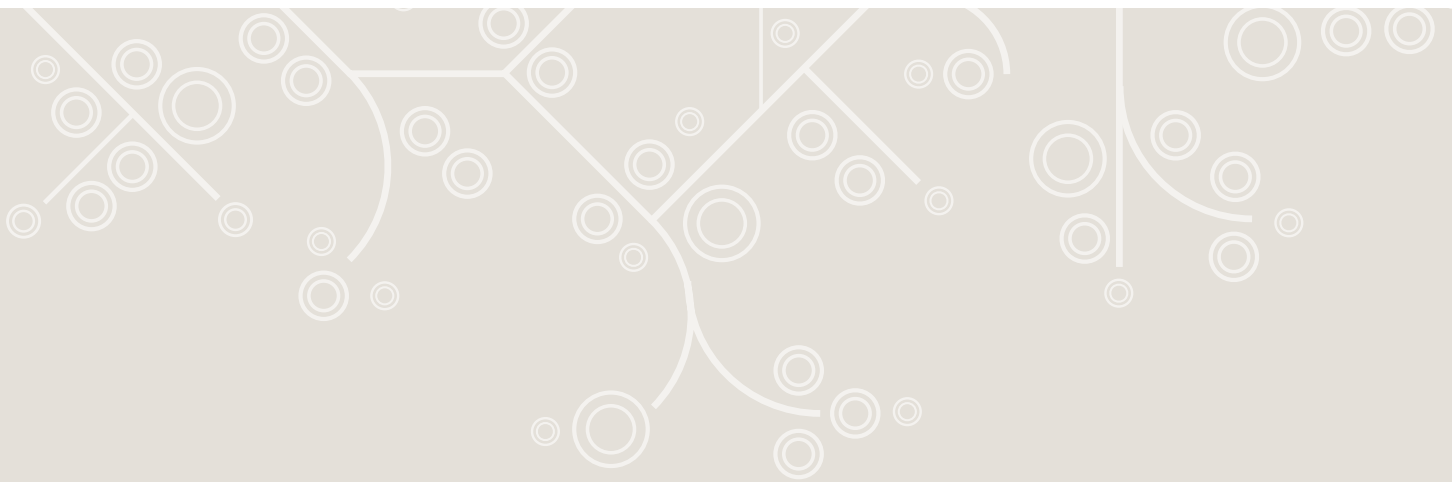


Short Guide to Green Business Model Innovation



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Preface

This Short Guide to Green Business Model Innovation draws on the practical learning from the business cases in the project Green Business Model Innovation completed for the organisation Nordic Innovation from august 2011 to august 2012. The work is a continuation of a previous project *Green Business Models in the Nordic Region – A key to promote sustainable growth*, also completed for the organisation Nordic Innovation in 2010.

In the green paper “*Green Business Models in the Nordic Region*” by the Nordic Council of Ministers (FORA 2010) it is concluded that the Nordic region has a great and untapped potential for Green Business Model Innovation. The green paper points to the demands for more in-depth knowledge and awareness regarding the benefits and effects of Green Business Model Innovation and for supporting policies and regulation to promote Green Business Model Innovation.

This Nordic project addresses the above fundamental challenges and strengthen international network relations with organisations such as the OECD, Nordic and international frontrunner companies, policy makers, industry organisations and experts.

The other reports in this series are *Green Business Model Innovation: Conceptualization Report*, *Green Business Model Innovation: Policy Report*, *Green Business Model Innovation: Empirical and Literature Studies*, *Green Business Model Innovation: Business Case Study Compendium* and *Green Business Model Innovation: Conceptualisation, Next Practice and Policy*.

This guide is divided into two main parts, where the first part is a step to step guide to serve as inspiration on how to get started with green business model innovation. The steps are based on best practice from the interviews conducted with the companies that took part in this study. The second part of this guide is a selection of specific tools used by some of the case companies.

Steps to Green Business Model Innovation

Introduction

Making changes in a company's business model can be perceived as a big and insurmountable task for a lot of companies. Simply making the decision that the company wants to be greener and more sustainable can be a big step to take. Many companies are deterred from making this decision because they do not know where to begin. Where in the company or their value chain should they start to make the changes in order to become greener and more sustainable?

