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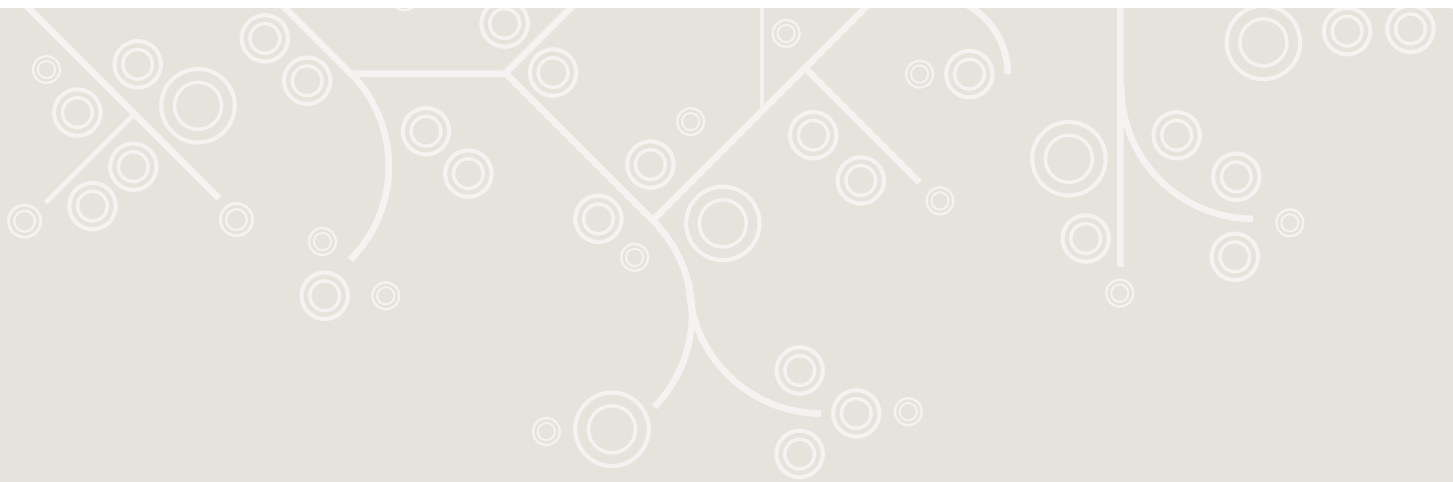
Green Business Model Innovation

Conceptualisation, Next Practice and Policy



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Executive summary

There are many terms in the public and academic debate about how companies green their business and how they are categorised as green companies. The concepts of the green economy, green growth, and eco-industries all emphasise sustainable use of resources, so that future generations may not experience resource scarcities or be exposed to environmental risks and thus be worse off than previous generations.

A company's business model can be analysed in different ways and many different tools have been developed to analyse business model concepts. The business model canvas¹ gives any company a simple and intuitive tool to describe and think through the different elements of its business models in order to systematically challenge the way it does business and thereby be able to create new strategic alternatives. The canvas tool consists of nine basic building blocks covering four main areas of a business: customers, offering, infrastructure, and financial viability. This gives the company a simple and intuitive map to understand its business models, but also a way to challenge and find successful alternatives of doing business. In the same time, companies can look at other companies' business models to be inspired to do similar changes to their own model or to design a completely new business model. Business model innovation is basically about improving the building blocks of the business model.

Business models often change gradually and do not necessarily imply fundamental revisiting of value propositions, but of course the changes could also focus on improving production processes or reconfiguring organizational structures. Usually the changes taking place in a business model is represented by one of the following forms:

- Modification through small and progressive adjustments;
- Re-design materialized in significant changes;
- Alternative building blocks, which can fulfill the same function or operate as substitutes for the original ones;
- Creation and introduction of entirely new and innovative building blocks.

1

Osterwalder&Pigneur, 2010

Therefore *Green Business Model Innovation* is when a business changes part(s) of its business model and thereby captures economic value as well as reduces the ecological footprint in a life-cycle perspective.

Generally, it can be said that the more parts of a business model which are changed and have a green effect, and the more profoundly a green change is taking place within the individual parts of the business model - going from modification, re-design, alternatives, to creation - the greener the business model innovation is.

While new ways of talking about sustainability are being shaped, companies are increasingly recognising that it can be a source of innovation that can help them become more competitive by either developing new products and services based on new technology (i.e. greentech and cleantech) or by making changes to their business models. These changes are here referred to as companies' green business model innovation. Companies might innovate by substituting to greener inputs, reusing or recycling resources, offering their product as a service function while continuing to have ownership of the products, or by developing greener products, services and processes.

Types of Green Business Model Innovation

We structure the greening of businesses with respect to two main models: the incentive models and the life-cycle models. The incentive models include functional sales or product service systems and performance-based models which may have green effects such as Energy Saving Companies (ESCOs), Water Saving Companies (WASCO), Material Saving Companies (MASCO), Chemical Management Systems (CMS), and Design, Build, Finance, Operate (DBFO) etc. The life-cycle models include cradle to cradle, take back management, green supply chain management, and industrial symbiosis.

In this study 41 companies were interviewed and on the basis of the interviews business case studies were completed. The sample is small and our analysis is therefore based on a limited amount of companies, which cannot be considered representative for the group of companies working with green business model innovation. However, the knowledge from the business cases can give us a first impression of the characteristics of companies working with green business model innovation and next practice.

Drivers of Green Business Model Innovation

One of the most important drivers for companies to initiate green business model innovation is increased consumer awareness towards sustainability. All of the companies use the green agenda as a driver for their green business model innovation - irrespective

of the size or sector of the company. Another important driver is the opportunity for companies to differentiate their products and services and create a competitive advantage by being greener and more sustainable than their competitors.

A driver of a different nature is related to increasing costs of resources and supply risk, which has forced companies to consider alternative resources for their production. The business case companies have set forth processes to cut costs and create new revenue streams by changing or expanding their focus on how to source from surplus materials, design recyclable products, add services to products or create take-back mechanisms for reuse of products or components.

Barriers to Green Business Model Innovation

Some of the most important barriers encountered among companies changing their business models into greener ones, is a lack of knowledge and skills throughout the entire value chain. In the development and production phases, employees lack knowledge of what substances are contained in the materials they use, alternative materials to use and how to use new materials when developing and designing new products. Some customers are willing to buy more sustainable products and services, but there is still a large group of customer that do not have enough knowledge about what sustainability is and who are too conservative to change their buying habits where price is the main purchasing incentive.

Another great barrier for companies wanting to transform their business models is the large costs of new machinery and new materials or changes that must be implemented in new product development and design. Furthermore, recycling and reusing materials require infrastructure systems, which also are costly to develop and implement.

Results of Green Business Model Innovation

Many companies' first attempts at green business model innovation are aimed at a limited number of product lines or initial attempts at selling services in a new way. While testing the different ways of doing green business model innovation focus is not initially placed on how to measure the outcomes. However, all of the companies see green business model innovation as a way to create positive environmental impacts, more innovation and financial benefit. Among the companies we interviewed, some of them can document specific financial results based on thorough calculations, some have made rough estimates, while others reply that they would not have initiated the green business model innovation unless it would result in positive financial impacts.

When asked what type of innovation the case companies achieved based on the transformation in their business model, almost three quarters replied that they had changed the processes in their company, while half of the companies had developed a new service and one third a new product. Some companies experienced that the transformation in their processes also resulted in new products and services that were greener, while some companies experienced that the quest for a new product or service altered the processes in their company towards greener ones. Especially the case companies that are experienced in working with a green business model have combined different kinds of innovation in all of their value chain. But for many case companies Green Business Model Innovation is still at an early stage, and the potential of the developed innovation has for some yet to unfold.

Environmental results might rarely show in the short run because it often takes time to build environmental management systems that create the intended impact, taking years before results can be documented. However, all of the companies that were interviewed in our study reply that they in one way or another have made or will make environmental improvements because of their green business model innovation. The most commonly reported environmental effect experienced by the business case companies were reductions in raw materials, energy consumption, water consumption, GHG emissions, toxic chemicals and waste.

Policy for Green Business Model Innovation

When considering the role of policy for green business model innovation, policy makers need to consider whether their emergence and the related innovation should be left to the market or whether policies are needed to support it and what should such policies look like. The rationale for policy intervention lies in market failure related to the negative externalities of climate change and other environmental challenges leading to under-investments in eco-innovation and green business model innovation. Furthermore, there might be systemic failures hindering the flow of technology and knowledge, and reducing the efficiency of the innovation efforts².

Policy recommendations to promote Green Business Model Innovation in the Nordic region

Policy makers' greatest challenge is to ensure that the policies they develop and implement will result in the desired effects. In an increasingly global world, the challenge becomes even greater since national policies cannot always stand alone, but will have to interlink with policies in other countries and regions. Companies can elude local policies

² OECD, 2012a

by moving their business to alternative geographical locations. This is why it makes sense for the Nordic region to look at policy making in a broader perspective than only national governments. On a global scale, the Nordic countries and their home markets are small. Successful Nordic companies operate in several of the Nordic countries and in many instances also become global players. Policy should assist in this development by implementing regulation that is as widespread as possible, instead of creating local policies that make it hard to compete globally. In order to be able to create future global players in the areas of green growth, the Nordic countries have the opportunity to join forces and create a common platform backed by Nordic regional policy, which also can become a driving force behind broader policy on an EU and global level.

It is also important to understand what types of companies Nordic regional policy should be addressed to. Based on the case interviews completed during this study, it was found that the companies that have taken on green business model innovation are mainly larger companies³. While there are cases of innovative small companies, it still seems like the focus of new policy should have a particular focus on assisting SME's in making the necessary transformations of their business models.

Policy needs to be developed in new ways if green growth and green business model innovation is to be enhanced. Dialog between the regulative authorities and private companies can pave the way for a common understanding of the challenges, and the need for new solution and new regulation to go hand in hand. It will be necessary to develop a new culture in the public sector in order to collaborate with private companies on future regulation while at the same time making sure that the regulation is based on objective criteria. A change of mindset requires trust from both sides and will probably take time. But pilot projects and role models can pave the way for the proliferation of collaboration between regulative authorities and private companies on future regulation⁴.

Policy recommendations to promote incentive models

While there is a positive transformation being undertaken in the business community towards more sustainable business models, it is also a journey that can be met with a range of different challenges. Some of the barriers related to transforming a company's business model to an incentive model are large investments that are tied up in products, long payback time for customers and lack of flexibility in the contracts, uncertainty about savings achieved by customers, traditional mindset among customers and employees, and difficulties in involving other companies in the value-chain.

In order to overcome these key barriers, the following policy recommendations have

³ See case compendium for more detailed results.

⁴ FORA, 2009

been developed to promote the use of incentive models:

- *Encourage an efficient public sector:* Develop selection criteria for the public sector to procure ESCO, DBFO and functional sales solutions when new investments are made or when renovating and operating e.g. public buildings and roads. The selection criteria could be linked to existing standards that ensure sustainability. The scope could also be broadened to include areas such as municipal car fleets, water management or waste management. Selection criteria could be harmonised across the Nordic countries to broaden the scope of bidders in public procurement.
- *Increase flexibility in long-term contracts:* Develop new types of flexible standard contracts for CMS and DBFO business models to make customer less hesitant towards a long-term commitment.
- *Standards:* Ensure that relevant sustainability standards are used for services and processes in all industries where standards have been developed. Standards could be developed for e.g. ESCO contracts that make it possible for customers to evaluate which ESCO agreement gives them best value for money.
- *Nordic financial rating scheme:* Create a framework to establish a Nordic rating agency that can cooperate with banks, pension funds national guarantee funds, venture capitalists and other relevant investors in the Nordic countries to be able to evaluate different types of green business model innovation. The agency should be a private company allowed to operate under licence from government.

Policy recommendations to promote life cycle models

Companies transforming their business models into life cycle models, also meet a series of challenges. Some of the most important barriers are large investments in machinery and infrastructure systems, unwillingness among partnering companies and suppliers to share information on chemicals and materials, redesign of products and processes to enable the use of new materials, and lack of competencies and knowledge in companies and public authorities.

