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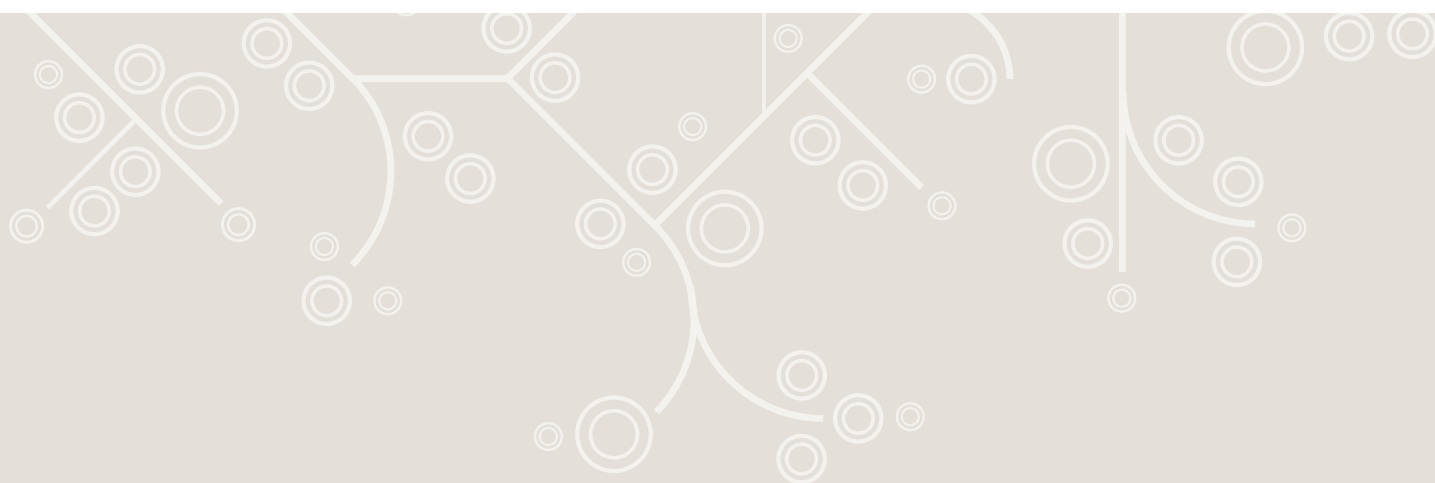
Green Business Model Innovation

Policy report



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Authors:

Kristian Henriksen, Markus Bjerre, Jakob Øster, Tanja Bisgaard

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Executive Summary

Companies are increasingly recognising that sustainability 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 in-novate 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.

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 efforts¹.

This report focuses on identifying policy initiatives that contribute to promoting the use of green business model innovation and the direct effects that policy has on enabling companies to implement it. By uncovering barriers to implementing green business model innovation and creating an overview of some of the existing policies and their effect, the work aims to suggest and develop new policy initiatives that can promote green business model innovation in the Nordic region.

The greening of businesses is structured with respect to two main categories of elements in companies' business models: the incentive models and the life-cycle models.

- *Incentive models:* companies create incentives for customers and themselves to use re-sources more efficiently by e.g. offering a service where the pay is linked to the usage of a product, rather than the product itself. The company is incentivised to

¹ OECD, 2012a

expand the life of the product through good care, while the customer pays less the less is used. The incentive models identified are Functional sales (FS), Energy Saving Companies (ESCO), Chemical Management Systems (CMS), and Design, Build, Finance, Operate (DBFO).

- *Life-cycle models:* companies focus on greening their value chain, in parts or throughout the entire value chain. Companies improve resource use, design products so they can be taken back and reused or recycled, or develop products that are not harmful to the environment and customers' health. The life-cycle models identified are Green Supply Chain Management (GSCM), Take Back Management (TBM), Cradle to Cradle (C2C), and Industrial Symbiosis (IS).

These eight elements of business models are *ceteris paribus* perceived to have a more positive impact on the environment than "business as usual" practices in businesses, as well as to have the possibility to have a positive impact on the company's earnings. These elements often have an emphasis on non-technological innovations, or the technology is an enabler of the innovation rather than the driver of the innovation, which is the case for greentech and cleantech companies. This list of elements to green business model innovation is most likely not a complete list, but has formed the basis and focus area of the research.