Based on the company interviews completed for the analysis on Green Business Model Innovation for the organisation Nordic Innovation, a range of best practice steps to green business model innovation have been identified and described. The companies participating in the study all experienced successful results in making changes to their business models that made them greener and more sustainable. Learning from their experiences could be a first step to take on the journey to changing a business model into a greener one. Eight steps were identified among the companies interviewed:

1. Develop company culture
2. Frame company values
3. Implement green strategy
4. Acquire appropriate skills and knowledge
5. Create green business cases
6. Involve customers
7. Start small before scaling up
8. Train sales staff

The following steps are described in brief, and company cases used to exemplify how

the steps have been implemented in the companies interviewed for the study. A short excerpt is shown from each relevant case, while the entire case can be found in the compendium *Green Business Model Innovation: Business Case Study Compendium*.

1. Develop company culture

Companies wanting to change their business models towards more sustainable and greener must start by developing a company culture towards sustainability. The culture of the entire organisation has to be changed and at all levels of management within the company. Employees as well as managers throughout the company must understand why the organisation is choosing a green or sustainable path, and developing new values will therefore require leadership and top-management commitment.

The American furniture and workplace solutions provider Steelcase overcame some of the barriers linked to their conservative company culture by initiating a cradle to cradle project and developing their ThinkChair. Creating a cradle to cradle product showed the employees that it could be done, providing proof of innovative and sustainable values throughout the organisation. To ensure this culture survives, Steelcase is developing a language and literacy within the organisation to be able to handle and build capacity in the area of environmental and social performance. The efforts also include finding people within the company who can act as champions (*see Steelcase case*).

The Dutch carpet manufacturer and supplier Desso experienced similar barriers when changing their business model towards a more sustainable one. With strong commitment from the management team, Desso moved from implementing cradle to cradle in a small part of the company, to creating a take-back system and developing 60 percent of their products based on the cradle to cradle philosophy. The next challenge for Desso is now to implement the philosophy in the “DNA” of the company. Extensive training and communication with the staff has been implemented, and a performance evaluation system with key performance indicators has been developed to make the process visible, relevant and serious within the company (*see Desso case*).

2. Frame company values

Developing a company culture based on green and sustainable values makes it necessary to frame the values embedded in the company culture in order to communicate them throughout the organisation. The values can be translated into principles or ways of conducting business which can be used throughout the organisation for training of employees, product design, service standards, sourcing, internal and external communication and so on.

The Swedish furniture company IKEA developed 9 principles with apparent linkages to sustainability values. By formalising and systemising these values into social and environmental standards, IKEA has developed and implemented a green supply chain management solution IWAY, which is used when sourcing materials and core services and which guides the company at every node of its supply chain. The next step will be to implement IWAY when sourcing indirect materials and services too (*see IKEA case*).

3. Implement green strategy

Once the company values have been framed, they must be transformed into a vision and a mission for the company, and linked to all of the activities performed in the company. Some companies choose to make the change in the entire company at once, while others chose to take it slow, and implement the strategy one product line at a time. However, once a company has committed itself to a green strategy, there cannot be parts of the business where the green values do not apply or where a green strategy is not valid.

The Danish supplier of furniture textiles and fabrics Gabriel has an environmentally responsible business conduct which is deeply anchored in the company's values and lies as a foundation for delivering products of a high quality to its customers. The focus has led to new and continuous production and product innovation, and has delivered a range of different solutions that fit with the company's overall strategy (*see Gabriel case*).

Another important part of a green strategy is to understand the development of environmental regulation that affects the company. One area where that has seen an increase in restriction is the regulation of dangerous chemicals and components in products and production processes.

Gabriel were among the first companies to remove heavy metals from the dyes used in their textiles and fabrics, and today they are an active advocate for stricter laws and regulation regarding environmental requirements.

The European subsidiary of DOW is called SAFECEM, a company that offers solvent cleaning solutions for metal and dry cleaning in advanced manufacturing industries. An important part of SAFECEM's strategy came as a result of stronger German legislation focusing on replacing chlorinated solvents with more environmentally friendly cleaning agents (*see SAFECEM case*).