In order to overcome these key barriers, the following policy recommendations have been developed to promote the use of life cycle models:

- *Green Public Procurement:* Develop selection criteria based on existing certifications to be used in public tenders, as well as criteria for procuring recycled materials and demanding design for recycling. The public sector can also develop criteria for the resource cycles of companies participating in public tenders. Green public private

partnerships can be developed on innovation platforms where problems that need to be solved in the public sector are identified.

- *Infrastructure for recycling:* Promote and develop systems and infrastructures that can encourage the reuse and recycling of obsolete products and materials, as well as infrastructure to handle decomposing of biological materials such as bio-plastics. Regulation can also be developed that requires companies to identify uses for their waste and by-products. Nordic systems should be developed to ensure benefits for all companies in the region.
- *Standards:* Ensure that relevant sustainability standards are used for products and processes in all industries where standards have been developed, and expand to cover more products and industries. The public sector could set these standards as selection criterion in all areas of public procurement. Furthermore, a new type of standard could be developed that tells consumers how their products can be recycled, i.e. plastic, metal, paper or organic.
- *R&D of new materials and chemicals, and access to information:* Support business development with focus on R&D of new materials and chemicals in order to enable new design and processes, for example in partnerships with universities. In addition, provide access to information of new methods in production and the use of new materials and chemicals.

Implementing policies for green business model innovation

For the policies to be implemented successfully in the Nordic countries, it will be necessary to uncover whether there are current or up-coming strategies or initiatives in each of the countries where the above recommendations would fit, and whether the policy recommendations can be implemented in the current frameworks. Existing relevant green innovation funding programs could include or have a strategic focus on the life cycle and incentive models such as ESCOs or C2C. These programs could for example be in line with the pilot project of the Danish Business Innovation Fund and focus on SMEs, or in relation to export guarantees.

In addition, more general policies to promote green business model innovation could be implemented in some of these existing programmes as suggested below:

- *Networks and partnerships:* Create business model specific networks for each type of business model, in each of the Nordic countries as well as regionally through regional Nordic networks. One focus area could be on creating partnerships

between functional sales or ESCO companies and financial institutions that are willing to invest in products that are tied up over long periods while their service is offered to customers. Another focus area could be on supporting industrial symbiosis initiatives at Nordic level to drive down search costs for potential companies. Yet another focus area could be on developing new skills and competencies in the area of design thinking and systems thinking by experimenting with new types of work teams.

- *Showcases, demonstration projects and dissemination:* The Nordic countries are often considered as a market with customers that demand a more sustainable way of living and have been chosen by companies as test markets for new concepts and products (e.g. Better Place's electrical vehicles). Focus could be on showcasing in certain industries such as building C2C neighbourhoods, or the public sector can develop projects via intelligent public procurement that can be showcased. Efforts should also be put on dissemination of green business model innovation by e.g. educating business advisors in public and private agencies.

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Preface

This synthesis report compiles the entire work done on 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 *Short Guide to Green Business Model Innovation*.

In the *Conceptualization Report* an in-depth review of the elements of green business model innovation is presented. The business model canvas developed by Alexander Osterwalder is used as a framework for analysing the different parts of a company's business model and how they can become more sustainable. In the *Policy report* current policies to promote green business model innovation are identified, as well as the barriers companies face when wanting to transform their business models. Inspired by existing policies, new policy recommendations are developed in order to assist companies in overcoming the challenges they face. In the report *Empirical and Literature Studies* the 41 case studies are presented and a quantitative as well as qualitative analysis is made based on the case interviews. The characteristics of companies working with green business model innovation are identified, and the effects companies achieve related to innovation, the environment and the bottom line are presented. In the *Green Business*

Model Innovation: Business Case Study Compendium the 41 case studies are gathered, and in the *Short Guide to Green Business Model Innovation* eight steps giving companies inspiration on how to start transforming their business models are presented as well as a selection of tools.

The work has been made possible thanks to funding from Nordic Innovation and the others partners on the project; The Danish Business Authority, VINNOVA, TEKES, Innovation Norway and Innovation Centre Iceland. The Nordic working group which has undertaken the work of this project has representatives of the Nordic innovation agencies and experts working with framework conditions, performance and funding green growth.

The Danish Business Authority has been the project lead, and the team at the Danish Business Authority consisted of: Kristian Henriksen, Special Advisor and project owner, Markus Bjerre, Head of section, Jakob Øster, Head of section, Alexandra-Maria Almasi, Research assistant, and Emil Damgaard, Research assistant. In addition the consultants Casper Høgenhaven from Hoegenhaven Consult and Tanja Bisgaard from Novitas Innovation have participated in the work, as well as the consultancy COWI. Tanja from Novitas Innovation took on the project management from Kristian Henriksen in January 2012.

We would also like to thank the group of experts whom have been interviewed, participated in workshops and discussions, and delivered valuable feedback:

Andrea Beltramello, Policy Analyst, Directorate for Science, Technology & Industry, OECD

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Juha Koponen, CEO, Co-founder, Netcyclers

Introduction

Businesses are at the centre of the debates and discussions on sustainability. They are identified as the cause of the environmental challenges we face but also as the ones that can contribute to creating sustainable growth and a sustainable future. But what exactly is the role of companies?

One line of reasoning is based on the worldview of Thomas Malthus where sustainable growth only can be achieved through resource restraint since resources are finite. Companies must make more with the resources they use, consumers must reduce their level of consumption, and everyone must recycle and reuse waste more efficiently. Another line of reasoning is based on the worldview of Robert Solow where innovation can participate in solving the environmental problems that we face. Companies can develop new technologies and processes that increase their level of productivity, thereby finding new ways of conducting business instead of being constrained by the lack of resources they are using today. Companies must in other words innovate within their current context⁵.

To resolve the current environmental challenges we face, it will be necessary to apply both philosophies. Policy must be developed to ensure scarce resources are not exploited and externalities are priced appropriately, and at the same time create conditions that can enhance and promote innovation in companies. In our context we primarily look at non-technological innovation in companies and focus on how companies can innovate their business models in order to become more sustainable and participate in creating sustainable growth, a term we have called Green Business Model Innovation.

Businesses are increasingly recognising that the greening of their own business or value chain by improving resource productivity may increase both their short-term and long-term competitiveness and may create new markets. Some businesses innovate by improving their resource productivity by substituting to greener inputs, selling greener products and services, while others implement life cycle elements in their business model or apply functional sales systems (or Product Service Systems, PSS) that may change consumption patterns and practices throughout the entire value chain.

⁵ Martin & Kemper, 2012

When considering the role of policy for green business model innovation, policy makers need to consider whether their emergence and the related innovation can be left to the market or whether policies are needed to support it and what should such policies look like. The rationale for policy intervention lies in market failure related to the negative externalities of climate change and other environmental challenges leading to under-investments in eco-innovation and green business model innovation. Furthermore, there might be systemic failures hindering the flow of technology and knowledge, and reducing the efficiency of the innovation efforts⁶.

When looking at how to transform a company's business model it is necessary to think of it as a system. Changing one element of the business model will in most cases affect one or more other elements and so on. Business model innovation can thus be seen from a systems thinking perspective, where there are cause and effect inter-linkages that change over time⁷. In order to succeed in achieving these transformations, companies must move away from thinking in "silos" and employ methods such as design thinking which enable cross-disciplinary teams to work together⁸. Making these types of changes often take a long time since entire systems are altered. Achieving sustainability by making changes in companies' business models will thus require long-term thinking.

How to read this report

This report presents the entire work completed in the project Green Business Model Innovation. The chapter *What is Green Business Model Innovation* introduces the concept of green business model innovation and presents the different elements that can be changed within different types of business models. The chapter *What companies do* presents short case examples of the different elements of green business model innovation and gives a quantitative as well as qualitative analysis of the 41 case studies completed during the project. The chapter *What companies achieve* presents the different types of effect companies have achieved after transforming their business models on innovation, the environment as well as financial effect. The chapter *Policy to promote green business model innovation* takes a look at which policies currently exist that promote green business model innovation and presents a range of policy ideas that can be implemented in a Nordic regional context as well as in national innovation strategies.

6 OECD, 2012b

7 Meadows, 2008

8 Brown, 2008

What is green business model innovation?

It is a well-established fact that innovation is essential for a sustainable long-term growth path for any country. It has also become widely accepted that resource scarcity, environmental and climate issues need to be addressed at government, consumer and business level if we are to retain our standards of living and create long-term growth.

Businesses are also increasingly recognising that the greening of their own business or value chain by improving resource productivity may increase both their short-term and long-term competitiveness and create new markets. Some companies innovate their business models and improve their resource productivity by substituting to greener inputs, selling greener products and services, while others implement cradle-to-cradle elements in their business model or apply functional sales systems (or Product Service Systems, PSS) that may change consumption patterns and practices throughout their entire value chain. In a broad sense this could all be characterised as greening of the companies' business models.

Defining Green Business Model Innovation

In the literature, there has so far not been established an internationally acknowledged definition of *green business model innovation*, nor has there previously been any structured way of describing these concepts as a whole. There are many terms in the public and academic debate about how companies green their business and how they are categorized as green companies. These terms are ranging from the more product-oriented perspectives like clean-tech companies that produce e.g. renewable energy such as wind and solar power, resource efficient products such as energy efficient pumps, to service-oriented companies which provide environmental services, to companies that implement more process-oriented initiatives in their businesses or whole value chain such as environmental ISO-standards, cradle-to-cradle, Corporate Social Responsibility (CSR) or green reporting etc.

We define green business model innovation as:

Green business model innovation is when a business changes part(s) of its business model and thereby both captures economic value and reduces the ecological footprint in a life-cycle perspective.

Generally, it can be said that:

1. the more parts of a business model which are changed and have a green effect, and
2. the more profoundly a green change is taking place within the individual parts of the business model – going from modification, re-design, alternatives, to creation

– the greener the business model innovation is and the higher potential for creating radical eco-innovation.

This is an open definition and it captures many small and large intended or unintended changes in many businesses. However, it seems problematic to set tighter boundaries on the concept of green business model innovation, since it is not easy to argue for or against why different ways of greening a business should or shouldn't be considered as green business model innovation. However, the more 'interesting' green business model innovations are naturally the ones that radically change the business model and have high economic and environmental impacts for both businesses and society.

Green business model innovation might not always be due to a one-time change with the aim of green and economic effects but be a result of continuous (efficiency) changes of the business model over time which eventually ends up being categorized as green business model innovation.

In the project we focus on and structure some specific ways of greening businesses which seem as promising levers in order to increase the competitiveness of businesses as well as to create new market opportunities.

We structure the greening of businesses with respect to two main models: the **incentive models** and the **life-cycle models**. The incentive models include functional sales or product service systems and performance-based models which may have green effects such as Energy Saving Companies (ESCOs), Water Saving Companies (WASCO), Material Saving Companies (MASCO), Chemical Management Systems (CMS), and Design, Build, Finance, Operate (DBFO) etc. The life-cycle models include cradle to cradle, take back management, green supply chain management, and industrial symbiosis.

Incentive models

Incentive models are based on how a company incentivises its consumers in a way so that part or the entire value chain is greened. These models use incentive schemes and changed ownerships structures as well as the company entering new markets in the value chain. Typically a business that keeps the ownership of a product or that is paid by its functionality will be incentivised to produce, maintain and dispose of the product in such a way that the whole value chain is greened. Examples of such are functional sales where the producer is paid by the result of the product or ESCOs where the retrofitter is paid by how much energy he saves for the customer. This gives the supplier incentives to manufacture the product so that it uses less resource and requires less maintenance and so on over the entire life cycle of the product. For a brief explanation of the incentive models see table 1.

Table 1. Incentive models

Functional Sales (FS)	Functional Sales (also called Product Service Systems, PSS) enables the customer to pay for the functionality or result of the product as a service instead of buying the product itself, e.g. leasing or product sharing.
Energy Saving Company (ESCO)	An ESCO provider optimises customers' operations in e.g. buildings and in return gets paid according to the savings achieved. The customer does not have to pay up front and pay less the less is used of the service.
Chemical Management Service (CMS)	Chemical management services is a business model based on a long-term contract, where the supplier of CMS accepts the responsibility for managing chemicals of its customers and strives to reduce the associated costs and risks.
Design, Build, Finance, Operate (DBFO)	Design, Build, Finance, Operate companies undertake capital intensive long-term construction projects where private finance, construction, service and/or maintenance are bundled into a long-term contract of typically 20-30 years.

