistance, advice governments and promote general cleaner production awareness (UNEP, 2002).

The Swiss State Secretariat for Economic Affairs (SECO) believes that Cleaner Production is an instrument to transfer environmentally friendly technology to developing countries (SECO,

2000). The SECO has for example financed a project of the UNIDO to set up a Cleaner Production Centre in Vietnam in order to address the serious environmental problems that persist in Vietnam (Klarer et al., 2003). Usually, the SECO takes the role of an employer, a cooperation partner and a reference centre vis-à-vis the independent Cleaner Production Centre, whereas the UNIDO mainly acts as a coordinator (SECO, 2000). This engagement of the SECO is consistent with its climate strategy, according to which the SECO's area of intervention is concentrated on sectors with a high potential to minimize climate-damaging emissions. The three pillars of the climate strategy are the promotion of energy efficiency, renewable energy sources and sustainable use of natural resources (SECO, 2009).

This idea of Cleaner Production and the engagement of UNEP, UNIDO and SECO are definitely valuable for the promotion of sustainable development in developing countries, but under the assumptions of the cradle-to-cradle theory, as they have been outlined in chapter 2.2, this concept and program of eco-efficiency is not sufficient. Having this same thought, UNIDO presented in 2004 a working paper with the title "From Cleaner Production to Sustainable Industrial Resource Management: Closing the loops" in which it advocates to go further than eco-efficiency and towards more integrated and radical strategies (UNIDO, 2004). This shift in the strategy of UNIDO and its link to the cradle-to-cradle concept will be presented in the following chapter.

### ***2.3.2 Sustainable Industrial Resource Management (SIRM)***

In its 2004 working paper, UNIDO presents a shift in the focus of its work from Cleaner Production (CP) towards Sustainable Industrial Resource Management (SIRM). The main aims of SIRM are the reduction of the material and energy used by increasing the efficiency, and the implementation of circular material and energy flows. It is suggested to achieve these aims by separating the material flows into a technical and a biological flow, by using renewable energy sources and by shifting the manufacturers' focus from selling products to supplying services (UNIDO, 2004).

UNIDO offers its two functions of global forum and technical cooperation in order to promote SIRM. Its global forum activities include research and development of tools and techniques and the dissemination of information. UNIDO's technical cooperation activities include familiarization of stakeholders, SIRM demonstrations and its application on a large scale. In order to implement its new focus on SIRM, UNIDO uses the existing Cleaner Production

Centers and network, which gradually shift their programs from Cleaner Production towards more advanced levels of SIRM (UNIDO, 2004).

UNIDO summarizes this new and integrated concept under the “principle of a continuous and systematic endeavor to “close the loops” of our societies’ materials and energy flows” (UNIDO, 2004, p.8). Various strategies fall under this concept, including the ideas of cradle-to-cradle or of industrial ecology (UNIDO, 2004). Both, cradle-to-cradle and industrial ecology focus on a cyclical, closed process. Hence, they analyze both material and energy flows and transformations, also referred to as industrial metabolism. However, they differ from each other in the sense that industrial ecology also integrates the management of waste and emission outputs into its concept (Garner & Koeleian, 1995; Seuring, 2004), whereas cradle-to-cradle goes further and rejects the concept of waste entirely. In other words, cradle-to-cradle is a concept, where no waste will be generated, but materials are rather decomposed into their initial high quality nutrients (see chapter 2.2.1). Industrial ecology, on the other hand, understands a cyclical closed process in the sense that waste from one industry is used as an input factor for another (Garner & Koeleian, 1995). In this paper, we focus on the cradle-to-cradle approach, a so-called zero waste initiative.

### ***2.3.3 Relevance of SIRM and cradle-to-cradle for developing countries***

In developed countries, SIRM has triggered growing interest and a number of public policies have been adopted to foster SIRM. Regulations to modify consumption patterns (e.g. targets of fuel efficiency in cars, energy labeling for household products or restrictions on pesticides) or policies for extended producer responsibility (e.g. take-back of products) have been implemented. In developing countries, on the other hand, such policies and programs are still very rare or lack effective implementation.