4. Acquire appropriate skills/knowledge

When implementing changes related to the greening of the business model and performing more sustainable ways of doing business, it will be necessary to acquire new skills and competencies in the company, often in several parts of the value chain. Three ways of accessing new skills were identified in the study:

- I.** Hire experts and consultants
- II.** Train and hire new staff
- III.** Create partnerships

I. Experts and consultants

Companies going through certification processes or changing entire processes in the company often hire consultants and experts to advice on how and where to begin.

The Danish shipping company Maersk Line have ordered 20 new container ships, Triple-E, which are to be built with a focus on economies of scale, energy efficiency, and environmental performance. Maersk Line's ambition is to deliver shipping services using ships that increasingly are built with a cradle to cradle mindset, and have also initiated the development and implementation of a cradle to cradle passport which will provide them with information on all materials used in the container ship construction. The Environmental Protection Encouragement Agency (EPEA) were hired as consultants to help with the development with the passport system (*see Maersk Line case*).

II. Train and hire new staff

Companies making large changes to e.g. choice of materials used or changes in processes, have implemented extensive training programmes to both communicate the changes being made as well as ensure the employees attain the new competencies that are required.

The Dutch carpet manufacturer and supplier Desso has a majority of the company's employees working with cradle to cradle products, and thereby also cradle to cradle processes. Scepticism among employees was overcome with extensive training and by working with one cradle to cradle product at a time (*see Desso case*).

In some cases it also means firing existing employees and hiring people with a new set of skills for the changes related to green business model innovation.

The Dutch waste management company Van Gansewinkel changed the focus of the company from being a traditional waste collecting business to using and reusing waste for making energy and products. This radical change in the company created a demand

for hiring new employees with a new set of skills. In the last 4-5 years 200 people have been hired to support the changes related to the greener business model (*see Van Gansewinkel case*).

III. Create partnerships

Companies have used a range of different types of partnerships in order to ensure they have access to the necessary skills and competencies. Examples include research partnerships, university partnerships and partnerships between companies in the value chain.

The American furniture and workplace solutions provider Steelcase performs dedicated research for gaining a better understanding of the changing nature of work, as well as getting deeper knowledge of how the use of technology, design, materials and so on affect the users' experience, effectiveness and satisfaction in the workplace - a platform called "insight led performance". The company's research efforts involve a large range of partnerships such as with leading architecture and design companies, as well as research institutions and universities covering areas such as sociology, psychology and brain research (*see Steelcase case*).

The Danish supplier of furniture textiles and fabrics Gabriel form partnerships with a number of different actors in the development of its new environmental product lines. Along with partnering with suppliers Gabriel has also strengthened its ties to the educational sector where a partnership with the University of Aalborg has been established to fill necessary gaps in Gabriel's technical know-how (*see Gabriel case*).

The French manufacturer of dispensing machines Eco2Distrib has formed a number of partnerships which have been crucial for the company's success. In the production of the dispensing machine, Eco2Distrib has worked closely with its electronics supplier. Partnerships with the retailers and suppliers of the fluid consumer products have also been pivotal. Because the Eco2Distrib solution literally changes the way products are packaged, distributed and sold, setting these partnerships up had to involve both retail and supply partners at the same time. Eco2Distrib has also set up partnerships with local companies for machine and service maintenance (*see Eco2Distrib case*).

5. Create business case

Green business model innovation must make business sense - whether the purpose is trying out new ways of innovating or doing something good for the environment. The basis for a good business case might be based on purely financial determinants, where analysing the costs of the new types of materials or evaluating whether surplus materials can be reused, are calculated based on estimated cost savings. However, some

companies also use the opportunity to take a look at how their products, services or processes can be redesigned or constructed in new ways to ensure e.g. reuse or recycling of materials.

The Swedish furniture company IKEA demands that any initiative with a social and/ or environmental benefit, whether stemming from the creation of new resource efficient products, more effective manufacturing processes, the use of alternative materials in production, or the development of new efficient distribution networks, must all make money-sense (*see IKEA case*).

The Danish supplier of furniture textiles and fabrics Gabriel have produced one of the products partly from surplus material from one of the company's own suppliers. The idea is that in addition to improving the company's standing with regards to higher environmental performance by turning surplus materials into raw materials for new products (or into nourishment for nature), the company can also lower their production costs and help them obtain a competitive edge (*see Gabriel case*).