Life-cycle models

The life-cycle models can be divided into several categories with respect to what part and how much of the value chain is greened by the model. If a company has a focus on greening the entire value chain there is a higher possibility of the company's actions being green seen in a life-cycle perspective. Green supply chain management and green procurement focus on the up-stream part of the value chain while product stewardship, extended producer responsibility, and take back management focus on the down-stream value chain. Remanufacturing, life cycle management, closed loop production and cradle to cradle more or less influence the entire value chain by taking in aspects all the way from pre-production, production, use as well as re-use. For a brief explanation of the life cycle models see table 2.

Table 2. Life cycle models

Green Supply Chain Management (GSCM)	Green Supply Chain Management is an integrated concept of greening activities in the supply chain focusing on upstream flow, cost reductions of and innovation in raw materials, components, products and services ⁹ .
Take back management (TBM)	Take back management extends the producers responsibility of waste management through take back mechanisms of the down-stream use of the product. This includes manufacturers, retailers, consumers and recyclers ¹⁰ .
Cradle-to-cradle (C2C)	Cradle-to-cradle designs innovative and essentially waste free products that can be integrated in fully recyclable loops or biodegradable processes. Cradle-to-Cradle focuses both up-stream and down-stream in the value chain ^{11, 12, 13} .
Industrial Symbiosis (IS)	Industrial symbiosis is a shared utilization of resources and by-products among industrial actors on a commercial basis through inter-firm recycling linkages. The aim of industrial symbioses is to reduce costs and environmental impact of participating companies and municipalities.

The Business Model Canvas

The business model basically explains how the company is doing its business. The business model explains how value is created for the customers and how value is captured for the company and its stakeholders^{14, 15, 16}. The business model is composed of different elements like revenues and costs, resources, activities and internal and external relationships and networks, the value proposition to the customer, and mechanisms to capture value for the company.

A better understanding of the business model gives the company a good overview of how it creates and captures value. It gives the company insights to the relationship between what the company does and the company's successes, and it gives the company the ability to compare its business model with other competing companies and to understand what can advantageously be changed to keep its competitive advantage on the market so that future growth of the company will continue.

⁹ <http://www.effektivitet.dk/-/media/858769ECCD3A45E1BA7D59B5DD06246E.ashx>

¹⁰ Van Rossem et al, 2006

¹¹ Kelly, 2010

¹² <http://www.cleanproduction.org/Steps.Closed.php>

¹³ http://en.wikipedia.org/wiki/Cradle-to-cradle_design

¹⁴ Linder and Cantrell, 2000

¹⁵ Magretta, 2002

¹⁶ Rajala and Westerlund, 2007

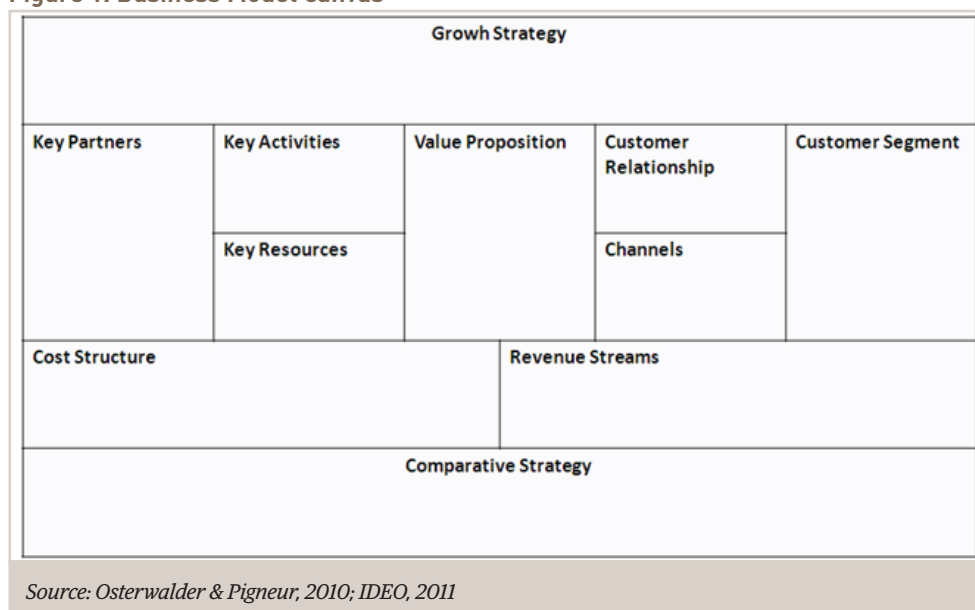
A company's business model can be analysed in different ways and many different tools have been developed to analyse business model concepts.

However, the business model canvas tool developed by Dr. Alexander Osterwalder (2010) is an intuitive way of understanding the business model concept and is a good starting point for analysing green business model innovation. Therefore the Business Model Generation (BMG) canvas is chosen for further analysis, and moreover, this canvas is internationally acknowledged and based on open source, so that it can be applied as a basis for the practical tools for companies.¹⁷

The business model canvas gives a company a simple and intuitive tool to describe and think through the different elements of its business models in order to systematically challenge the way it does business and thereby be able to create new strategic alternatives. The canvas thus serves both as a tool for companies to understand the business model and as a tool for the companies to do business model innovation.

The business model canvas tool of Osterwalder consists of nine basic building blocks covering four main areas of a business: customers, offering, infrastructure, and financial viability. Besides these nine blocks from the Osterwalder business model canvas two additional building blocks on comparative strategy and growth strategy have been added based on inspiration from IDEO^{18,19}.

Figure 1. Business Model Canvas



¹⁷ The tool is described in the book Business Model Generation which has been developed and published through open source collaboration with an international group of 470 practitioners. (Osterwalder and Pigneur, 2010)

¹⁸ Osterwalder & Pigneur, 2010

¹⁹ IDEO, 2011

The business model canvas can be used to conceptualise green business model innovation. It appears as a very usable tool to uncover the main elements of a business model in relation to businesses green or sustainable practices.²⁰

The business model canvas is a static model and it does not capture the dynamics of businesses. The dynamics of the model is only reflected in one box “Growth Strategy” although it can be important to think through the dynamism in each of the building blocks of the canvas. Also, the canvas appears linear in its structure, but in real life the business models has many different causality loops implied. The framework conditions for the company are reflected in several boxes of the canvas, especially in Competitive Strategy and Growth Strategy, e.g. in energy prices.

Although the canvas has a simple structure, it forms a complex system of interdependencies between the different elements. Any changes to any of the included elements can affect the other elements and the entire system. For instances a business model can be changed by bringing down the costs of a car by reducing e.g. comfort or speed and thereby making it more affordable. At the same time the business is changing its key resources, addressing a new customer segment, and changing its growth and comparative strategies.

The business model canvas tool by Osterwalder and Pigneur (2010) gives a company a simple intuitive map to understand its business models, but also for it to challenge and find successful alternatives ways of doing business. Also, companies can look at other companies’ business models to be inspired to do similar changes to their own model or to design a completely new business model. Business model innovation is basically about improving the building blocks of the business model.

The tool allows companies to reconsider their customer-segments, value proposition to customers, profitability scheme, various activities and relationships to partners and so on, in order to reach new markets or renew old ones, change the content of their offerings, change their value chains, reduce costs and risks and increase profitability.

As the business model takes a holistic approach towards explaining how firms do business, companies can use the tool to go through its business model and question each building block and its relationship with other building blocks and think through the consequences of changing its model.

Each of the 11 building blocks can be a starting point for generating new ideas to do business model innovation. Due to the complex system of interdependencies between the different elements in the business model, the transformation of one building

²⁰ The business model canvas was tested in the version of IDEO, which is very close to the Osterwalder and Pigneur’s business model canvas. Therefore, most of the conclusions from the workshops are transferable to the extended Osterwalder and Pigneur’s business model canvas.

block will affect multiple building blocks. For example if a company changes its value proposition to the customers of delivering a service instead of a product, the customer relationship, the distribution channel, the revenue streams and cost structures would also need to be adjusted accordingly.

A framework for Green Business Model Innovation

For businesses to be able to retain and further strengthen their market position, they have to continuously rethink and reinvent their business models. Innovation is relevant for all firms and organisations as it is about staying in the „game“, or being at the forefront of competition while assuring viability and sustainability of their operations. Radical changes in business models imply revisiting the customer base and value chain or redefining products and services. Business models often change gradually and do not necessarily imply fundamental revisiting of value propositions, but of course the changes could also focus on improving production processes or reconfiguring organizational structures²¹.

Corporate sustainability is now in many companies playing an integral role in shaping the mission or driving force of a firm²². Emerging markets for greener products and services on the one hand, and the rise of sustainability and green growth agendas in corporate management on the other, are increasingly leading firms to integrate non-financial metrics into their decision-making processes, to revisit the concepts of value and profitability that drive their business models, and to reconsider the balance between the dual objectives of short-term profitability and long-term sustainability²³.

The first attempts to use eco-innovation as a response of corporate practices towards sustainability and green growth have mainly materialised at the product level, but some companies have broadened this trend by using it for redesigning their production processes or distribution channels. The front-runner companies have taken it even further, to organisational levels and using it to create alternative value propositions, or even to restructure their business models.

The OECD has a very rich portfolio of studies which focus on eco-innovation, and one of their projects²⁴ proposes that this can be understood and analyzed from three dimensions, namely in terms of an eco-innovation's:

²¹ OECD, 2011

²² Cocklin and Subbs, 2008

²³ Bryson & Lombardi, 2009

²⁴ http://www.oecd.org/document/37/0,3746,en_2649_34173_40695077_1_1_1_1,00.html

1. Target - which refers to the basic focus of eco-innovation, and which may be:

- Products - involving both goods and services;
- Processes - such as production methods or procedures;
- Marketing methods - for the promotion and pricing of products, and other marketing-oriented strategies;
- Organisations - such as structure of management and the distribution of responsibilities
- Institutions - which include the broader societal area beyond a single organisation's control, such as institutional arrangements, social norms and cultural values.

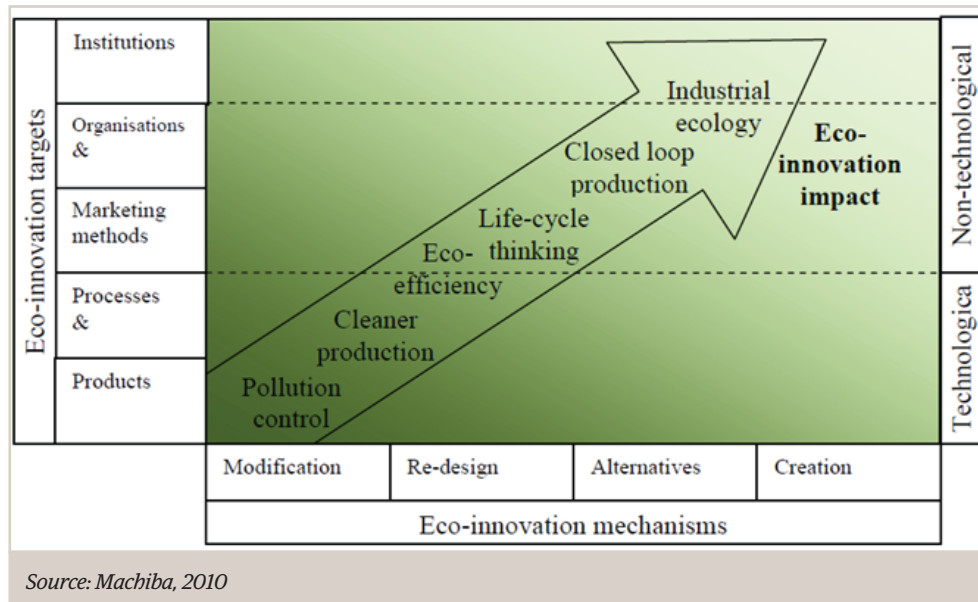
2. Mechanism - which relates to the method by which the change in the eco-innovation target takes place or is understood, and four basic mechanisms are identified:

- Modification - such as small, progressive product and process adjustments;
- Re-design - referring to significant changes in existing products, processes, organisational structures;
- Alternatives - such as the introduction of goods and services that can fulfil the same functional need and operate as substitutes for other products;
- Creation - the design and introduction of entirely new products, processes, procedures, organisations and institutions