If SIRM is further promoted in developed countries this will also have an impact on developing countries that cannot be neglected. The producers in developing countries will need to adapt and innovate if they want to produce for the international markets and be viable partners of environmentally sound producers in the developed world. This can bring about benefits for the developing countries in terms of sustainable economic development, (UNIDO, 2004):

- High levels of quality and environmental soundness grant market acceptance.
- Technology transfer and development of skills.

- The efficient use of resources reduces costs (of inputs and waste).
- Development of waste treatment infrastructure in developing countries.
- Lowering of the environmental impact of production.

In addition to these benefits that can arise from implementing SIRM strategies in developing countries we see even more potential for the cradle-to-cradle concept, which is only one of the approaches towards SIRM. Beyond providing a solution for the debate between developed and developing countries about environmental protection versus the right to economic growth, some characteristics of the cradle-to-cradle concept are also of interest for developing countries and development cooperation for other reasons:

First of all, the majority of cradle-to-cradle certified products that exist today come from sectors that are highly relevant for developing countries. The construction and building sector is absolutely central for developing countries (UN HABITAT, 2009). There are more than 300 cradle-to-cradle certified products existing today, approximately 200 of which are published on the MBDC website. Roughly half of these 200 are construction materials, and textiles and packaging are also well represented (MBDC, n.d.).

Second, as in order to meet cradle-to-cradle standard, different components of a product or construction have to be reintroduced in different cycles once the product or construction is no longer used in this form, those parts need to be easily separable (McDonough & Braungart 2002). This requirement that the different parts are easily separable also implies that the parts are easy to assemble and that it is possible to sell them separately. This possibility in turn breaks down the cost. Huge initial investment costs can be circumvented because the product or construction can be bought piece by piece and progressively assembled, thus making it more affordable for the poor. The already above mentioned building and construction sector in developing countries is a good example to illustrate the relevance of this cradle-to-cradle characteristic for developing countries: “Roughly 70% of the world’s population in developing countries access shelter through “progressive housing” and “this ‘self-built’, ‘incremental’, or ‘progressive’ housing accounts for the bulk of housing investment in most emerging countries” (Fergusson, 2008, p. 1).

Third, there is potential in developing countries for the “product of service” or “eco-leasing” concept of cradle- to-cradle where consumers do not buy the product itself but the service of the product for a defined period of time (McDonough & Braungart, 2002). This idea will be developed further in the following chapter.

### ***2.3.4 The idea of eco-leasing - implemented by UNIDO***

As developed in chapter 2.3.2, UNIDO aims at a Sustainable Industrial Resource Management. Through a multifaceted and multidisciplinary concept UNIDO wants to “close the loops” of our societies’ materials and energy flows (UNIDO, 2004). UNIDO proposes different means to achieve these objectives. Among them and in line with McDonough and Braungart’s idea of eco-leasing, UNIDO wants to change “the relation between manufacturer and user, where manufacturers shift from selling products to supplying services” (UNIDO, 2004, p. 8). Additionally, manufacturers become responsible for the entire life-cycle of their products, including the disposal.

The initiators of cradle-to-cradle ("Celebrating The Human Footprint", 2010) and UNIDO (UNIDO, 2004) agree in saying that the introduction of “take-back policies” would put pressure on the manufacturers and animate them to redesign their products in a way that they can be taken back and recycled.

Reactions to this concept of extended producer responsibility can be observed already today. Companies based in developing countries, for instance, have started requiring their suppliers to redesign their products in order to make them more easily recyclable. Moreover, UNIDO reports on several companies that decided to become providers of services instead of being manufacturers. So far, take-back policies have been implemented for various products ranging from carpets (see also the example of Interface in chapter 2.2.5), to copying machines, automobiles and chemicals (UNIDO, 2004). As an example, the so-called Chemical Leasing approach shall be presented hereafter.