Policies for Green Business Model Innovation

Some countries have developed and implemented policies targeting specific green business model innovation. They do not seem to form part of national or more overall strategies with respect to green business model innovation, but have the characteristic of being single standing policies in the countries that have implemented them. Policies that directly impact one of the eight elements of green business model innovation have been identified and included in this study. The following table gives an overview of the policies identified:

Business Model Element	Existing policy
<i>Incentive models</i>	
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

Business Model Element	Existing policy
Design, Build, Finance, Operate (DBFO)	Private Finance Initiative, UK
Life-cycle models	
Green Supply Chain Management (GSCM)	No policies identified
Take Back Management (TBM)	Directive on 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

When looking at the two main categories of elements for green business model innovation, it was possible to identify at least one policy initiative for the three specific incentive models, but none for the more generic functional sales model.

The ESCO business model seems to be the single functional sales model that has achieved most attention from policy makers so far. The results from the FEMP in the US are encouraging, speaking for implementing similar policy initiatives in other countries.

The CMS business model is promoted in Europe through a European-wide policy initiative REACH. However, if the goal is to eliminate toxic chemicals from industry, additional policy has to be developed and implemented in order to create the right incentives for companies to change their way of doing business.

The DBFO business model has been promoted in the UK. While there have been some controversies related to the price of private finance versus public finance, it still seems like a policy that could foster sustainable projects through 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 were identified for three of the four main categories of models.

TBM is in its early days of being promoted through EU policy focusing 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.

C2C is mainly promoted through policies that focus on waste prevention. There seems to be a gap when it comes to areas such as developing materials and designing products

that can be reused and recycled or which can be used as compost. There also seems to be a lack of policy to promote new “infrastructures” that can enable the collection of used materials in order to bring them back into the manufacturing processes.

IS is promoted through policy in a range of countries. We have described three countries that have created specific policies in different ways to promote IS. 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.

On a more general level, there do not seem to be countries that strategically have implemented policy initiatives that promote Green Business Model Innovation. The only relevant policy initiative we have been able to identify is the Business Innovation Fund from Denmark, which has been inspired by the early work of this project.

The pilot programme seeks to transform companies business models through green business model innovation by putting them through two stages. In the first stage the companies potential is identified and a business case is made before going on the second stage where the companies receive guidance and coaching in how to transform the business models.

Policy recommendations to promote GBMI 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 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 companies². 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 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 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. For example, if a house owner has refurbished his house under the Green Deal in the UK, the improvements are 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.
- *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 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 the licence from government. Investors could work together with national guarantee funds and venture capitalists to broaden the scope of funding.

Policy recommendations to promote life cycle models

Companies transforming their business models into incentive 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. Furthermore, the public sector can develop criteria for procuring re-cycled materials, as well as demanding design for recycling, where products are designed in order to be separated to allow materials to be reused and recycled. 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. 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. 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. The Nordic countries have already developed the Nordic Ecolabel that is a voluntary eco-labelling scheme that evaluates a product's impact on the environment. This could be expanded to cover more products and industries. 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. Furthermore, a new type of standard could be developed with inspiration from the US 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 customer 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.

Preface

This policy report is one of four reports in the work related to Green Business Model Innovation completed for the organisation Nordic Innovation. The other reports in this series are *Green Business Model Innovation Conceptualization Report*, *Empirical studies of Green Business Model Innovation* and a *Synthesis report of Green Business Model Innovation*. The work builds on the report *Green Business Models in the Nordic Region – A key to promote sustainable growth*³.

The work behind this report 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 behind the policy report at The Danish Business Authority consisted of: Jakob Øster, Head of section, Kristian Henriksen, Special Advisor, Markus Bjerre, Head of section, Alexandra-Maria Almasi, research assistant, and Emil Damgaard, research assistant. In addition Tanja Bisgaard from Novitas Innovation has participated in the final stages of the work and the making of the report.

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1. Introduction

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, business and consumer level if we are to retain our standards of living and create long-term growth for emerging economies.

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 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.

In order for policy makers to contribute to the positive development in the business community and develop policy that fosters sustainable business, it is necessary to understand how companies make these transformations of their business models and what barriers they encounter. An in-depth review of the elements of green business model innovation is presented in the report *Green Business Model Innovation: Conceptualization Report*. Furthermore, experiences and insights from the 41 business case studies as well as input from experts are drawn upon in the discussion and development of policy suggestions. The findings of this report are integrated with the findings of the entire project in a synthesis report.