3. Impact - referring to the eco-innovation's effect on the environment, across its lifecycle or some other focus area.

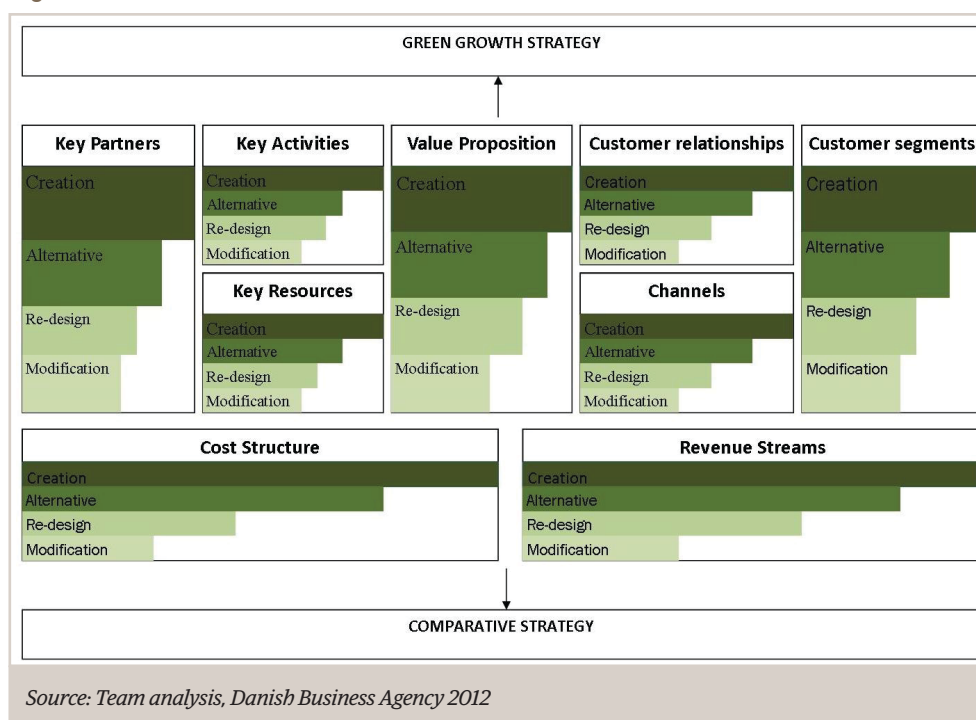
The three dimensions and their linkages are shown in the figure below.

Figure 2: Conceptual relationships between sustainable manufacturing and eco-innovation



Given a specific target block, the potential magnitude of the environmental benefit tends to depend on the eco-innovation's mechanism, as more radical changes, such as alternatives and creation, generally embody higher potential benefits than modification and re-design²⁶. Therefore in this section's approach the environmental impact is not a third dimension of analysis but a variable determined by the chosen target blocks and mechanism, see figure 3.

Figure 3: Green Business Model Innovation



Even though the primary targets of the Green Business Model Innovation framework are the business model building blocks, a great innovative potential is also placed in the interaction zones between them. Their interaction refers to the previously explained process in which the change of a building block may imply several changes in other blocks.

Furthermore, the 'growth' and the 'comparative strategy' blocks are only influenced through the change process of the other blocks, and do not represent a target on their own.

The Green Business Model Innovation framework leads to a great number of diverse change opportunities in business models and enhances their potential to generate systemic eco-innovation, in order to make the green growth objective of absolute resource decoupling possible.

What Companies do

Interviews with 41²⁷ companies were conducted and business case studies completed for each interview. The companies were selected based on desk research and recommendations from experts. The sample is small and our analysis is therefore based on a limited amount of companies, which cannot be considered representative for the group of companies working with green business model innovation. However, the knowledge from the business cases can give us a first impression of the characteristics of companies working with green business model innovation and next practice.

Many of the companies have employed different types of green business model innovation to support a more overall and general green business model. Their green business model innovations thus overlap and/or support each other by building on business approaches that derives from a focus on restorative value and materials streams. Few have so far focused their green business model innovation on both their input side (pre-production and production) and on their output side (use and after-use/reuse).

Case companies working with functional sales (FS) have seen competitive advantages and new revenue streams in selling the functionality of their product or adding services to it. They have changed the cost structure and risk schemes for their customers, due to lower investment cost, lower operational risks and higher customisation options.

Case companies working with green supply chain management (GSCM) source bio-based, energy-efficient or surplus and waste materials from external suppliers. This has proved to secure more stable sourcing, creating resource-efficient production or supporting the branding of the company by substituting core components that are crucial for their production and that will have the highest business impact.

Case companies working with cradle to cradle (C2C) design and produce biodegradable, decomposable and reusable products. They start by focusing on one product line to see if the product is profitable. A few larger companies have taken the approach further by using the cradle to cradle mindset as a driver to systematically take products and

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29 of the business case studies were used for the quantitative analysis and 20 for the qualitative analysis

components back into own production.

Case companies working with take-back mechanisms (TBM) distribute waste and surplus materials to their own or other companies' production. They have all seen new revenue streams, cost-cutting opportunities and risk management in taking their own (or others') products or packaging back into own production. This creates an incentive to design products to be recyclable and decomposable and to retain product ownership.

Case companies working with industrial symbiosis (IS) is a collaboration where companies buy and sell residual products, materials and resources. It has created interlocking systems where companies cycle their surplus and waste materials to reduce cost and the need for new materials.

When looking at the sample of companies as a whole, some general characteristics were identified.

Characteristics of companies

More than 40 percent of the companies interviewed were large companies with more than 1,000 employees. It is not possible to know whether our sample is biased towards large companies, but it is likely that it has been easier to identify larger companies than smaller ones since larger companies' actions are easier to identify.

When engaging in green business model innovation, almost 90 percent of the interviewed companies use in-house resources by engaging and training their own employees while more than 50 percent of companies hire experts and consultants to guide them through the processes and changes that need to be implemented. An important factor that was identified to succeed with green business model innovation was creating a company culture where employees understood what sustainability meant to the company and why it is important, and this could be reflected in the high number of employees that received training. Consultants and experts are brought in when specific processes need to be initiated, such as going through a certification process.

At the same time, partnerships are developed with a range of different actors such as universities, other companies as well as governments and NGO's. Almost 50 percent of the interviewed companies created partnerships with universities, while just over 40 percent of partnerships were with other companies and 25 percent of partnerships with governments or NGO's.

Drivers of Green Business Model Innovation

One of the most important drivers for companies to initiate green business model innovation is increased consumer awareness towards sustainability. All of the companies use the green agenda as a driver for their green business model innovation - irrespective of the size or sector of the company. Customers are increasingly expecting companies to behave responsibly and offer sustainable products and services, and customers are also increasingly willing to pay for these products and services. Another important driver is the opportunity for companies to differentiate their products and services and create a competitive advantage by being greener and more sustainable than their competitors. The interviews showed that all case companies see green business model innovation as a way to counter growing competition and new market conditions that have arisen from new technology, the financial crisis, new global competitors, scarce resources, increased focus on corporate responsibility or changes in customer demands. Especially the smaller and family-owned case companies are also driven by a value of 'doing good'.

A driver of a different nature is related to increasing costs of resources and supply risk, which has forced companies to consider alternative resources for their production. In many cases companies have chosen more sustainable alternatives or implemented measure that can reduce the amount of resources used and thereby costs. The business case companies have set forth processes to cut costs and create new revenue streams by changing or expanding their focus on how to source from surplus materials, design recyclable products, add services to products or create take-back mechanisms for reuse of products or components. This can all be seen as examples of circular and holistic business approaches, where waste is used as a resource and products are designed, sold and supported to be restorative.

Barriers to Green Business Model Innovation

Some of the most important barriers encountered among companies changing their business models into greener ones, is a lack of knowledge and skills throughout the entire value chain. In the development and production phases, employees lack knowledge of what substances are contained in the materials they use, alternative materials to use and how to use new materials when developing and designing new products. Further down the value chain, marketing and sales staff lack knowledge of how to sell a sustainable product or service and suppliers do not understand the new green business model. Finally, while some customers are willing to buy more sustainable products and services, there is still a large group of customer that do not have enough knowledge about what sustainability is and who are too conservative to change their buying habits where price is the main purchasing incentive. Another great barrier for companies wanting to transform their business models is the large costs of new machinery and

new materials or changes that must be implemented in new product development and design. Furthermore, recycling and reusing materials require infrastructure systems, which also are costly to develop and implement. The solution to many of the barriers might be to create partnerships, but for many companies this is also seen as a great challenge to initiate on their own.

Business Case Examples

When companies embark on transforming elements in their business models, it can be done in several ways. In the following a short description is given of each of the eight elements of green business model innovation as well as a short extract of a business case to exemplify the business model element.

Functional Sales

Functional Sales (also called Product Service Systems, PSS) is a generic business model that holds common characteristics of all incentive models within the green business models. In functional sales the provider offers the customer to pay for the functionality or result of the product instead of buying the product itself. The structure of the business model gives the provider the incentives to optimise and maintain the product to ensure life cycle cost efficiency, which in turn reduces the environmental impact.

CASE BOX 1: VOLVO AERO

The Swedish company Volvo Aero sells the service of well performing aircraft turbines (a flight hour agreement), instead of selling the engine itself. The customer pays per turbine spins in the air. Volvo takes on the responsibility of the maintenance of the engine, providing highly skilled staff with specific knowledge of the engines functionality. This makes it unnecessary for the flight carrier to hire specialist engineers to maintain the engines. When Volvo themselves maintain the engines, the result is an optimized performance of the engines leading to a reduction in fuel consumption. Flight carriers thereby save on costs for employees as well as fuel, in addition to emitting less CO₂ when using their engines as a result of fuel reduction.²⁸

Among our business case studies, large as well as small companies have implemented functional sales business models, and within a range of different sectors.

The larger and more established companies have started offering functional sales services as add-ons to their existing products. This secures a foundation for continual upgrades and improvements of the products, and extends the customer relationship from the sales phase to the use and reuse phase thereby creating stronger bonds and better insights into the customer's changing needs.

The companies that are newly started have centred their entire green business model

innovation on leasing products or packaging to customers. They have spotted new trends in existing markets by offering products that are more customised in both use and in the reuse phase.

Energy Saving Companies

The most widely disseminated green business model within the incentive models is Energy Saving Companies (ESCOs). The provider of ESCO solutions optimises companies' operations and public buildings and in return gets paid according to the savings achieved. The customer does not have to pay up front. Most examples stem from energy savings in public sector buildings. One example could be to guarantee energy savings for industrial companies and get paid according to the energy savings achieved as a result of their installations. Customers pay less the less is used, and are compensated if savings are less than guaranteed.

CASE BOX 2: DANFOSS SOLUTIONS

The Danish company Danfoss Solutions helps industrial companies in the food and beverage market reduce the amount of energy they use in their production processes and operations by e.g. installing more efficient pumps or installing controls on refrigeration temperatures or lighting or changing routines of employees. They guarantee their customers a saving with a return on investment of 2-4 years and are paid a percentage of the savings, while also reducing the amount of CO₂ emissions from the company as a result of energy savings.²⁹

There are also a few slightly different versions of ESCO such as MASCO and WASCO. A MASCO company specialises in material efficiency and makes the material saving investment in the customer company, while a WASCO company specialises in water efficiency and makes water usage saving investments in the customer company. Also in these models the companies are compensated on the basis of the cost savings they achieve for their customers.

Among our business case studies, it is the large companies that have implemented ESCO models.

Chemical Management Services

Chemical management services (CMS) is a business model based on a strategic, long-term contract, according to which the supplier of chemical management services accepts the responsibility for managing chemicals and strives to reduce the associated costs and risks for the customer. This strategy also has the potential for reducing the environmental impacts of toxic chemicals.

The chemical provider and the chemical user have the common goal of reducing the

²⁹ FORA, 2010

costs and quantities of chemicals applied in the user's processes. In traditional provider-buyer relations, the provider's profits depend on the amount of products sold; the greater the quantity, the higher the profits. In CMS the provider's profits depend on how well the function of the chemicals is delivered and the customer is interested in the final result e.g. the cleanliness of the machine parts cleaned by a solvent³⁰.