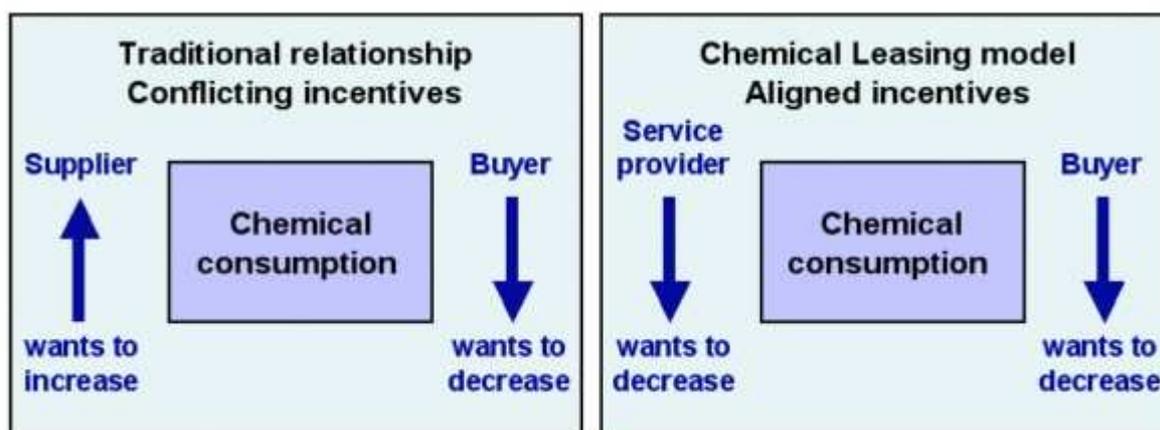
#### ***2.3.4.1 Chemical Leasing***

UNIDO is a main supporter of Chemical Leasing (ChL) and has established an international multi-stakeholder working group with representatives of industries, governments, quality assurance institutions and the consultancy sector. The National Cleaner Production Centers (NCPC) of UNIDO shall thereby serve as a worldwide network for the promotion of ChL.

The main idea of ChL is to change existing chemicals management systems. Traditionally, chemicals are sold to customers, who become the owner of the substances and therefore are responsible for their disposal. The suppliers in turn have a clear interest in increasing the amount of chemicals sold – often regardless of the environmental harm they may cause.

If on the contrary the customer pays for the benefits obtained from the chemical, not for the substance itself, the economic success of the supplier does not correlate positively with the amount of chemicals sold anymore. In other words, the supplier sells the functions performed by the chemical and gets paid for the service provided. Functional units (number of pieces, area coated, etc.) are used to quantify the payment. Also, the supplier also provides know-how about the efficient use and recycling of the products he sells. Furthermore, the supplier remains responsible for the whole life cycle of a chemical product, including its disposal. In this service-oriented approach, chemical consumption becomes a cost for the chemicals supplier. Therefore, he will try to optimize the use of chemicals and has a strong incentive to recycle the. This is illustrated in Figure 7.

*Figure 7 - Chemical Leasing model*



*Source: ChL, n.d.*

The ChL business model can be applied to a variety of services such as cleaning, greasing/degreasing, cooling/heating and painting and is therefore applicable in a multitude of industry sectors and countries. Experiences have shown that the ChL business model is most successful in sectors with high recycling rates (ChL n.d.).

Since March 2005 and in close cooperation with the respective National Cleaner Production Centers, ChL pilot projects have been set up in Egypt, Mexico and Russia. Experiences have shown that the advantage of ChL is two-sided: while encouraging companies to improve their economic and environmental performance and to access to new markets, it also reduces negative releases to the environment (ChL, n.d.).

### ***2.3.5 Necessary conditions for successful implementation of cradle-to-cradle***

Now that it has been presented how UNIDO applies its SIRM approaches in developing countries and how the eco-leasing concept could be implemented, this section develops which factors and conditions in the legal, the political, the economic and the social field are crucial for the successful implementation of the cradle-to-cradle concept in developing countries.