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 efforts⁴.

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. Moreover, companies call for practical tools, which can help them implement 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.

1.1 Aim and focus of the policy report

This report focuses on identifying policy initiatives that contribute to promoting the use of green business model innovation that holds the potential to transform companies' business models into greener ones. We have identified policies that have a direct effect on the eight elements of green business model innovation. By uncovering barriers to implementing green business model innovation and creating an overview of existing policies and their effect, our work aims to identify existing and new policy initiatives that can promote green business model innovation in the Nordic region.

The Nordic Council of Ministers and Nordic Innovation have recently focused on green business model innovation, and this policy report is a contribution to strengthening the knowledge in this area and contributes to the vision of how to continue to make the Nordic region the 'Green Valley of Europe'. This entire project's findings will be discussed at a meeting for the Nordic Council of Ministers in late 2012, but it can also serve as inspiration for countries and policymakers that would like to explore this area further.

The aim of the Nordic project *Green Business Model Innovation* is to develop and anchor policies in the Nordic countries to support the framework conditions of Green Business Model Innovation for Nordic companies. The ambition is to encourage Nordic companies to make use of Green Business Model Innovation by disseminating information on how they work and how they benefit existing companies. Focus is placed on creating awareness among Nordic policy makers on what barriers must be overcome to spur green business model innovation and how policy initiatives can play a role in overcoming some of these barriers. The policy report presents recommendations

⁴ OECD, 2012b

for new feasible policies for Nordic policy makers inspired by policies implemented in countries around the world.

The work is relevant for companies wanting to transform the way they do business to “greener” ones, as well as for academics and scholars interested in inspiration on how to create green growth through policy interventions.

1.2 How to read the report

A brief first chapter introduces the concept of green business model innovation, but for a complete view of this see the conceptualization report. The next section takes a look at selected policies targeted the different types of business models we describe. Each of the eight identified elements of green business model innovation are briefly described and existing policies are described where we have identified some. Finally we take a look at the barriers experienced by companies and how policy can participate in overcoming the barriers. Based on this understanding and the existing policies, new policy suggestions for the Nordic region are proposed.

2. Methodology

The policy report has drawn on desk research carried out to uncover policy recommendations from international organisations like the OECD, the EU, and the Nordic Council of Ministers. Reports from private consultancies containing policy recommendations have also been uncovered. Furthermore, inputs from the 41 business case studies conducted during the project also contribute to the development of policy recommendations.

Inputs from the policy workshop held in 2010 as part of the Green Paper is part of the first contribution to the list of policy recommendations and is supplemented by desk research that has been carried out to uncover existing national and regional policies that support and disseminate the use of green business models. Moreover, the joint workshop together with the OECD, the European Commission and Nordic Innovation in January 2012 has also led to many useful insights on the policy side.

2.1 Delimitation

There are several ways to promote green growth and eco-innovation. There is a lot of focus on developing new technologies that can help solve the global challenges related to climate change and resource scarcity. New industries are emerging where cleantech and greentech companies offer solutions to save resources, create energy from renewable resources or drive fuel-efficient cars. And the list of solutions keeps getting longer. However, companies do not necessarily have to develop new technologies in order to become greener and participate in solving the global challenges. Many companies can change the way they do business, and thereby participate in having a positive effect on the environment as well as ensuring a competitive company. In this study we have chosen to limit the type of policies we examine, to the ones that have an effect on transforming companies' business models into green ones and we have specifically focused on non-technological innovation.

2.2 Conceptualising Green Business Model Innovation

In the literature, there has so far not been established an internationally acknowledged definition of *green business models* or *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 or how they are categorised as green companies. These terms are ranging from the more product and service oriented perspectives like cleantech companies that produce e.g. renewable energy such as wind and solar power, resource efficient products such as energy efficient pumps, environmental services and so on, to companies that implement more process oriented initiatives in their businesses or value chain such as environmental ISO-standards, cradle-to-cradle, Corporate Social Responsibility (CSR) or green reporting⁵.

We structure the greening of businesses with respect to two main models: the *incentive models* and the *life-cycle models*.

We have identified eight elements of green business model innovation, where the way business is done has a more positive impact on the environment than “business as usual”, as well as the company’s earnings. This is most likely not a complete list, but has formed the basis for our research. Some companies have started up using a green business model while other companies have changed the way they do business, thereby transforming their business model into a green one.