CASE BOX 3: SAFECEM EUROPE

The American company **SAFECEM**, a subsidiary of The Dow Chemical Company, provides customers with a complete solvent cleaning solution service instead of selling chemical cleaning products. The service is based on a closed-loop system where solvents are delivered, used and taken back.

Customers are invoiced monthly and the fee is based on product performance (e.g. chemicals used per m²) instead of per product used. **SAFECEM**'s revenue now depends on the volume of e.g. cleaned metal instead of the volume of solvents sold.

SAFECEM's chemical leasing service has the potential to reduce solvent usage by 63 percent and waste by 95 percent. The full service model reduces environmental impact caused by photochemical oxidation, human toxicity and other environmental impacts by 10, 25 and 75 percent respectively³¹.

While the CMS model has been around in the US for 20 years, CMS activities in Europe have been significantly lower. The increased regulatory focus on the industrial use of chemicals is expected to create an increased interest for the CMS concept on the European market. Among our business case studies only one company was selected that used the CMS business model.

Design, Build, Finance, Operate

Design, Build, Finance, Operate (DBFO) companies undertake capital intensive long-term construction projects where private finance, construction, service and/or maintenance are bundled into a long-term contract of typically 20-30 years, which allocates risks and responsibilities between the parties. In this business model long term contracts give incentives to improve the quality of the construction project so that the life-cycle costs are lowered.

³⁰ Mont et al., 2006

³¹ See project case studies for complete case description

CASE BOX 4: ALLFARVEG

Allfarveg is a Norwegian company that was established to design, build, finance, operate and maintain the new road between Lyngdal and Flekkefjord in Norway. The company has a 25-year contract with the Norwegian Public Roads Administration, and has taken over many of the tasks that in previous road building projects have been the government's responsibilities. Allfarveg receives payment based on the performance of the road; whether it is safe to drive on, cleared for snow and so on. The incentive structure including the operation of the road lead Allfarveg to e.g. use brighter stones in the asphalt requiring less light intensity to light up the road at dark. This has lead to a 30 percent reduction in electricity costs, and a savings in resources used for electricity. In addition the road construction work was completed two years ahead of time.³²

This is a business model that is popular in the UK, and which has been gaining ground in some of the Nordic countries in recent years. This particular business case example is taken from the previous work done on Green Business Models in the Nordic Region.

Green Supply Chain Management

Green Supply Chain Management (GSCM) is an integrated concept of greening activities in the supply chain focusing on upstream flow. Raw materials and components are sourced as sustainably as possible while toxic content is minimised and eliminated where possible. Demands are also placed on suppliers providing products and services to ensure they meet the requirements of environmentally sustainable behaviour. Many companies embarking on efforts to green their supply chain also discover alternative inputs that are more cost-efficient.

CASE BOX 5: IKEA IWAY

The Swedish company IKEA has large warehouses with all types of home furnishings, and a large number of suppliers globally. IKEA has developed their own IKEA Way on Purchasing Products, Materials and Services – IWAY – which is the IKEA supplier Code of Conduct. IKEA has systemised and formalised social and environmental standards, which are to be met in the sourcing of raw materials and core services throughout the entire company. This has resulted in e.g. reduced use of toxic chemicals and the introduction of more sustainable materials in the transportation of their goods³³.

Among our business case studies it is the larger companies that are experienced in working with supply chain management and now seek to take environmental aspects into account when sourcing resources and materials for production.

The case companies working with green supply chain management are looking into how surplus, energy-efficient and waste materials can replace, substitute or become

³² FORA, 2010

³³ See project case studies for complete case description

a supplement to new and newly extracted raw and non-sustainable materials. New technologies and cost-efficient and reliable recycling systems have accelerated this process by offering new ways to source and reuse waste and surplus materials. This cuts costs and secures more stable supplies of production materials that are less rare and less vulnerable to for example fluctuations in price.

Take Back Management

Take back management (TBM) extends the producers responsibility of waste management through take back mechanisms of the downstream use of the product. This includes manufacturers, retailers, consumers and recyclers. A variety of companies have developed cost-effective ways to recover products from their distributors and customers. By working with product designers and other functions, supply chain managers can establish systems that enable them to recover these assets and reduce manufacturing costs.

CASE BOX 6: DESSO

Desso is a Dutch manufacturer of carpets, carpet tiles and artificial grass. The company offers to take back customers' old carpets – ones made by themselves as well as those made by competitors. Based on the technology developed in Desso's Take BackTM Programme, they can recycle and recover raw materials from used carpets and reuse them for making new ones. The yarn is separated from the carpets' backing and is used to produce new yarn, while the backing of the carpets are sold as input to the road and roofing industry. As a result, 60 percent of Desso's carpet tiles are made from 100 percent recycled yarn. This has led to an increase in market share of 8 percentage points while company profitability has increased eight-fold³⁴.

Among our business case studies it is mainly larger companies with numerous supplier and customer partnerships and with a deep insight into their own (and others') value chains that set up their own take back management systems.

They have established new relations with suppliers, customers and sometimes also competitors to secure stable and cost-efficient take-back mechanisms and distribute waste and surplus materials to their own or other companies' production. This creates an incentive to design products and packaging to be recyclable and decomposable. It also creates an incentive to retain product ownership, because one or more parts of the products become valuable, for example in terms of lowering production costs.

Take-back mechanisms can be complex to create and facilitate. It takes a streamlined value chain to set up the right incentives for customers, end-users and partners to gain support for the process of distributing products back to manufactures. But by accepting surplus materials, manufacturers can acquire low-cost feedstock for new manufacture or remanufacture, and offer a value-added service to buyers.

³⁴ See project case studies for complete case description

Cradle to Cradle

The phrase Cradle to cradle (C2C) was first put forward by a Swiss architect Walter R. Stahel in the 1970s. The paradigm as it is known today was developed by The Environmental Protection Encouragement Agency (EPEA) and the German chemist Michael Braungart in the 1990s. The goal of the concept is to start thinking of companies' business models as circular, where the waste that is produced in a company can be reused in a technical sphere or a biological sphere. Materials fall into two categories, and are either technical or biological nutrients. Technical nutrients have no harmful effects on the environment, and can be reused in continuous cycles. Biological nutrients are organic materials and can be disposed of in the natural environment without causing any harm.

CASE BOX 7: GABRIEL

Gabriel is a Danish company that manufactures furniture textiles and fabrics. One of its textiles is a cradle-to-cradle certified wool product Gaja. It contains non-harmful dyes and is completely compostable, thereby eliminating the concept of waste from its products. The product is certified C2C since the product can be part of a biological cycle where it does not create any waste, but can be used as nutrients once decomposed in nature.

Through the production of Gaja textiles Gabriel has been able to reduce its amount of waste from production and the costs associated with it³⁵.

The business case companies that use the cradle to cradle business model differ in size and sector. Cradle to cradle products can be found in both smaller, medium sized and large companies and can be applied to a wide range of products and sectors: from household products to components for building houses and ships.

The companies start by focusing their innovation on one product line to see if the product is profitable and to learn from experience how to produce and sell a cradle to cradle product to existing and new customers. A few case companies have taken the approach further and are systematically taking products and components back into their own production. They use their cradle to cradle products as promotional flagships that can create new customer segments and strengthen a green market profile.

The cradle to cradle concept is so far mostly developed on the materials side, and there is still potential for further business model innovation. Most case companies have applied cradle to cradle by redesigning one or more of their product lines.

Industrial Symbiosis

Industrial symbiosis is a systems approach to a more sustainable and integrated industrial economy which identifies business opportunities that leverage underutilised

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See project case studies for complete case description

resources (materials, energy, water, capacity, expertise, assets etc.)³⁶. The aim of industrial symbioses is to reduce costs and environmental impact of participating companies and municipalities. In industrial symbiosis traditionally separated industries engage in an exchanges through shared facilities. The waste of one company becomes another's raw material. Both substantial and minor environmental benefits accrue from these industrial symbiosis exchanges.

CASE BOX 8: INDUSTRIAL SYMBIOSIS KALUNDBORG

The industrial symbiosis of Kalundborg in Denmark was the first one of its kind in the world. It consists of seven companies and the municipality of Kalundborg. The companies in the symbiosis exploit each other's by-products or residuals from production on a commercial basis, including energy cooperation, water cooperation and by-product cooperation. As an example, more than 98 pct of the sulphur in the flue gas from the Asnæs Power station is removed before it leaves the plant, and is reused by the plasterboard manufacturer Gyproc instead of importing gypsum.

CO2 emissions are reduced by 240,000 tons, 3 million m3 of water is saved, and 150,000 tons of gypsum is created from the flue gas desulphurisation³⁷.

The business case companies participating in an industrial symbiosis are larger companies and they are most often physically located close to each other to keep transport costs low and synergies high. They have often based the industrial symbiosis on existing partnerships between suppliers and customers on a more formalised agreement that increases competitiveness and environmental performance. This formalisation creates stability and strong interconnection and a basis for long-term investments in streamlining resource flows and minimising distribution and production costs.

³⁶ Lombardi and Laybourn, 2012

³⁷ FORA, 2010

What Companies achieve

Measuring the results companies achieve after transforming parts of their business models or implementing new ones is no easy task. Many companies' first attempts at green business model innovation are aimed at a limited number of product lines or initial attempts at selling services in a new way. While testing the different ways of doing green business model innovation focus is not initially placed on how to measure the outcomes. It is difficult to isolate specific indicators related to the results of green business model innovation, particularly if the innovation affects only one product line where cost and revenue figures are not broken down at such detailed levels. It is also difficult to measure the effects of changes to processes in companies such as sourcing greener resources and materials since these types of changes may take a long time before they materialise into savings that are seen on the bottom line. However, all of the companies see green business model innovation as a way to create positive environmental impacts, more innovation and financial benefit.

The literature review shows that many international companies such as Texas Instruments, Dell, and PepsiCo have made large savings as well as reduced their environmental impact through f. e. source reduction, recycling and use of reusable packaging systems. Companies like Honeywell, LG Electronics, and Xerox have all implemented take back mechanisms and managed to cut costs as well as reduce a significant amount of waste. Similarly, the companies Timberland, Desso, and Ahrend have all embraced cradle to cradle which have made positive impacts on their business. The Kalundborg Industrial Symbiosis in Denmark, Kwinana Eco-Industrial Park in Australia, and the National Industrial Symbiosis Programme in England have all astonishing results on their economical and environmental impacts. Also, companies which implemented functional sales, ESCOs, CMS, DBFO show that there is a economical and environmental potential for these ways of doing business.

Finally, on the basis of a survey, the economical, environmental, and innovation effects of implementing GBMI were explored. From the limited data, it was not possible to establish statistical significant effects of implementing GBMI, but interviewed experts point to the fact that the correlation between sustainable activities and financial impacts is particularly hard to identify in impact assessments. Green business model innovation

takes time and investments to develop and sufficiently implement, but other studies show that positive returns can be identified.

The best way to determine what results companies have achieved by initiating green business model innovation in this study, has been by conducting in-depth interviews where the companies themselves have evaluated what types of results they have achieved with respect to financial effects, innovation effects and environmental effects. Since green business model innovation is still not prevalent among companies there is no general consensus on how to measure it, making it difficult to gather large statistical numbers of companies that can be evaluated according to the same template. Furthermore, the results achieved by individual companies cannot be generalised as they vary across company size, sector and country.