#### ***2.3.5.1 Legal aspects***

Through the mean of environmental legislation, producers can be forced to change their production patterns and to take on responsibility. Most developed countries have taken up the environmental issue and have decreed laws focusing on the manufacturer's responsibility. In other words, developed countries adopt regulations, which aim at preventing and recycling waste. The European Union (EU), for example, has regulated the recycling, reuse and re-manufacturing of automobiles, electronics and consumer appliances (Kumar & Putnam, 2008). Such regulations can have broader effects, and even extend to countries such as China or Korea: In order to ensure their export to Europe, these countries adopted similar environmental regulation on products as the EU (Kumar & Putnam, 2008).

Still, developing countries have generally less environmental legislation. Additionally, transparency is often missing and enforcement mechanisms are also rather weak (Chiu & Yong, 2004). As a consequence, companies in developing countries often lag behind those in developed countries in terms of environmental standards (Klarer, Minh Chi, & Marchich, 2003; Islam, Martinez, Mgbeoji, & Xi, 2001).

The International Organisation for Standardisation (ISO), and especially its ISO 14000 series of voluntary environmental management standards and guidelines, do not provide an adequate legal framework, because "the ISO 14001 centers around the commitments of a company to perform the obligations under the applicable laws of the country where it is registered" (Islam et al., 2001, p. 30). Hence, if there are no effective environmental laws in force, companies are not forced to change their production patterns towards sustainability. In developing countries this is especially true for producers which supply the local market, because export-oriented producers might be induced to adopt environmental standards of developed countries to ensure their international market access (Verbruggen, Kuik & Bennis, 1995). Without any pressure from outside, companies are less likely to change their production patterns in a sus-

tainable way. However, it is another question, whether a government is willing or can be induced to adopt and implement environmental legislations.

When taking up the more detailed idea of eco-leasing, legal aspects beyond the field of public law become crucial. A country can force producers with take-back policies to more responsibility. Not only does this regulation affect the relationship between the state and producers, but it also has implication for the relationship between producers and consumers. The idea that producers shift from selling products to supplying services (see chapters 2.2.5 and 2.3.4) also requires a sound civil law system, which regulates the leasing requirements and its terms and conditions. For example, the question of liability has to be regulated in case the product is damaged during the leasing period. Hence, the idea of eco-leasing elicits important legal questions concerning the relations between the producer and the consumer and the producer's capacity to set up such terms and conditions.

In general, regulations are crucial for the implementation of environmental standards in developing countries, such as the cradle-to-cradle philosophy and eco-leasing in particular. However, its implementation elicits challenges at both, the public and the civil law side.

#### **2.3.5.2 Political aspects**

In order to implement cradle-to-cradle in developing countries support of the political system through an adequate policy framework is vital. "The role of enabling policy framework is of paramount importance to any new concept to get institutionalized and incorporated into routine business" (UNEP, n.d. b, n.p.). The political system must endorse and promote the new concept and provide for measures and incentives in support of the successful implementation of the new concept (UNIDO, 2004). However, the government's efforts have to go beyond simply acting through some adaptations in the existing system, such as modifying taxing and subsidies. Environmentally sustainable production concepts, here cradle-to-cradle, touch various policy areas, so "it is not just environmental policies that can support enterprises to be environmentally sustainable" (UNIDO, 2007, p. 4) Therefore a successful implementation of the concept requires efforts not only in environmental policy, but also in various other policy fields such as industrial policies, resource pricing policies, trade policies, fiscal policies, educational policies and technology development policies (UNEP, n.d.; UNIDO, 2007). The cradle-to-cradle concept requires extensive know-how. Educational policies play therefore a key role in the successful implementation of the concept. However, as consequently a significant number of government institutions are to be involved, drawbacks from lack of coordination

such as overlapping and insufficiently defined roles of the different public sector bodies are to be expected (Chiu & Yong, 2004).