2.2.1 Incentive models

A particular way to green ones value chain is to create incentives for customers to use resources more efficiently. Examples of such models are functional sales where the manufacturer offers the service of his product to customers who pay according to usage for the product, rather than the product itself. The ownership of the product stays with the manufacturer, giving him incentives to design, manufacture and operate the product, so that it minimises the use of energy, resources, requires minimal maintenance which in addition have a positive effect on the bottom line. See table 1 for a short introduction of the incentive models.

⁵ For a more in-depth description of green business model innovation see the project report “Green Business Model Innovation: Conceptualization report”

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, Oper-ate (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.

2.2.2 Life-cycle models

There are many different ways of greening a company's value chain, and also companies may focus on smaller or larger parts of the value chain ranging from fully implemented cradle-to-cradle to more or less implemented green supply chain management, take-back arrangements, life-cycle thinking etc. In between there are a many different ways of greening ones value chain. One example is the industrial symbiosis model (industrial ecology) that centres closely around neighbour companies' surplus input/output resources and utilising these in the most optimal way across the companies in the industrial symbiosis. See table 2 for a short introduction of the life cycle models.

Table 2. Life cycle models

Green Supply Chain Manage-ment (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 ⁶ .
Take back man-agement (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 ⁷ .

⁶ <http://www.effektivitet.dk/-/media/858769/ECCD3A45E1BA7D59B5DD06246E.ashx>

⁷ Van Rossem et al, 2006

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 ^{8 9} .
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.

8 Kelly, 2010

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

3. Policies for Green Business Model Innovation

Our focus is on identifying policies that directly promote the use and dissemination of green business model innovation. While there also are “indirect” policies such as landfill tax, carbon tax and so on that play an important role in creating more sustainable behaviour amongst companies and consumers, we have chosen not to include these types of policies in this report. For a short overview of each of the Nordic country’s green growth strategies, see appendix I.

3.1 Policies for specific green business models

Some countries that have developed policies targeting specific green business model innovation. We have identified the ones we believe directly impact one of the eight elements of green business model innovation we have chosen to include in our study.

In the following we briefly describe each of the eight elements, and present a short company case within each of the eight categories. We give an overview of some generic barriers to implementing the green business model, but it is important to keep in mind that many of these conditions will vary from country to country as well as depending on industry.

We also present an overview of the existing policies we have found to promote each element of business model and which will help encourage companies to transform their business into a greener one. In many of the policy cases we have been able to uncover evaluations of the effect of the policy. However, these evaluations are mainly focused on outputs and positive outcomes, and information related to costs and investments have not been possible to identify. This makes it difficult to fully evaluate the effects of the implemented policies, never the less, we hope the information will still prove useful in demonstrating what can be achieved through policy.

3.2 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 optimize and maintain the product to ensure life cycle cost efficiency, which in turn reduces the environmental impact.

CASE 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 reduction¹⁰.

3.2.1 Barriers

There might be some initial hurdles related to convincing customers - private as well as business customers - that buying a service might be better than owning the product themselves, however there seems to be more barriers related to how a company organises itself internally and its corporate culture. Some of the barriers that have been mentioned are e.g. lack of integration between corporate divisions, separation of departments in companies between the financial bodies responsible for investments and the bodies responsible for operation, or lack of knowledge about benefits of the functional sales model.

When adopting a functional sales model, it will require including new actors in the value chain. New actors require training, and companies find it too time consuming or difficult to teach new actors what it takes to keep the customers happy.

Current accounting practices might also be a barrier for customers wanting to buy a service instead of a product. A customer that owns a product also has the products registered as assets in its accounts. However, buying a service instead will result in the company's assets declining, and might lead to a fall in credit rating. Furthermore, it is a challenge to change from short-term profit realisation at the point-of-sale to longer time amortisation periods at the point-of-service. Offering products and their services

¹⁰ FORA, 2010

will require large investments in the products that put strains on companies' capital and cash-flow.

3.2.2 Existing policies

We have not found any existing policies that focus on promoting the use of functional sales at this general level. However, based on the barriers described, it would seem like a good idea to introduce policy frameworks that can promote functional sales on a broad scale. One of the reasons for the absence of policies in this area identified by Mont (2003) is due to the lack of using the principles of life cycle thinking. Environmental policy has historically been formulated in relation to specific categories such as air, water and land. In order to formulate policies related to functional sales (or product service systems, PSS) it is necessary to design policies where the environmental impact is considered across the entire life cycle of a product and thereby the entire value chain of the company offering the product.