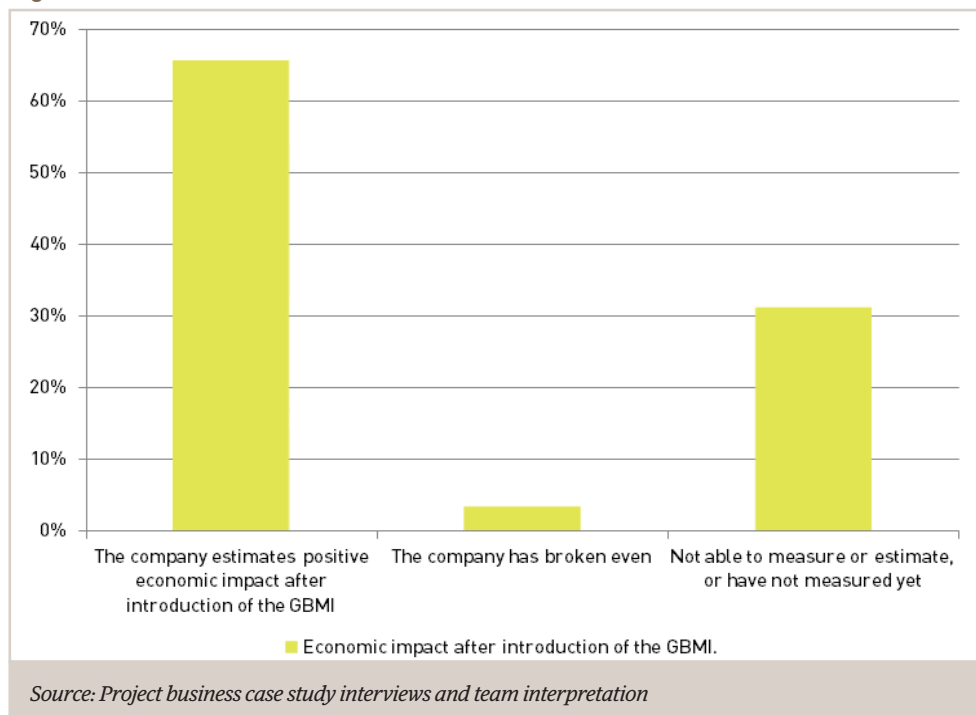
Financial results

Green business model innovation takes time and investments to develop and sufficiently implement, but studies show that positive returns can be identified. A study on green supply chain management concludes that positive financial results can be identified, especially for the first movers³⁸.

Among the companies we interviewed, some of them can document specific financial results based on thorough calculations, some have made rough estimates, while others reply that they would not have initiated the green business model innovation unless it would result in positive financial impacts.

Two thirds of the case companies estimate that they have experienced, or expect to experience, financial benefits from introducing their green business model innovation. For one third of the companies it was difficult for the team to interpret the answers. Some companies could not indicate whether they had achieved either a positive or negative impact, some replied that they had not attempted to measure the impact, and others had not been able to estimate the financial impact of their green business model innovation yet. A minority of the companies estimated that the green business model innovation would lead to break-even, while none of the companies indicated that they had experienced a negative financial result. See figure 4 below.

38 Testa, et al., 2009

Figure 4: Financial results after GBMI

One of the experts consulted during this project, Nick Johnstone, has looked into the motivations for and the impacts of environmental management systems and green supply chain management. His studies identify that building trust, strengthening customer relations and managing risk often proven to be strong motivators for implementing environmental management systems. Furthermore, the more a company is able to involve its business partners in the development of co-operative environmental plans, the more it is able to achieve the expected results and to improve its performance³⁹.

Innovation results

A preliminary analysis of business eco-innovation cases carried out by the OECD shows that most changes in innovations in the observed companies seem to take place in the activities component with research and development⁴⁰.

In the survey that was sent out, it was also found that the two areas where innovation results could be documented, were in the management systems of companies applying green supply chain management and in the infrastructure of companies working with take-back systems. When looking at the companies interviewed, the highest level of

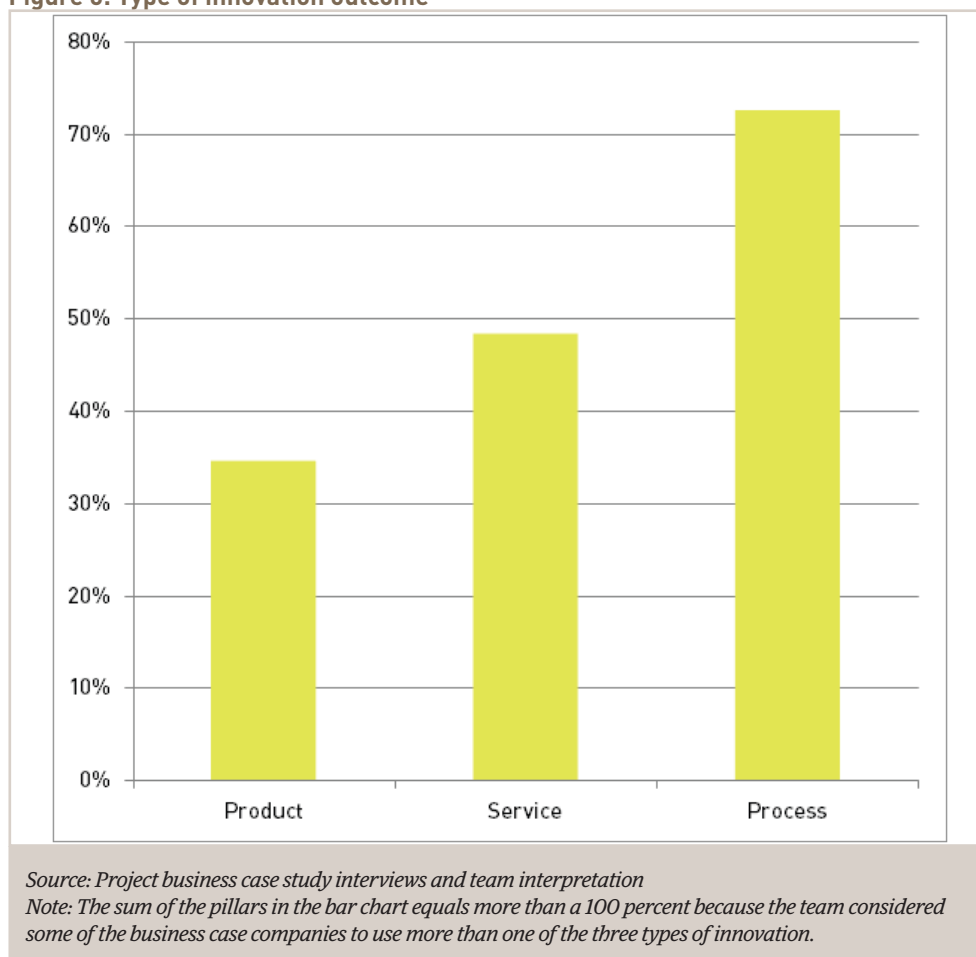
³⁹ Testa et al, 2009

⁴⁰ Machiba, 2012

innovation was found in companies transforming their business model into a functional sales or cradle to cradle model, while the business model building blocks that experience the highest level of change are the Value Proposition, Cost Structure, Key Partners and Key Resources.

When asked what type of innovation the case companies achieved based on the transformation in their business model, 72 percent replied that they had changed the processes in their company, while 48 percent developed a new service and 34 percent a new product. See figure 5 below.

Figure 5: Type of innovation outcome



Some companies experienced that the transformation in their processes also resulted in new products and services that were greener, while some companies experienced that the quest for a new product or service altered the processes in their company towards greener ones. 28 percent of companies saw changes in their products as well as processes, while 24 percent of companies experienced changes in their services as well as their processes.

Environmental results

Environmental results might rarely show in the short run because it often takes time to build environmental management systems that create the intended impact, taking years before results can be documented.

However, all of the companies that were interviewed in our study reply that they in one way or another have made or will make environmental improvements because of their green business model innovation. While some companies have made thorough and precise measurements of their environmental improvements and can present exact numbers, others have not measured it directly but base their answer on estimates. The most commonly reported environmental effect experienced by the case companies are listed in the table below.

Table 3: Selection of environmental impacts among the case companies.

Environmental results as experienced by the case companies
• Reduced amount of new raw materials. • Reduced GHG emission • Reduced energy consumption • Reduced amount of waste and increased recycling • Reduced amount of toxic chemicals • Reduced water consumption

Source: Project business case study interviews and team interpretation

The business model where the largest effect is seen is in the cradle to cradle business model where all companies implemented a reduction in toxic chemicals in their products and processes.

Policy to promote green business model innovation

When considering the role of policy for green business model innovation, policy makers need to consider whether their emergence and the related innovation can be left to the market or whether policies are needed to support it and what should such policies look like. The rationale for policy intervention lies in market failure related to the negative externalities of climate change and other environmental challenges leading to under-investments in eco-innovation and green business model innovation. Furthermore, there might be systemic failures hindering the flow of technology and knowledge, and reducing the efficiency of the innovation efforts⁴¹.

Summary of existing policies targeted GBMI

We have attempted to identify relevant policies that support green business model innovation in order to create a compendium that can be used to inspire policy makers in the Nordic countries. However, since these policies target challenges that are faced by all nations, policy makers in any country wanting to develop policies targeting green business model innovation can be inspired by the work.

A lot of time has been spent on researching existing policies, and while we have found a few, we probably have missed a few too. But the policies we have identified have helped us create a picture of where governments have attempted to support businesses, and where no attempts have been made yet. We have also focused on identifying the effects of the implemented policies - a policy can only be deemed good if there are results to show for it. Some of the policies we have identified are still in the making, so while the ideas seem good, it is not possible to know whether they will achieve the wanted targets. Other policies have been implemented some time ago, and can document what results they have obtained. We believe that if a policy has shown positive effects, it can be promoted for use in other countries and regions. However, policies also need to be evaluated according to the costs of implementing them. This information has not been

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OECD, 2012a

possible for us to obtain in our overview, so only one side of the story is described. It is also necessary to keep in mind, that while learning from the successes, policy has to be tailored to the country and region where it will be implemented.

When looking at the two main categories of business model elements, we have been able to identify at least one policy initiative for the three specific incentive models, but none for the more generic functional sales model:

Table 3. Existing policy for incentive models

Business Model	Existing policy
Functional Sales (FS)	No policies identified
Energy Saving Companies (ESCO)	Federal Energy Management Program, US Green Deal, UK ESCO Light, DK Decoupling Policy California, US
Chemical Management Services (CMS)	Registration, Evaluation, Authorisation and restriction of Chemical substances, EU
Design, Build, Finance, Operate (DBFO)	Private Finance Initiative, UK

The ESCO business model seems to be the one functional sales model that has achieved most attention from policy makers, as there now are three countries that have implemented policies to promote it. While it is only the FEMP from the US that has existed for long enough to be able to measure performance, the results are encouraging, speaking for implementing similar policy initiatives in other countries wanting to reduce the amount of energy consumed. However, it is worth noting that even though the UK and Denmark will be implementing policies to promote ESCO, the composition of the policy initiatives vary in the way the incentives are created. The decoupling regulation in California places the incentives for energy saving by the utility companies, promoting ESCO from “top-down”.

The CMS business model is promoted in Europe through a European-wide policy initiative. However, if the goal is to eliminate toxic chemicals from industry, additional policy have to be developed and implemented in order to create the right incentives for companies to change their behaviour. The use of toxic chemicals in industry is a global phenomenon, and for policies to truly have an effect on this area, Europe cannot stand alone in its demands for stricter regulation on the monitoring of chemicals use. Furthermore, policy should also encourage the use of alternative chemicals through the use of Green chemistry⁴², which are chemicals developed that do not contain any harmful substances.

The DBFO business model seems mainly to be incentivised in the UK. The PFI was implemented some time ago, but still no other countries have followed suit and been inspired to create similar policies. This could be due to some of the controversies related to the price of private finance versus public finance, but none the less, it seems like a policy that could foster public private partnerships in a time of financial crises and the need for sustainable growth.

When it comes to policies for the life-cycle models, policy initiatives for three of the four main categories of business model elements were identified:

Table 4. Existing policy for life cycle models

Business Model	Existing policy
Green Supply Chain Management (GSCM)	No policies identified
Take Back Management (TBM)	Waste electrical and electronic equipment, EU
Cradle to Cradle (C2C)	Cradle to cradle network, EU National Waste Management Plan, NL
Industrial Symbiosis (IS)	Industrial Symbiosis Kalundborg, DK National Industrial Symbiosis Program, UK Kwinana Synergies Project, Australia

Not many policies were identified to promote take back management among producers. The revised EU policy on e-waste focuses on recycling and reuse of electrical and electronic equipment. While this is an important first step that encourages producers and consumers to consider what happens to obsolete equipment, policy could be developed to broaden the scope of take back of products to other industries. One model that could be used as inspiration is found in several of the Nordic countries where customers pay a small deposit on bottles for beer and soft drinks when they purchase the beverages, and when the bottles are handed back to the shop their deposit is retrieved.