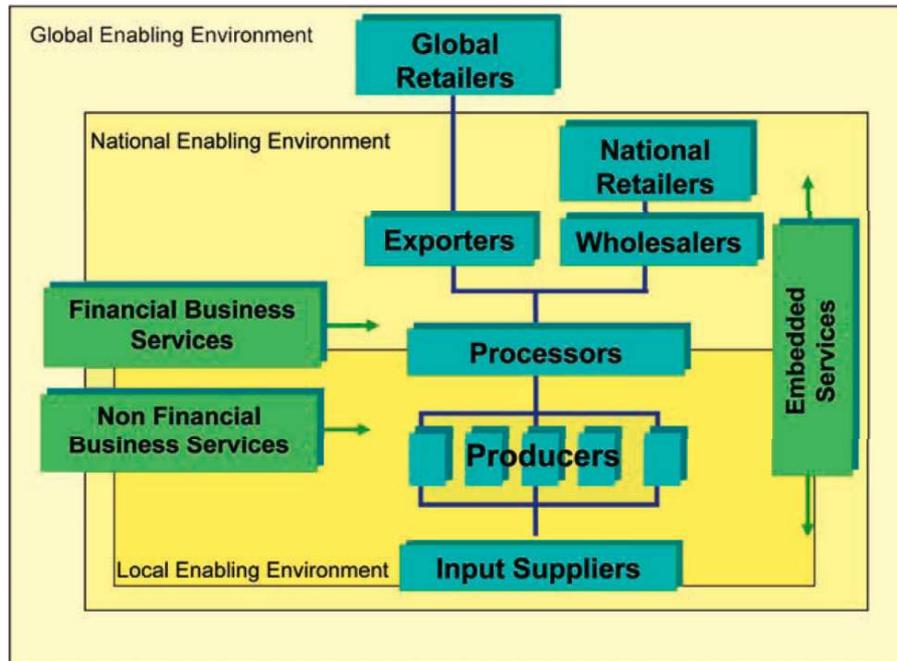
### ***2.3.5.3 Economic aspects***

In order to make sure that the implementation of the cradle-to-cradle principle in developing countries is sustainable, the products produced according to this principle need to be profitable and competitive compared to existing similar products. Production costs need to be monitored closely and evaluated on a regular basis. The best way to accomplish this is the involvement and responsibility of the entrepreneurs and the proprietors from the beginning of the cradle-to-cradle implementation (UNIDO, 2004). Hence, those managers in the developing countries need profound economic and managerial skills in order to produce profitably. This is best achieved through capacity building initiatives that target the educational system of developing countries (UNIDO, 2007).

The financing of cradle-to-cradle projects in developing countries is closely linked to the profitability and the competitiveness of cradle-to-cradle products. Financial institutions need to be involved at an early stage into the process of implementing cradle-to-cradle so that they can see how it works and how benefits can be generated by using this new approach, if they are to invest into these projects (UNIDO, 2004). Possible sources of financing for cradle-to-cradle projects in developing countries are international financial institutions, regional development banks or private companies. It is crucial that producers in developing countries have access to affordable financing, financial services and to an efficient financial system (WTO, 2007)

Another aspect in the economic field is the integration of cradle-to-cradle at all stages of the value chain of a product.

Figure 8 - Scheme of a value chain



Source: SDC, 2007, p. 5

At the beginning of the value chain the main challenge is to assure that the input materials *always* meet cradle-to-cradle standard and that the producers can be sure of this. This may be achieved through the definition of the exact requirements i.e. standards, transmission of knowledge and understanding to input suppliers, trust building between input suppliers and producers, regulation, means and technologies for the producers to test if their input suppliers' raw materials meet cradle-to-cradle standards. Cradle-to-cradle and eco-leasing in particular emphasize the importance to reuse technical nutrients, which allows reducing production cost by 20 to 30 percent due to reused input materials (Voight, 2010).

At the production stage know-how is the most important requirement. It goes without saying, that producers need the relevant technological means and skilled labor forces. Furthermore, they need either access to solar energy or the capacity to produce it themselves. Of course none of these challenges can be met without adequate funding.

For the next stage of the value chain, where the product passes on to wholesalers and/or exporters, packaging is a central aspect. The particularity of cradle-to-cradle is that the considerations on the value chain do not end, when the product is bought by the consumers. Hence, in order to avoid waste, cradle-to-cradle focuses on taking-back policies. The separating of

and reintroducing of the technical and biological nutrients of the product after their use in their respective cycle also requires know-how, incentives, regulations and not least new institutions and installments at the production side (McDonough & Braungart, 2002; SDC, 2007).