We have found policy examples that are targeted specifically towards the incentive models Energy Saving Companies (ESCO), Chemical Management Services (CMS) and Design, Build, Finance, Operate (DBFO) that are described in the following.

3.3 Energy Saving Companies (ESCO)

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 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 savings¹¹.

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. We have not been able to find any policy aimed at promoting the MASCO and WASCO business models specifically. However, we have found some research done on MASCO business models in TEKES in Finland which was a joint research project including academics, industry as well as policy makers¹², and where the aim of the project was to test several ways to use MASCO business models.

3.3.1 Barriers

ESCO suppliers will have to be able to make larger investments themselves, as they take over the investments and risks of their customers. These investments are often perceived more risky, as the customers' behaviour and actions now will influence the ESCO provider. In addition, there will be an increase in competition for scarce capital compared to more traditional investments.

A lack of knowledge among customers in the private market, the public sector and in the business to business sector may hinder the demand of ESCO solutions. Customers are reluctant to invest in large upfront investments since they are uncertain of the potential savings, and are deterred by the long payback time of the investments as the period of time they own the property might be shorter than the expected payback time. Lack of trust in suppliers might also lead to reluctance to committing to long term ESCO contracts.

3.3.2 Existing policies

Three relevant policies to support and disseminate the use of ESCO agreements were uncovered:

- *Federal Energy Management Program - FEMP (US)*
- *ESCO-Light (DK)*
- *The Green Deal (UK)*

The Federal Energy Management Program in the US has existed since the beginning of the 1970s, while ESCO light is in its trial phase in Denmark, and the The Green Deal is to be introduced in the UK later this year. They are described briefly below¹³.

¹² http://management.aalto.fi/en/research/groups/responsibility/research_projects/

¹³ See Annex A for more detailed information on the identified policies

Federal Energy Management Program - FEMP (US)

This program was first introduced in 1973 at the time when the US was experiencing its first energy crisis. The 1973 oil price increases was estimated to have cost the US economy USD 350 billion. The FEMP was mandated to help federal agencies set the example in reducing energy use, energy costs, and emissions in public sector facilities.

The FEMP provides alternative financing contract support, technical assistance and training, co-ordination of federal reporting and evaluation, and supports the introduction of advanced technologies into the federal vehicle fleet and other activities that assist federal agencies. The FEMP website provides a comprehensive range of information aimed at agency energy managers.

Effect

Concerning energy savings performance contracts (ESPCs) as of May 2011, more than 570 projects worth USD 3.9 billion were implemented at 25 federal agencies in 49 states and DC.

These projects saved an estimated:

- 32.8 trillion British thermal unit (Btu) annually; equivalent to the energy consumed by 345 000 households or a city with a population of 893 000.
- USD 13.1 billion in energy costs¹⁴

ESCO-Light (DK)

The focus of the ESCO Light initiative is to promote energy efficiency in private homes.

An ESCO Light pilot project was initiated in Middelfart, resulting in savings equivalent to the energy consumption of 25 private houses were realised. To motivate the inhabitants of the municipality, citizens received DKK 1¹⁵ pr kWh they saved during the pilot project.

The ESCO Light evaluation helped the customer identify, plan and complete energy efficiency measures, making it easier for the customer to implement an energy efficiency solution. The ESCO Light initiative combines energy efficiency expertise, assistance in implementation of the measures, payback model and a guarantee that savings will be achieved.

The homeowner will have to pay for any work done up front. However, the energy efficiency measures that have been implemented in a house should be visible immediately by a reduced energy bill, giving the homeowner the benefit of the savings instantly. In addition to the savings attained on the energy bill, the homeowner will be

¹⁴ Read more: <http://www1.eere.energy.gov/femp/>

¹⁵ Equivalent to approximately 13 eurocents

able to receive DKK 0,24 pr kWh they save by participating in the ESCO Light initiative.¹⁶

The Green Deal (UK)

The focus of the Green Bill is to reduce CO2 emissions in the UK, by reducing the energy consumption in people's homes and in commercial buildings.

The Green Deal is focused on energy efficiency measures that meet the golden rule - the expected financial savings must be greater than the costs attached to the energy bill.