The Danish shipping company Maersk Line has developed a cradle to cradle passport that functions as a materials knowledge feedback system, which provides the company with information on all materials used in the containership construction. This information is then used to identify areas in which changes in ship design, construction and/or materials can improve ship performance and material recyclability. The cradle to cradle passport can therefore help to secure the availability of recycled high-quality steel in the future, reducing costs in the long run (*see Maersk Line case*).

6. Involve customers

In order to understand customers' needs and their expectations of what a sustainable company should deliver, companies work closely with customers. The customer relationship could be research based and including them in the innovation process, or based on close interaction in the testing of products.

The American furniture and workplace solutions provider Steelcase performs dedicated research for gaining a better understanding of the changing nature of work, as well as gaining deeper knowledge of how the use of technology, design, materials, etc. affect the users' experience, effectiveness and satisfaction in the workspace – a platform which the company calls "insight-led performance" (*see Steelcase case*).

The British waste innovation company Elvis & Kresse have developed a special relationship with some of their customers; a group of people whom they call "brand ambassadors". The group is made up of people who started buying the company's

products early on and with whom Elvis & Kresse have ongoing informal dialogues about how the company should change their products, and what they should be making next (*see Elvis & Kresse case*).

The American manufacturer and supplier of biopolymers NatureWorks engaged both their customers and their customers' customers all the way down the value chain. They used a push/pull strategy for each product category; i.e. first engaging the first movers and more innovative players in the market, and then the more conventional but larger actors. In the "first mover" category, NatureWorks went to display product samples to companies at the very end of the value chain (*see Nature Works case*).

Another way of involving customers in the green offering of the company, is to constantly communicate with them about what the company is doing, how it is doing it and what it is offering that is greener than other companies'.

The German manufacturer of textiles and clothing Trigema developed a website for the Cradle to Cradle products, explaining what the products are about, how they are different from other products, and how they were developed (*see Trigema case*).

7. Start small before scaling up

When implementing green business model innovation, existing companies started small scale before expanding their offering. Some companies started with one product or one product line, some companies with pilot projects and some with testing in one market first.

The Dutch manufacturer of solutions for washroom hygiene Van Houtum Papier has developed a new product line consisting of paper, soap and dispensers that are all Cradle to Cradle certified. Van Houtum's new sustainable product line still only constitutes a fairly small percentage, 2-5 percent, of the company's total sales, but it is growing rapidly (*see Van Houtum case*).

8. Train sales staff

Training employees throughout the entire company is important when transforming bigger or smaller parts of the company's business model. However, one area that proved vital to companies that had taken on green business model innovation was to communicate the company's values, products and services in a credible way to distributors and customers.

The German manufacturer of textiles and clothing Trigema noticed that end-customers were not compelled to purchase Trigema's Cradle to Cradle products by words such as 'organic' and 'compostable' and there was a belief that the products generally would be of a poorer quality. Moreover, even Trigema's own sales people knew little about the products. Steps were first taken to inform the sales people about the Cradle to Cradle products, and then to upgrade the product information on the web (*see Trigema case*).

Green Business Model Innovation toolkit

Many studies have shown that many companies in the Nordic countries and organizations have an emerging interest in developing a green business model or renewing and improving existing green business models. However, many companies state that one of the main barriers for the companies in relation to Green Business Model Innovations (GBMI) is the lack of knowledge. The purpose of this toolkit is to bring knowledge to companies and organizations about some of the most successful GBMI tools around and how to implement the tools in the innovation process.

The toolkit consists of seven important GBMI tool groups that can serve as inspiration for companies and organizations. The toolkit describes the seven tool groups; how a company can use the GBMI tools and where to go in order to get more information about the tool. The toolkit does not give an exact A to Z guide for companies to use the concrete tools, however, the toolkit links to sources that will give the sufficient detailed information.

The toolkit's seven groups are identified based on the experiences from a screening of companies and organizations working with green business model innovation resulting in more than close to 100 GBMI examples of which 41 business case studies were conducted during this project. After interviewing the companies that were used as business case studies, the different methods were extracted from the material and have been gathered in this toolkit.

It is important to underline that there are many tools that can be used in GBMI and that far from all GBMI tools are included in this toolkit. The seven tool groups gathered in this toolkit are tools that have been used with success by companies in the case studies conducted in this project and are all tools that have showed to have a positive influence on companies' innovation and often the companies' financial statement. We hope that companies and organizations reading this toolkit will learn from other companies and organizations' experiences in their work with GBMI.