Most of today's trade is conducted within such value chains. Still, many producers in developing countries do not even have access to such value chains, and before they can start to think about taking part in a cradle-to-cradle value chain, there is the challenge to first integrate these producers into local, regional or global value chains (SDC, n.d.).

#### ***2.3.5.4 Social aspects***

A successful implementation of any strategy, such as the SIRM, the cradle-to-cradle and the more specific eco-leasing idea, requires involvement of the civil society in the implementation process (UNIDO, 2004).

Accordingly, those ideas of SIRM and cradle-to-cradle have to be reflected in consumer values and behaviors to assure a sustainable consumption. In other words, not only does the supplier have to offer sustainable products, the demand for those products is also crucial. Consumption patterns vary by each region in the world and businesses have to cope with different sustainability challenges. In developing countries, for example, it is necessary to find solutions for low-income segments while providing a basis for sustainable growth (WBCSD, 2008).

“Consumers are increasingly concerned about environmental, social and economic issues, and increasingly willing to act on those concerns” (WBCSD, 2008, p. 15). Not only in developed countries, but also in emerging countries, such as China, consumers are increasingly aware of the environmental issues, because the impacts of climate change are mainly felt in developing countries (Euromonitor, 2010). Nevertheless, there are still many developing countries, where the “consumer awareness and the understanding of sustainable consumption among consumers” (WBCSD, 2008, p. 16) is rather low. Additionally, even if the willingness of sustainable consumption is manifested, the actual consumer behavior does usually not render justice to their environmental concerns. This is true for both developed and developing countries. The reasons are manifold. However, “the lack of understanding, selfishness and associated costs and taxes” (WBCSD, 2008, p. 18) are the most important ones. People do often not understand the different product labels.

Furthermore, people living with less than \$1.25 a day (WB, n.d.) have hardly the means to

afford expensive products. In other words, the products must be cost-efficient and convenient. These products must become easily affordable and comparable so that consumers change their consumption patterns in a sustainable way (Karnani, 2006; WBCSD, 2008). It is to say that the production with local materials and the reuse of valuable decomposed raw materials, as promoted by the cradle-to-cradle standards, can lead to lower production costs (Kumar & Putnam, 2008; UNEP, 2002). Hence, the cradle-to-cradle production does not necessarily induce a price raise of the end product and therefore, meets the criteria of cost-efficiency.

People in developing countries live with a very small amount of money a day and therefore, cannot afford expensive products. The concept of eco-leasing gives them the opportunity to pay by installments, rather than to buy the product at once. The possibility to break down the costs by eco-leasing is a chance for poor people to widen their consumption patterns and to better fulfill their needs (Prahalad & Hart, 2002). Hence, eco-leasing offers a possibility to poor consumers to bypass cost constraints and to live up to their environmental concerns. In other words, eco-leasing can contribute to changes in consumption behavior and help to shift it to consumer responsibility.

In general, consumers become increasingly susceptible to environmental concerns. However, the gap between changed environmental attitude and effective behavior is still far from being closed. Cradle-to-cradle and eco-leasing in particular can help to close this behavior gap. However, an extensive marketing of such services and products, also by the government, remains indispensable in order to implement such environmental strategies successfully (WBCSD, 2008).

### ***2.3.6 Critical points and open questions***

As we have seen in the preceding chapters, there are initiatives, for example from UNIDO, that try to implement cradle-to-cradle-like approaches in developing countries. But the necessary conditions for its success are many and we want to resume the most critical points in this chapter, in addition to the critiques about the theory outlined in chapter 2.2.6.

First of all, many developing countries lack appropriate environmental law and enforcement to bring companies to produce more environmentally friendly. Furthermore, the policy context in those countries does often not promote or even hinders a commitment to sustainable production. In addition to environmental policies, industrial policies play an important role in setting the right incentives and promoting sound product and process standards. These poli-

cies have not always kept up with the technological advancement and do therefore not provide an adequate setting for cradle-to-cradle.