The Green Deal offers the opportunity to repay the investments made in home energy improvements through energy bills, spreading the costs of the investment. There will be no upfront cost to the owner of the property. Furthermore the bill payer is only liable to make Green Deal payments whilst they are liable to pay the energy bill at the property. Once the property is taken over by another owner, the new owner will take on the Green Deal payments associated with the energy bill. Once the payments for the investments have been made, they will be taken off the energy bill.

Effect

The scheme is being implemented in full in 2012 and is expected to provide opportunities for skilled and unskilled labour - from assessment to installation, from manufacturing to supply - sustaining and creating jobs in the UK. The prediction is that 100,000 jobs could be created throughout the supply chain within five years.¹⁷

Decoupling Policy California (US)

California's utility-sector customer energy efficiency programs date back to the 1970s and have grown and evolved substantially over three decades. Investor-owned utilities administer energy efficiency programs with oversight by the California Public Utilities Commission (CPUC), which establishes key policies and guidelines, sets program goals, and approves spending levels.

Decoupling is the separation of a utility's profit from its sales of electricity as a commodity. Instead, a utility's revenue is met by setting a revenue target, then electricity rates are regularly fine-tuned to meet that target¹⁸. Utilities submit their revenue requirements and estimated sales to regulators. The CPUC sets the rates by regularly applying adjustments to ensure that utilities collect no more and no less than is necessary to run the business and provide a fair return to investors. Any excess revenue gets credited back to customers. Any shortfall gets recovered later from customers.

¹⁶ Read more: www.ens.dk

¹⁷ Read more: http://www.decc.gov.uk/en/content/cms/tackling/green_deal/green_deal.aspx

¹⁸ <http://www.aceee.org/energy-efficiency-sector/state-policy/california/1575/all/191>

Effect

California's per capita energy has remained relatively flat over the last thirty years. In perspective, energy use per capita in the rest of the country has surged by 50 percent¹⁹.

3.4 Chemical Management Services (CMS)

The number and diversity of chemicals produced and used in society today are growing in conjunction with both the evident and uncertain environmental impacts associated with the life cycles of these chemicals. 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. This strategy also has the potential for reducing the environmental impacts of chemicals.

The chemical provider and the chemical user have the common goal of reducing the 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: the customer is interested in the final result—the number of cars painted, the period during which equipment is properly lubricated, the outcome of a cutting process in which cutting fluids are used, the cleanliness of the machine parts cleaned by a solvent, and so forth.²⁰

CASE 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 respectively²¹.

¹⁹ www.cpuc.ca.gov

²⁰ Mont et al, 2006

²¹ See project case studies for complete case description

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.

3.4.1 Barriers

Customers are often reluctant to make agreements with CMS providers since the contracts are long-term making it difficult for the customers to switch to other suppliers. Furthermore, customers often lack trust in the CMS supplier and are unwilling to provide confidential process information.

The value of CMS lies in its ability to reduce total chemical costs. It is often difficult for firms to identify and link costs to chemical usage, making it hard to determine the total costs of chemical use, and thereby assess the benefits of a CMS program. The result is often that customers are reluctant to budget adequately to improve the environmental impact of the company.

CMS makes most sense when it is a large quantity of services that can be sold, making it more valuable for large companies. Variable production can also be a barrier to implementing CMS, as varying chemical usage makes it hard to determine appropriate CMS fees.

Contracting CMS is more complicated than selling/buying products, especially across European countries.

3.4.2 Existing policies

We have identified a policy initiative at European level called the Registration, Evaluation, Authorisation and Restriction of Chemical substances (REACH). It is described briefly below.

Registration, Evaluation, Authorisation and Restriction of Chemical substances (REACH)

REACH is the European Community Regulation on chemicals and their safe use, and was established in 2007. In 1981 there were more than 100.000 types of chemical substances that had been introduced to the European Community and that had not been tested. New regulation in 1981 demanded new chemical substances to be tested, resulting in 3.800 substances being registered and analysed. However, there were still over 100.000 chemical substances where there was a lack of sufficient information publicly available in order to assess and control them.

REACH was therefore implemented with the aims of improving protection of human health and the environment from the risks of chemicals. Any company that imports or manufactures products with chemical substances in, or chemical substances

themselves, are obliged to report them to the REACH Agency, and ensure that there is relevant information available on hazards and how to handle the substances.