Organization of the toolkit

The toolkit is organized in seven main groups of green business model innovation tools. This does not mean that the seven tool groups are the only GBMI tools around. In the process, we have identified more than 50 different tools. Since the 50 tools often were variants of the same themes we have divided the 50 tools that we originally have identified into seven main groups where the different tools in the groups have overlapping characteristics.

When a GBMI tool is presented in the toolkit, it will be presented as following:

- First of all, the individual tools will be **presented** and their overall features will be presented (e.g. the overall purpose of the tool, in what industries the tools are most commonly etc.).
- After setting the scene for the different tool groups, the toolkit will present some ideas of how companies that wishes to engage in GBMI can **get started** (e.g. concrete tools, the possibility to obtain knowledge from the web, information about external help etc.). The ideas of how to get started with GBMI come from the case examples that have been compiled in relation to this project.

The seven tool groups

As described, the toolkit consists of different variants of GBMI into seven groups of tools that describe different tools within the groups and how to use the tools. It is important to underline that the seven groups of tools are not the only GBMI tools around but are the tool groups that occurred in the 41 case examples that were identified in this study.

The seven tool groups that will be presented in this tool kit are (listed after how many of the identified cases that used the individual tool):

1. **Cradle-to-Cradle certification**
2. **Take back programmes, recycling systems**
3. **LCA (Life Cycle Assessment)**
4. **LCC (life cycle Costing), Calculations of consumption, documentation of effect**
5. **ESCO/ Chemical leasing (fee per month etc)**
6. **Eco Design**
7. **Public GBMI supporting initiatives (OECD's tools, Klimakompasset)**

In the following, the seven tool groups will be described more indebt according to the structure presented earlier in the tool kit.

1. Cradle-to-Cradle certification

The goal of the C2C concept has right from the beginning¹ been to secure a positive development of quality in product innovation where the product deals with a range of standards of what quality is today. When dealing with C2C companies and organizations put up different objectives for a quality progress through a road map.

The C2C certified programme is one of the most commonly used GBMI tools if not the most used GBMI tool. The certificate is a copyrighted tool, which evaluates a product's safety for people and for the environment. Furthermore, the C2C certified programme evaluates a product's possibility for a positive effect in future material cycles.

The C2C certified programme includes a gathering of guidelines with the purpose of helping the companies implementing the C2C frame of materials with the positive feature that they can be recycled or can be used as re-used biological nutrients.

What differentiates the C2C certification programme from traditional environmental labels is that the C2C certification contains a strategy for 360 degrees evaluation of a product and the manufacturing process in relation to the creation of the product.

The C2C framework helps companies and organizations to implement a standard for assessing and constantly improving products within different categories such as; safe and appropriately sourced materials, material reutilization, renewable energy and carbon management, water stewardship and social fairness. The five C2C categories explain different steps that are necessary for companies and organizations to take in order to obtain a very high level of environmental and human wellbeing today and in the future.

Today, the C2C product certificate protocol is handled by the non-profit organisation *The Cradle to Cradle Products Innovation Institute* in California and a newly opened centre in Venlo in the Netherlands.

Learn more about the C2C certification programme: http://c2ccertified.org/index.php/product_certification/program_details

Case example of C2C from project cases:

- Desso
- Van Houtom Papier

¹ Cradle-to-Cradle has roots to the 1990s where EPEA developed the intelligent product system but the real commercial breakthrough in 2002, William McDonough and Dr. Michael Braungart published the book "*Cradle to Cradle: Remaking the Way We Make Things*". The subject for the book was materials as biological or technical nutrients, their use periods and evolution. Mr McDonough and Mr. Braungart created a framework for quality assessment and innovation: the Cradle to CradleCM certified program (C2C).

2. Take- back programmes

Take-back programmes give manufactures the responsibility for products or packaging at the end of the products lifetime. By taking-back used products, manufacturers can acquire low-cost feedstock for new manufacturing or remanufacturing activities, and offer a value-added service to the buyer. Many companies have developed cost- efficient ways to recover products from their distributors and customers and have through take-back obtained a successful and environmental friendly green business models.