Another essential condition for the functioning of cradle-to-cradle in developing countries is an adequate infrastructure, including educational systems, a well performing utilities sector, functioning value chains that integrate the local producers and an operational environmental services industry. However, many of these conditions depend on the willingness and ability of the political regime that is in place in a country. While the ability of a regime can be positively influenced for example through development cooperation, such as knowledge transfer and capacity building initiatives, the willingness or attitude of a government is more difficult to change. One option to do so is the World Bank's approach to link financing to policy and capacity requirements and performance (IDA, 2009).

Another threat to the successful implementation of a cradle-to-cradle strategy is for example the pressure on developing countries' economies to grow. This pressure pushes aside all awareness of environmental issues and highlights monetary values, very similar to how it has been and still is in developed countries. Furthermore, developing countries present a setting in which resources are scarce and poverty is high (Chiu & Yong, 2004).

One concrete problem that can arise if cradle-to-cradle is to be applied in developing countries is the lack of a functioning environmental services industry. This industry ranges from recycling companies to companies that manage a recovery or take-back infrastructure to consulting companies for technical or managerial assistance. UNIDO believes that this lack can partly be counterbalanced by "demands being made by companies controlling global value chains for environmental management" (UNIDO, 2007, p.4). But in the long term, the corporate social responsibility approaches of companies in developed countries cannot compensate for lacking infrastructure and ineffective enforcement of environmental laws in developing countries.

A critical point that is specific to the concept of "eco-leasing" is the problem of liability if a product is damaged during the leasing period. This case requires a well established civil law as well as respective courts and enforcement. Furthermore, it could lead to a need for insurance possibilities for the poor. In that case, an insurance sector that is easily accessible for the poor would need to be established. The question that arises is if such insurance fees would not go beyond the financial means of the consumers in developing countries if they were added to the leasing fee of a product.

A more general concern is that only MBDC is authorized to emit cradle-to-cradle certificates. Hence, they dispose of a kind of monopoly in the matter. In order to make the certification process more objectively, it is therefore necessary to negotiate these rights with MBDC and to raise the certification process to a more global institution such as UNIDO.

### ***2.3.7 Conclusion and recommendation for the work of the SECO***

The idea and objective of the cradle-to-cradle concept are very appealing and groundbreaking. Economic development without compromising the environment – especially in developing countries – should be at the heart of every development initiative or program. Still, the concept also leaves room for doubts about its feasibility and universal applicability. And especially in developing countries, there are many challenges and threats to overcome in order to successfully implement a cradle-to-cradle strategy.

Despite all the critical points, open questions and challenges that remain, we do think that the general idea of cradle-to-cradle or of SIRM strategies should be implemented into the work of the Economic Cooperation and Development section of the SECO. Besides continuing its cooperation with Cleaner Production Centers, other fields of the SECO could also base their work on the ideas of cradle-to-cradle.

The Trade Promotion Unit could intervene in favor of cradle-to-cradle by helping cradle-to-cradle projects to get market access to Switzerland and Europe through a system of import preferences or by providing them with information and assistance in the field of international product and process standards. The Private Sector Development Unit could help to improve the business environments in developing countries in a way that favors and supports cradle-to-cradle initiatives. Furthermore, this unit has competences in the field of enhancing access to finance for companies in developing countries, which is also a crucial element for cradle-to-cradle projects. The Infrastructure Unit could also play an important role for the successful implementation of cradle-to-cradle as utilities, energy and environment infrastructures are essential conditions for the functioning of cradle-to-cradle.

The best way to integrate cradle-to-cradle or SIRM approaches in developing countries is to integrate them into the main national strategies and to view these approaches as “both the strategy and the instrument of economic development” (Chiu & Yong, 2004, p.1043). We believe that the same should be valid for the work of the SECO and that all activities of the Economic Cooperation and Development section should be conducted in the light of cradle-to-cradle or SIRM approaches.

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