The policies identified related to cradle-to-cradle are mainly focused on waste prevention. While this is central to the enabling of cradle-to-cradle business model elements, it is not the only area that should be relevant for policy intervention. There seems as if there is a gap when it comes to areas such as developing materials that can be reused and recycled or which are constructed to be used as compost. Furthermore, while reducing and reusing waste is important, it is just as relevant to think of new “infrastructures” that can enable the collection of used materials of almost any sort in order to bring them back into the manufacturing processes. These types of efforts should be addressed nationally as well as regionally and globally in order to create a shift in the manufacturing paradigm.

When it comes to policies for promoting industrial symbiosis, we came across three

countries that have created specific policies but in different ways. In Denmark it is the municipality that is the driving force, in the UK the task was initiated by a private company and backed by government funding, and in Australia it is the university that is the driving force behind the implementation of industrial symbiosis. However, these policies all have the same main ingredients – they facilitate the meeting between different companies, identify relevant synergies and provide the necessary skills and competencies for analysing the by-products that can be utilised. However, while several countries have created policy initiatives, there are still countries that could benefit from implementing similar initiatives. And there are already many countries that are in the process of implementing industrial symbiosis initiatives.

Policies at a general level

While a few countries have developed policy that target specific business models, there do not seem to be many countries that have implemented policy initiatives that promote the use of Green Business Model Innovation on a general level. The only relevant policy initiative we have been able to identify is the Business Innovation Fund from Denmark.

Business Innovation Fund, Denmark

The Danish Business Innovation Fund launched a new pilot programme in September 2012 targeting the development and implementation of innovative green business models in Danish companies. The target group is primarily companies with an existing product portfolio that can be adapted or transformed into a new innovative green business model. The programme has a funnel-based design with gates between the different phases and companies are initially screened for fit with the programme. The following two phases constitute the core of the programme:

- **First phase:** The purpose is to help companies clarify whether and how an innovative green business model can increase the companies' turnover and revenue while at the same time making the business greener. To achieve this purpose the companies have to develop a business case for the new business model documenting i.a. economic and green effects, viable pricing schemes as well as technical and legal challenges. Companies are supported through grants that e.g. can finance external advice. Participants for phase two are selected based on the most promising and viable business cases from the first phase.
- **Second phase:** The purpose is to help the selected companies realise and implement the new innovative green business model in their company. After this phase the new business model including new or adapted products and services should be ready for market launch. Companies are supported through grants given for the development and adaptation of solutions to a new green business model.

Day-to-day administration of the programme is handled by a facilitator that also provides guidance to the companies on business model innovation and business development in general. Lessons learned during the programme will provide input for a potential long term anchoring of the policy programme.

Policy suggestions to promote GBMI in the Nordic region

Policy makers greatest challenge is to ensure that the policies they implement will result in the desired effects. In an increasingly global world, the challenge becomes even greater since national policies cannot always stand alone, but will have to interlink with policies in other countries and regions. Good intentions in one country alone are not necessarily enough to create changes in the mindset and operations of companies. Companies can elude local policies by moving their business to alternative geographical locations where they consider regulation to be more lenient and which can make running their business easier and maybe more profitable. Policy making today therefore needs to be looked at on regional levels in order to create widespread coherence.

This is why it makes sense for the Nordic region to look at policy making in a broader perspective than only national governments. On a global scale, the Nordic countries and their home markets are small. Successful Nordic companies operate in several of the Nordic countries and in many instances also become global players. Policy should assist in this development by implementing regulation that is as widespread as possible, instead of creating local policies that make it hard to compete on equal terms globally. In order to be able to create future global players in the areas of green growth, the Nordic countries have the opportunity to join forces and create a common platform backed by Nordic regional policy, which also can become a driving force behind broader policy on an EU and global level.

It is also important to understand what types of companies Nordic regional policy should be addressed to. Based on the case interviews completed during this study, we found that the companies that have taken on elements of green business model innovation are mainly larger companies.⁴³ While there are cases of innovative small companies, it still seems like the focus of new policy should be on assisting SME's in making the necessary transformations of their business models. A particular challenge that needs to be addressed is how SME's will obtain knowledge of green business model innovation in order to inspire them to change their "business as usual". Specific strategies for the dissemination of knowledge on green business model innovation and related policy initiatives should be developed to ensure that as many SME's as possible are informed and reached. Focus should be placed on reaching SME's through networks, workshops

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See case compendium for more detailed results

and targeted solutions.

As green growth is becoming important in the national strategies of all the Nordic countries, environmental and business policies are increasingly converging. Focus in policy making is no longer about either creating growth for companies or preservation of the environment and climate. The areas are interlinked, putting pressure on governments and regions to develop policies that address both issues simultaneously. As a result, governments will have to start thinking of companies as part of a larger ecosystem, and where topics such as life-cycle systems need to be addressed.⁴⁴

Policy needs to be developed in new ways if green growth and green business model innovation is to be enhanced. Dialog between the regulative authorities and private companies can pave the way for a common understanding of the challenges, and the need for new solution and new regulation to go hand in hand. It will be necessary to develop a new culture in the public sector in order to collaborate with private companies on future regulation while at the same time make sure that the regulation is based in objective criteria. A change of mindset requires trust from both sides and will probably take time. But pilot projects and role models can pave the way for the proliferation of collaboration between regulative authorities and private companies on future regulation⁴⁵.

As pointed out at the OECD conference held in Copenhagen on 19 and 20 January 2012, subsidies or direct financial support is not necessarily the best way to promote green growth and green business model innovation. While subsidies encourage customer to buy new green solutions, the green solutions will not always be able to create a sustainable business case when subsidies intervene with the forces of the free market. It is therefore necessary to reconsider the ways in which public sector financing can fund companies in their transformation to greener companies.

It was also pointed out that while government intervention can be good, it is important that the policy support is at arms length. Governments' role should be to set national goals and allocate resources that can be used by companies in the quest for green transition, but they should not interfere in the methods that are used by industry to achieve the targets of becoming greener business.

In the following we present a range of policy recommendations targeted incentive models and life cycle models. We believe it is necessary to combine macro level policies with micro level policies. Policy makers must also focus on creating the necessary framework conditions through entrepreneurship policy, regulatory policy, competition policy and so on while at the same time implementing demand side policies⁴⁶.

⁴⁴ Mont, 2010

⁴⁵ FORA, 2009

⁴⁶ OECD, forthcoming

While the micro level policies are presented according to how they influence specific elements in green business model innovation, they are also meant to be relevant for companies in different industries and sectors, but which have similar elements in their business models.

Policy suggestions to promote incentive models

When looking at the barriers experienced by companies employing incentive models, it can be seen that existing policy help alleviate some of the challenges, but not all. There are also some challenges faced by companies using certain business models that are not currently addressed by policy.

See table below for an overview of the barriers mentioned by companies.

Table 5. Key barriers for incentive models

Incentive models	Key barriers
FS	• Large investments (long-term) tied up in products. • Complicated to involve other companies in value-chain. • Internal company organisation. • Current accounting practices. • Traditional mindsets • Bonus systems for the buyer
ESCO	• Large operating investments for company. • Large refurbishment investments by customers. • Long payback time for customers. • Uncertainty about savings for customers, and financial institutions. • Lack of capital for initial investments and for smaller projects since there is a competition for scarce capital with more traditional investments.
CMS	• Difficult for customers to identify costs linked to chemical usage, handling, disposal etc. and thereby savings with respect to a service supplement from a CMS company. • Long-term contracts deter customers. • Variable chemical usage makes it hard to determine fee. • Lack of customer knowledge about the business model
DBFO	• Lack of flexibility due to long-term contracts. • Complex procurement process for the public sector. • Private capital might be more expensive than public capital. • Lack of insight into environmental impacts. • Uncertainties concerning the calculation of risk among customers

Based on the interviews performed in this project, the barriers experienced by companies and the existing policies, as well as discussions with experts, we present some specific policy recommendations for incentive models in the Nordic region. While some policies make sense to implement in a Nordic perspective, others might make more sense to implement on a national level.

Encourage an efficient public sector

Develop selection criteria for the public sector to procure ESCO, DBFO and functional sales solutions when new investments are made in equipment or fixtures such as when renovating and operating e.g. public buildings and roads. The selection criteria could be linked to existing standards and certifications that ensure sustainability. In the US and the UK they have had positive experience with the use of ESCO in public sector buildings through the use of the Federal Energy Management Program, and DBFO through the use of the Private Finance Initiative.

Governments can be role models in using these new types of business models and experimenting with them, showing other types of customers the benefits, and maybe participate in overcoming some of the barriers by customers who are deterred by the long-term contracts and large investment costs.

The Nordic region could learn from the experience in the UK and the US and implement similar initiatives that also could include the use of other functional sales models in the operation of public sector buildings and infrastructure. Examples include buying the service of office furniture and lighting, instead of buying the fixtures and lamps. The scope could also be broadened to include areas such as municipal car fleets, lamp-posts, water management or waste management.

Selection criteria could be harmonised across the Nordic countries to enable companies in all of the Nordic countries to be able to participate as bidders in public procurement projects. Transparency as well as competition for public procurement projects would be increased.

Increase flexibility in long-term contracts

One of the recurring barriers in all of the functional sales models is the reluctance customers have to the long-term contracts that come with the use of these types of business models. In the UK the Green Deal proposes to solve this issue by allowing the contract to be “sold on” to another customer. For example, if a house owner has refurbished his house under the Green Deal, the improvements are paid via the electricity or gas bill and tied to the property, not the owner of the property. When the house owner sells his house, it will be the new owner that takes over the bill and thereby also the contract and payments.

This contract model could be used as inspiration for developing new types of flexible contracts for CMS and DBFO business models. It should be considered whether it is possible to develop Nordic standard contracts, or whether national regulation and industry specific issues such as personal credit rating and so on would hinder it.

Standards

It should be ensured that relevant sustainability standards are used for services and processes in all industries where standards have been developed. Standards could be developed for e.g. ESCO contracts that make it possible for customers to evaluate which ESCO agreement gives them best value for money. There are already a range of EU and international legislation that promotes the use of standards in various industries. It might be time to revise them with the aim of introducing them to promote the use of green business model innovation across industries.

Furthermore, work could also be done in order to uncover specific needs of governmental, regional and municipal bodies in order to determine what different types of standards would be useful at the different levels. Also here it should be considered whether it is possible to develop Nordic standard contracts, or whether national regulation and industry specific issues such as taxes and tariffs in areas such as energy would hinder it.

Nordic financial rating scheme

One great barrier for companies wanting to green their business model, is often lack of financing. The business models are new to investors, and there might therefore not be much experience in dealing with these types of business models. In particular for companies wanting to go from a business model of selling their products to a functional sales model, finance is vital. Large investments are often required if equipment is to be rented out over a long-term period, instead of the product being sold. These types of investment often have to come from third parties.

If a company wanting to establish a functional sales model can be evaluated by a third party and receive some form of “risk/credit rating”, it should enable the company to gain the trust of investors’, thereby enabling easier funding and overcoming the barrier of access to funding for large investment costs.

We therefore propose that a Nordic rating agency be established that can cooperate with banks, pension funds and other relevant investors in the Nordic countries to be able to evaluate new types of green business models. The investors could work together with national guarantee funds and venture capitalists to broaden the scope of funding.

Policy suggestions to promote life-cycle models

Companies are increasingly employing life cycle models, but also these types of green business model innovation face a range of challenges.

See table below for an overview of the barriers mentioned by companies.

Table 6. Key barriers for life cycle models

Life cycle models	Key barriers
GSCM	• Lack of financial and human resources. • Costs for improving GSCM have a long payback time • Difficult for company to link cost to savings and effects in the internal processes. • Smaller customers may not have the necessary purchasing power to influence suppliers' products or production processes.
TBM	• Complicated logistics of used and obsolete products. The transportation needs to make economic and environmental sense. • New design to enable recycling of products. • Use of new types of materials that can be recycled. • Investments in new machinery. • Unwillingness to share information on chemicals and materials. • Current accounting practices.
C2C	• Complicated to involve other companies in value-chain, e.g. suppliers. • Unwillingness to share information on chemicals and materials. • Sometimes large investments in materials, technology and recycling infrastructure is necessary • Lack of competences and knowledge at the upper management level. • Insufficient case references. • Higher costs involved in switching to other suppliers.
IS	• Difficult for companies to identify synergies between themselves (high search costs). • Lack of trust between companies and unwillingness to share information on production processes. • Lack of available recovery technology to transform by-products into resources. • Need for substantial investments in infrastructure systems within the IS. • Lack of knowledge in companies and public authorities

Based on the interviews performed in this project, the barriers experienced by companies and the existing policies, as well as discussions with experts, we present some specific policy recommendations for the Nordic region. While some policies make sense to implement in a Nordic perspective, others might make more sense to implement on a national level.