Many types of products are good candidates for take-back. Some of the product categories in which we have identified successful take-back programs include products with limited time span, products with packaging that are recyclable, products containing significant material value, products containing significant energy value and products containing very valuable components.

For inspiration to get started with your company's own Take-Back programme you can use the PPRC's checklist, which include the following elements:

- Assess whether any of your product(s) might be good candidates for take-back
- Assess whether your business has good potential
- If you proceed, build the program incrementally
- Design (or redesign) the selected product or packaging
- Research and validate viable uses and markets
- Develop a material and product distribution tracking system
- Set up a collection infrastructure
- Inform consumers and distributors
- If feasible, provide incentives for returning product or materials

Read the full checklist: <http://www.pprc.org/pubs/epr/takeback.pdf>

Learn more about the Take-back programmes:

<http://www.pprc.org/pubs/epr/takeback.cfm>

<http://www.sba.gov/content/green-product-development>

Case example of Take-Back Programmes from project cases:

- Philips
- Safechem Europe GmbH

3. Life Cycle Assessment (LCA)

LCA is just like the related concepts such as the ISO 14040, Product Category Rule (PCR), Environmental Product Declaration (EPD) and Environmental Preferable Product (EPP) an evaluation of sustainable products and systems. More specifically Life Cycle Assessment (LCA) is a way of assessing the environmental impacts associated with the different stages of a product's life cycle from a raw material through manufacturing, distribution, use, repair and maintenance to disposal or recycling.

LCA is a key aspect of moving towards a more performance-based outcome of sustainability.

One of the most interesting features of the LCA is the possibility of helping to avoid that a narrow outlook on environmental concerns by compiling an inventory of relevant energy and material inputs and environmental releases; evaluating the potential impacts associated with identified inputs and releases, and interpreting the results to help companies and organizations to make a more informed decision.

Based on a survey of LCA practitioners carried out in 2006, LCA is mostly used to support business strategy, R&D, as input to product or process design, in education and for labelling or product declarations.²

According to International Standard ISO 14040, LCA is *"a compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle"*³ and environmental performance is generally measured in terms of different potential effects, such as:

- fossil fuel depletion
- other non-renewable resource use
- water use
- global warming potential
- stratospheric ozone depletion
- ground level ozone (smog) creation
- nutrification (excess nutrients)/eutrophication (oxygen deficiency) of water bodies
- acidification and acid deposition (dry and wet)
- toxic releases to air, water, and land

² Cooper, J.S.; Fava, J. (2006). "Life Cycle Assessment Practitioner Survey: Summary of Results". Journal of Industrial Ecology.

³ ISO 14040:1997

Examples of LCA-based tools:

- BEES 3.0®. A product comparison tool including brand specific data.
- ATHENA® Environmental Impact Estimator (EIE). For analysis of whole buildings and assemblies for use at the conceptual design stage.
- Also, many of the ECO Design tools listed later on are often used in a LCA process.

Learn more about LCA:

<http://pimasustainability.wikispaces.com/LCA,+PCR,+EPD,+EPP>
<http://informedesign.org>

Case example of LCA from project cases:

- Polyplak AB
- Steelcase

4. Life Cycle Cost (LCC)

Life Cycle Cost (LCC) or Whole-Life Cost refers to the total lifetime cost of ownership over an asset. In LCC the costs include the financial costs as well as the environmental costs and the social costs. Both LCC and Whole-Life Costs are commonly referred to as the “cradle to grave” costs.

When calculating the economical aspect of LCC the following data is required:

- The Design life. The minimum length of time that a scheme or structure is required to perform its intended function.
- Capital costs. The Planning and site investigation costs, Design and project management, Clearance and land preparation work, Material costs, Construction costs, Planting and post-construction landscaping costs, Cost of land take.
- Operation and maintains costs. Maintenance in order to ensure short-term operation and minimize risks to long-term performance.
- Risk Costs. The residual risks can be managed to a certain extent through safe designs for exceedance, regular monitoring and appropriate maintenance.
- Environmental costs. Environmental benefits including amenity and recreation opportunities, biodiversity and ecological enhancement, aquifer and base flow augmentation etc.