The Agency evaluates the chemical substances reported by companies, and chemicals of very high concern are made subject to authorisation and a list of the substances is published. Companies using these substances are monitored, and are required to constantly investigate whether there are less harmful chemicals that can be used as substitutes.^{22 23}

Effect

A survey sent to companies in 2012 found that 72 percent of companies thought it had led to an increase in access and scrutiny of information about chemical substances and 24 percent indicated that they had been able benefit from REACH through increased knowledge of substances and properties.

It was asserted that the registration process has had an impact on innovation, but the list of hazardous chemicals is currently creating the greatest deal of innovative activity. Authorisation and restriction, while important in specific sectors affected, are affecting a smaller part of the industry. It has not been able to discern overall unequivocal benefits for consumers, the market and society at this stage of implementation.

Highly innovative SMEs have a more negative view of the overall effect of REACH on innovation than large firms for the present and the future²⁴.

3.5 Design, Build, Finance, Operate (DBFO)

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.

²² http://ec.europa.eu/environment/chemicals/reach/reach_intro.htm

²³ EC, 2007

²⁴ http://ec.europa.eu/enterprise/sectors/chemicals/documents/reach/review2012/innovation_en.htm

CASE 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 pct 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.²⁵

3.5.1 Barriers

Customers are often not aware of the potential benefits a DBFO model can have, both financially and environmentally. Furthermore, there is a lack of documentation on the results of such contracts, making it hard to evaluate whether a DBFO model would make sense.

Customers are also concerned with a lack of flexibility due to long-term contracts, and uncertainty concerning the calculation of risk between the different parties involved.

Public organisations deciding to go ahead with DBFO models are often deterred since the procurement process is often more complex and lead to additional transaction costs.

Another barrier seen from the eyes of the public sector is that private finance which is raised to fund the DBFO projects, often are more expensive than raising public finance. But at the same time, finding public finance is often harder than finding private finance. DBFO thereby allows the public sector to renovate and build at a faster rate since the funding comes from private sources.

3.5.2 Existing policy

We identified an initiative in the UK that seeks to promote the use of the DBFO model. It is described briefly below²⁶.

The Private Finance Initiative (PFI), UK

In 1992 the Private Finance Initiative (PFI) was introduced as a way of generating new investment in public services without raising taxes²⁷ and to benefit from the private sector skills in management of projects and services traditionally undertaken by the

²⁵ FORA, 2010

²⁶ The Danish Competition and Consumer Authority and the municipalities have also for some years had a focus on DBFO and have helped with funding, networking, and guidance.

²⁷ House of Commons, 2001

public sector. PFI differs from privatisation since the public sector retains a substantial role in the project, either as the main purchaser of the project or as an essential enabler of the project. It also differs from contracting out since the private sector provides the capital assets as well as the services. PFI contracts can be used in any public sector.

Groups of private investors manage the Design, Build, Finance and Operation of public infrastructure based on specifications decided by public sector managers and their departments. Under the PFI, the public sector does not own the asset, such as a hospital or a school, but pays the PFI contractor a stream of revenue payments for the use of the facilities over the contract period. Once the contract has expired, the ownership of the asset either remains with the private sector contractor or is returned to the public sector, depending on the terms of the contract.

In total, 61 new PFI projects were being procured as of March 2011, with a total estimated investment value of 7 billions pounds. This is additional to over 600 billion pounds of capital investments already committed by private investors under signed PFI contracts²⁸.

3.6 Green Supply Chain Management (GSCM)

Green Supply Chain Management 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 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 goods.²⁹

²⁸ House of Commons, 2011

²⁹ See project case studies for complete case description

3.6.1 Barriers

Suppliers often lack relevant information on regulation and how to implement green supply chain best practice. A lack of tools for companies makes it hard to optimise the supply chain with environmental management.

Companies also experience a range of internal barriers such as a lack of financial and human resources to develop new products and processes, as well as a lack of awareness amongst both management and employees. Lack of resources is probably one of the most important barriers, since the resources have to compete with other priorities in the company.

Costs have to be incurred in the short term whilst the benefits can take years and often can be difficult to associate with the measures taken. In particular SMEs have difficulties in investing the needed amount of capital in greening their supply chain.