Green Public Procurement

The public sector can encourage the use of life-cycle models by demanding products where focus has been placed on GSCM, TBM or C2C by developing selection criteria to be used in public tenders. The criteria can be based on existing certifications such as FSC, Rainforest Alliance, C2C, Ecological Footprint and so on. However, the selection criteria must not be linked to specific certifications, but must be developed to allow for public procurement from several types of certifications.

Furthermore, the public sector can develop criteria for procuring recycled materials, instead of using virgin materials when e.g. buildings and roads are built. Focus can also be placed on designing for recycling, where products are designed to be separated to allow materials to be reused and recycled⁴⁷. The public sector can also encourage IS by developing criteria for the resource cycles of companies participating in public tenders.

The public sector as a customer might help overcome barriers related to getting new customers that do not fully understand the benefits of life-cycle models and green business model innovation. One way to encourage the development of green business model innovation could be by establishing innovation platforms that can help define which problems the public sector needs to solve and which green business models could be employed by establishing public private partnerships⁴⁸.

Selection criteria could be harmonised across the Nordic countries to enable companies in all of the Nordic countries to be able to participate as bidders in public procurement projects. Transparency as well as competition for public procurement projects would be increased.

Infrastructure for recycling

If obsolete and old products are to be used again in production, it will be necessary to develop systems and infrastructures that can encourage the reuse and recycling of obsolete products and materials as well as infrastructure to handle decomposing of biological materials such as bio-plastics.

Some companies have developed their own take-back systems, and teamed up with other companies to create an eco-system that can handle all the parts of the value chain. But this is easier for large companies than for smaller ones. It therefore seems natural for the public sector to assist in creating some of these systems and recycling infrastructures.

For recycling and the reuse of products and materials to become successful, it will also be necessary to create a market for used and recycled products and materials.

⁴⁷ Cirkulær Økonomi i Danmark, maj 2012

⁴⁸ <http://www.bis.gov.uk/files/file34926.pdf>

Encouraging companies to take back their obsolete and old products in order to create materials that can be reused in their own production or sold in the marketplace to other companies, can thereby create a virtuous circle and a new type of market. Inspiration can be found in several of the Nordic countries where customers pay a small deposit on bottles for beer and soft drinks when they purchase the beverages, and when the bottles are handed back to the shop their deposit is retrieved. Regulation can also be developed that requires companies to identify uses for their waste and by-products. Similar incentives can be created for customers in other industries and could encourage the take back and reuse of products and materials such as batteries, phones, cardboard or plastic products.

It is similar for products and materials that can be decomposed. Today there are no real places to decompose bottles made of e.g. maize starch. They are either thrown away with the other garbage, or put into plastic recycling containers.⁴⁹

We therefore suggest the development of new types of recycling systems and infrastructure that could be developed in Nordic cooperation to promote the use of TBM and C2C and overcome barriers linked to recycling infrastructure and logistics. If the Nordic countries are first movers in this area, the systems and infrastructures could be exported to the rest of the EU as well as globally where the demand for them soon will grow.

Standards

It should be ensured that relevant sustainability standards are used for products and processes in all industries where standards have been developed. For example, in the building sector standards such as BREAM, LEED and DGNB have been developed to ensure sustainable buildings. The public sector could set these standards as selection criterion in all areas of public procurement.

In the US a new label for recycling has recently be launched with the participation of several large corporations. Products are labelled with a recycling logo so consumers know whether the product can be handed in for recycling, and what type of recycling is possible (e.g. plastic, paper, metal).⁵⁰

The Nordic countries have already developed the Nordic Ecolabel⁵¹ that is a voluntary eco-labelling scheme that evaluates a product's impact on the environment throughout the entire lifecycle. This could be expanded to cover more products and services, and a new branch could be developed with inspiration from the US that tells consumers how their products can be recycled.

⁴⁹ FORA, 2009

⁵⁰ www.how2recycle.info

⁵¹ www.nordic-ecolabel.org

R&D of new materials and chemicals, and access to information

For small and medium sized companies wanting to use new materials in the production and in products, research and development is a large cost to bear. They also have little or no knowledge of how it can be done. It often requires new processes, designs, products and services and it can be hard to determine which is the first step to take. It is also capital intensive and perceived as being risky, since the results of developing new materials are not known in advance. The company does not know if the new material will be usable, how long it will take to develop and so on. There also seems to be a need to promote the use of Green Chemistry and encourage companies to develop and use alternatives to harmful toxins used today. New research shows that it is possible to develop new chemicals by going back to the drawing board and determining from the outset what characteristics a particular chemical should possess.⁵²

We therefore suggest supporting companies in the early stages of the changes they must make to green their business and transform their business models, when ideas are being developed, new innovation processes are beginning and where products are redesigned⁵³. One focus area could be on the development for research of new materials and chemicals, for example in partnerships with universities. In addition it seem as if providing access to information of new methods in production and the use of new materials and chemicals also could benefit companies significantly⁵⁴. Supporting the development of new materials and chemicals will benefit most of the life-cycle business model elements, and particularly GSCM and C2C when overcoming barriers linked to overcoming the large investments in the short-term in materials and machinery.

Implementing policies for green business model innovation

For the policies to be implemented successfully in the Nordic countries, it will be necessary to uncover whether there are current or up-coming strategies or initiatives in each of the countries where the above recommendations would fit, and whether the policy recommendations can be implemented in the current frameworks. Existing relevant green innovation funding programs could include or have a strategic focus on the life cycle and incentive model elements such as ESCOs or C2C. These programs could for example be in line with the pilot project of the Danish Business Innovation Fund with particular focus on SMEs or in relation to export guarantees.

⁵² http://www.greenbiz.com/blog/2012/07/26/green-chemistry-product-innovation?page=0%2C1&utm_source=E-News%20from%20GreenBiz&utm_campaign=21c7056b94-GreenBuzz-2012-27-07&utm_medium=email

⁵³ Josiassen & Rosted, 2010

⁵⁴ Mont, 2010

In addition, more general policies to promote green business model innovation could be implemented in some of these existing programmes as suggested below:

Networks and partnerships for each type of business model innovation

Experiences from government-backed networks, show that getting companies to meet and share experiences often lead to new partnerships that result in new products or other types of innovation. Experience from NISP in the UK shows that facilitated networks give the best results when a neutral facilitator can create and manage the contact between the network members when complicated information needs to be shared in order to achieve appropriate matchmaking. NISP has more than 15,000 members and has created 2,000 synergies. Experiences from Denmark show that companies participating in innovation networks have a higher chance of developing new products and increasing their sales, in particular for SME's.⁵⁵ Networks focusing on promoting the use of Green Business Model Innovation and sharing best practice will not only benefit the companies participating in the networks, but also other companies that are part of their value chains.

The range of challenges which are faced by partnership innovations can sometimes be overcome if the public sector takes responsibility as facilitator in the creation of the partnership. This is particularly relevant if area for innovation is government regulated, which often is the case in relation to green business model innovation. Sometimes new solutions are only commercially relevant if the regulation is changed. But often regulation can only be changed if new solutions are in place. In that way a chicken or the egg dilemma can hinder innovation. Dialog between the regulative authorities and companies is the way forward to overcome the dilemma and implement new policy⁵⁶.

One focus area could be on scaling up local industrial symbiosis initiatives for them to be supported by regional and national public authorities in partnerships to drive down the search costs of the information required. An analysis, including a preliminary mapping of each of the countries potential as well as key barriers, could be undertaken as well as to investigate which possibilities there would be for co-funding from the EU Commission as a first step.

Another focus area could be on creating partnerships between functional sales or ESCO companies and financial institutions that are willing to invest in products that are tied up over long periods while their service is offered to customers.

Furthermore, some networks could focus on developing new skills and competencies by experimenting with new types of work teams. Green business model innovation requires people and teams to consider how to develop products, services and processes from a systems thinking and design thinking perspective, looking at entire eco-systems

⁵⁵ Innovation Network Denmark, 2010

⁵⁶ FORA, 2009

and the way the different components influence each other. In order to achieve this, teams will have to be increasingly cross disciplinary and employ new conceptual methods to their innovation processes where expert knowledge can be combined with holistic thinking.⁵⁷

Nordic networks and partnerships could focus on industries and business model elements where there is not a critical mass of companies in one single Nordic country alone. But by including companies from the entire region, a larger group of companies will have the possibility to meet and share experiences, and create partnerships and winning teams for potential exports.

Showcases, demonstration projects and dissemination

The Nordic countries are considered innovative and have a history of a society and culture that consists of a sustainable way of living as well as high living standards. They are often considered as a market with customer that demand a more sustainable way of living, and have been chosen by some companies as test markets for new concepts and products (e.g. Better Place's electrical vehicles).

This is a platform that could be expanded in a Nordic perspective by promoting the Nordic countries as a showcase for green living and enabling test sites and demonstration projects for new green products and services and companies that employ greener business models. By showcasing green living customers, employees and suppliers will have the possibility to learn about the new offerings and educate themselves as to why it makes sense for companies to offer more sustainable products and services via changes in their business models, and companies will have a channel of communication.

The fundamentals for this platform are already in place in some areas in some of the Nordic countries. For example, Finland has a long tradition of using living labs and many well functioning ones have been established across Finland. This platform could be used to promote green business model innovation and the living labs could be used as test sites for new products and services. Specific industries could be chosen for demonstration projects such as C2C neighbourhoods. In Denmark the municipality of Kalundborg has shown the world how an industrial symbiosis can operate and function. This could be another platform that can be used to showcase Nordic companies with a greener focus. Intelligent public demand could also be used as a platform for choosing public projects that can showcase the use of green business model innovation. In order to make a Nordic platform for showcasing green living, it might make sense to map which countries have certain capabilities that can be taken advantage of in a Nordic setting.

Furthermore, efforts should also be put on dissemination of green business model innovation by e.g. educating business advisors in public and private agencies.

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Brown, 2008

Conclusions

Companies mindsets are changing and many of them are embracing the opportunities that can be found in green business model innovation. It is possible for a company to transform the way it does business to a more sustainable model and contribute to green growth, even though it is not a cleantech company. Technology is not necessarily the main driver for a company moving towards a more sustainable way of doing business. Innovation is taking place throughout the entire company and its value chain, where green business model innovation is becoming an important lever for change.

Companies are also finding green business model innovation to be good business. Companies replace resources and raw materials that are scarce and therefore costly with alternative materials that can be reused and recycled, or which are in abundance, and can see results on their bottom line due to savings. Other companies are becoming more efficient in the way they operate by selling their products as services to their customers, where the products quality is optimised to last longer and where maintenance is reduced to improved product design.

While becoming more efficient and using more sustainable resources reduces costs, the effect is also seen on the environmental impact by companies. More sustainable and greener resources means less harmful and toxic chemicals used in production or emitted into the environment and climate.

The increased awareness of green and sustainable ways of doing business is also becoming a driver of innovation for many companies, where they seek to design new product and services that are more sustainable and improve their processes in their own company and throughout the entire value chain through green business model innovation.

There are also signs of policy makers finding ways to contribute to companies' sustainable innovation through national green growth strategies as well as policies to promote green business model innovation. Policies have to be developed in several layers - at macro levels where taxes are put in place to correct for the negative externalities that are not included in today's prices - and at micro level where incentives are created to promote

innovation among companies. Furthermore, demand side policies can facilitate the transformation of companies and accelerate the move towards more sustainable ways of doing business.

Governments, regions as well as local authorities and municipalities have to find ways to work together with the business community through partnerships and networks, where change is implemented together to overcome the global challenges faced by everyone.

At the same time, companies also have to learn how to work together with each other, and some companies are also forming partnerships and cooperating with NGO's. As pointed out by president Peter Bakker of World Business Council of Sustainable Development in an interview with the Guardian, now is time for action. A lot of work has been put in to creating awareness of the challenges and many reports have been written; now it is time to "concentrate on the scaling of solutions"⁵⁸.

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Green Business Model Innovation

Conceptualisation, Next Practice and Policy

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