- Disposal costs. Some materials may require disposal as a result of operation and maintenance.
- Residual Costs. In a full economic evaluation, the residual value of the land used for the drainage components should be included.
- Discount rate and period. The discount rate is the rate used to convert all future costs and benefits to 'present values' so that they can be compared.

LCC is often mistaken for LCA and the two methodologies are also complementary, but even though LCC also focuses on the environmental and social benefits the methodology has its primary focus on the dollar costs of building and maintaining a structure over its life cycle, while LCA focuses on environmental performance.

The formula for calculating present value is given in the "Learn more about LCC".

Learn more about LCC:

Norris, G. A. (2001): *"Integrating Life Cycle Cost Analysis and LCA"*, in: The International Journal of Life Cycle Assessment, Jg. 6, H. 2, p. 118-120.

<http://ciria.org.uk> (Whole-Life Cost Summary)

Case example of LCC from project cases:

- Polyplank AB

5. Performing fee/ ESCO

Another one of the most widespread GBMI is the Performance fee model. The model is most well-known for Energy Saving Companies (ESCO's).

ESCO solutions are delivered by companies, which specialize in - and have made a business out of - optimizing companies and public organizations buildings operations. In the Performance fee/ ESCO model, companies does normally not get paid upfront but according to the savings that their optimization activity has let to. The most ESCO examples come from optimization of energy savings for industrial companies and energy saving in buildings. Other performance fee models include MASCO and WASCO. Companies using the MASCO model focuses on material optimization and makes material saving investments in the customer companies while WASCO companies focuses on water efficiency through water saving investments.

Beside ESCO solutions the performance fee/ ESCO model are used in other industries such as the chemical industry, where companies have developed chemical leasing

concepts where chemical waste are removed in a programme where the chemical companies are removed from their waste for a monthly fee. Like it was the case in the ESCO, MASCO and WASCO approaches, companies using the performance fee/ ESCO model in the chemical area invest in optimization and get their revenue from a “no cure, no pay” agreement with the customer company.

There are different ways of addressing the performance fee/ ESCO model for companies wanting to use the business model but some actions to be done when engaging in a performance fee/ ESCO model:

- Energy study. To offer potential customer company an energy study with recommendations for actions to save energy.
- Offer. Based on the energy study the customer company are offered to get the recommendations implemented with a minimum performance guarantee.
- Business model. E.g. should the customer company be offered a model where the customer finance the project up front and pays according to progress or should the customer not pay any of the initial cost but only for the savings realized.

Learn more about the performance/ ESCO model:

Tukker, A. ed. (2006): *"New Business for Old Europe. Product-service Development, Competitiveness and Sustainability"*, Greenleaf Pubns, Sheffield

Norris, G. A. (2001): *"Integrating Life Cycle Cost Analysis and LCA"*, in: The International Journal of Life Cycle Assessment, Jg. 6, H. 2, p. 118-120.

<http://www.energyservicescoalition.org/resources/whatis.htm>

<http://www.greenbiz.com/news/2008/04/13/escos-and-utilities-shaping-future-energy-efficiency-business>

<http://www.esco-europe.com/>

Case example of performance/ ESCO from project cases:

- Siemens Building Technology

6. ECO Design

ECO Design, which has strong roots in design⁴, is focusing on product development and creative processes that ensure the integration of different environmental considerations and integrates the whole-life cycle in the product development process unlike other tools such as LCA, which focuses on assessment and requires a significant amount of resources and personal experiences.

There are a lot of different ECO Design tools that can help companies work from the ECO Design approach some of which are also used in some of the other approaches. The most commonly known Eco Design tools are as follow⁵:

- **Brain storming.** Traditional brainstorming for mutual inspiration is an important aspect of a ECO Design process. The rules for a traditional brain storm process: No criticism is allowed, quantity means more than quality, no idea is stupid, it is fine to elaborate on other peoples ideas.
- **Brain Writing.** Very similar to brainstorming but instead of an open dialog the participants are invited to write down their ideas instead. The process is that the first person writes down his or her ideas on a piece of paper. Afterwards, the papers are circulated between the other participants that are allowed to write down three or more ideas inspired by the first persons ideas. The paper circulates between all the participants in the group. Afterwards, each person is asked to select the three best ideas from the paper.
- **Morphological boxes.** To break a problem down into a number of parameters and give the parameter a number of variations of design alternatives.
- **Rules of thumb.** A few rules or principles for inspiration for improvements. For example, rethink a product, reduce material consumption, replace harmful substances, recycle and make easy to repair.
- **Product summary Matrix.** Is developed by AT&T and is a 5x5 matrix in which the life cycle stages are arranged in rows (pre-manufacturing, manufacturing, packaging and transport, product use, refurbishment-recycling-disposal) while environmental concerns are put in columns (Materials, Energy use, Solid waste, liquid waste, gaseous emissions). The Met matrix estimate the total environmental impact by giving all the

⁴ ECO Design first came to the agenda as early as in 1972 when Victor Papanek wrote the book "Design for the real world". In the book Papanek states that design is an important tool in order to design environmental friendly products that are environmental friendly all through a products whole-life cycle. This was the beginning of what today is known as ECO Design.

⁵ Source: Kørnøv.L, Thrane.M, Remmen.A and Lund.H.: "Tools for Sustainable Development", Aalborg Universitetsforlag, Aalborg, 2007.

25 cells (5x5) a number between zero and four with zero being the highest and four the lowest estimated impact. The maximum is 100 points and represent the best alternative to the existing products and so on.

- **The Met matrix** (Material, energy, toxicity) **or the MECO analysis** (material, energy, chemical and other). Both tools focus on the different types of input and output related to the life cycle stages of the product. They can be used as a way of structuring principles of data collection. There are several different versions of MET and MECO⁶.
- **The “fast five method”**. Is developed by Philips and suitable for the brainstorming process in the beginning of the project. The five fast method ask the five “yes/or no” questions: 1) require less energy? 2) Requires a more recyclable product? 3) Contain and/ or produce less chemical waste? 4) Have a better durability, repairability or affect level? 5) Represent an alternative way to provide service? The number of “yes” answers decides whether or not the product is a good alternative to existing products.

Learn more about ECO Design:

Kørnøv.L, Thrane.M, Remmen.A and Lund.H.: *“Tools for Sustainable Development”*, Aalborg Universitetsforlag, Aalborg, 2007.

Papenek.V: *“Design for the real world”*, Academy Chicago Publishers, Chicago, 1972.

Case example of ECO Design from project cases:

- Elvis & Kresse

7. Public GBMI supporting initiatives (OECDs tools, Climate compass)

Beside the GBMI tools listed above companies and organizations can get help to start develop a GBMI or refine their existing GBMI concept from one of the many interesting public supporting initiatives. The different public GBMI supporting initiatives are an important help in order to make companies and organizations greener with valuable information. In the following, two of the most interesting public GBMI supporting initiatives; OECD's Sustainable Manufacturing Toolkit and Danish Industries and the Danish Business Authority's Climate compass will be presented:

OECD Sustainable Manufacturing Toolkit. The Organisation for Economic Co-operation and Development (OECD) has developed a Sustainable Manufacturing Toolkit in order to help companies interested in a greener production that the one that

⁶ Source: Kørnøv.L, Thrane.M, Remmen.A and Lund.H.: *“Tools for Sustainable Development”*, Aalborg Universitetsforlag, Aalborg, 2007. Page 278-282

they currently have. The toolkit offers two different components; a step-by-step Start-up Guide and a Web Portal where technical guidance on measurement and relevant links are provided.

Climate compass. If your company or organization are interested in reducing your CO2 emission the Danish site the Climate compass (in Danish “Klimakompasset”) will help you calculate and reduce your CO2 emission. Behind the Climate compass stand Danish Industries (DI) and the Danish Business Authority (ERST). The Climate compass aims at making it easy for companies and organizations to get started working with climate friendly actions. The Climate compass contains knowledge, advice and tools. Tools available on the Climate compass are a CO2 calculator, inspiration and Guidance to how to make a climate strategy and concrete ideas of how to save energy in your company or organization and thereby reduce your impact on the climate. Furthermore, the Climate compass offer the possibility for companies to chat with other companies for inspiration and different other networking activities.

Learn more about public GBMI supporting initiatives:

http://www.oecd.org/site/0,3407,en_21571361_47075996_1_1_1_1_1,00.html

<http://www.climatecompass.dk/>

Case example of public supporting initiatives from project cases:

- Car2Go

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