3.6.2 Existing policy

We have not been able to identify any policies that specifically support the use of GSCM. However, one source of inspiration can be found in Forum for the Future which is a British non-profit organization with a mission to promote sustainable development. It runs partnerships with more than 90 organizations across business and the public sector to incorporate the principles of sustainable development. The *Sustainable Business Model Group* is a specialist network for partners that work with sustainable business models. It connects global pioneers from across different sectors that learn from each other, have access to a growing body of knowledge, and can shape the Forum's work in this area³⁰.

3.7 Take back management

Take back management 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 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% of Desso's carpet tiles are made from 100% recycled yarn. This has led to an increase in market share of 8 percentage points while company profitability has increased eight-fold.³¹

3.7.1 Barriers

Companies engaging in take back systems have to consider how the last part of the value chain affects the first part of it – materials taken back have to be included in production in one way or another – either in their own production or in another company's production.

A main barrier when working with take back management, is how to transport the used products from the customers back to either the company that manufactured the product, or to another company that can use the discarded product in their manufacturing processes. Geography plays an important role. It might not necessarily make much sense to send a discarded product used in Europe back to the manufacturer in China.

Another barrier take back management poses, is how to design the product so it can be taken back and reused. It also requires thinking through how recycled materials can be used to develop new products. Once the design of a product changes, it very often affects the manufacturing systems of the company, requiring new machinery and new systems to be put in place.

Getting suppliers on board often poses a great barrier since reusing materials require the company to know what the materials consist of in order to determine ways to reuse the materials. Some suppliers can be reluctant to share information on what their materials contain.

There are also accounting barriers for take back management.

3.7.2 Existing policies

We identified an EU directive that seeks to promote the use of the TBM model. It is described briefly below.

Waste Electrical and Electronic Equipment, EU

EU legislation restricting the use of hazardous substances in electrical and electronic

³¹ See project case studies for complete case description

equipment and promoting the collection and recycling of such equipment has been in force since February 2003. The legislation provides for the creation of collection schemes where consumers return their used e-waste free of charge. It also requires certain heavy metals that are considered environmental and health risks to be substituted by safer alternatives.

Despite such rules on collection and recycling only one third of electrical and electronic waste in the European Union is reported as separately collected and appropriately treated. A part of the other two thirds is potentially still going to landfills and to sub-standard treatment sites in or outside the European Union. In December 2008, the European Commission therefore proposed to revise the directives on electrical and electronic equipment in order to tackle the fast increasing waste stream of such products. The aim is to increase the amount of e-waste that is appropriately treated and to reduce the volume that goes to disposal. The proposals also aim to reduce administrative burdens and ensure coherency with newer policies and legislation covering, for example, chemicals and the new legislative framework for the marketing of products in the European Union³².

Effect

The updated directive strengthens a range of e-waste regulations and imposes new targets that will require member states to collect 45 percent of electronic equipment sold for approved recycling or disposal from 2016, rising to 65 percent of equipment sold or 85 percent of electronic waste generated by 2019, depending on which goal member states choose to adopt. The EU anticipates the new directive will have a huge impact on the e-waste recycling sector, delivering a five-fold increase in the amount of equipment that is collected and making it easier for firms to extract valuable materials such as gold, silver, copper and rare metals³³.

The existing EU collection target is 4 kg of WEEE per capita, representing about 2 million tonnes per year, out of around 10 million tonnes of WEEE generated annually in the EU. By 2020, it is estimated that the volume of WEEE will increase to 12 million tonnes. The final target of the new directive, an ambitious 85 percent of all WEEE generated, will ensure that in 2020 around 10 million tonnes, or roughly 20 kg per capita, will be separately collected in the EU.

Targets are proposed also for the recovery of medical devices.

32 http://ec.europa.eu/environment/waste/weee/index_en.htm

33 <http://www.guardian.co.uk/environment/2012/aug/14/eu-waste?newsfeed=true>

3.8 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 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 it.³⁴

3.8.1 Barriers

Implementing Cradle to Cradle requires a company to make changes to its own business as well as involving all other stakeholders in its value chain, i.e. suppliers, customers, end users, public bodies and so on. It requires a great deal of transparency for all the parties involved. When working with the cradle to cradle concept an important step is to uncover what materials and chemicals are found in the products of a company – a task that involves the company's supplies as well as its own internal processes. A barrier to making these substantial changes is a lack of tools and competencies to start up these types of projects.

Investments in new technologies and materials will be necessary, requiring access to finance. Furthermore, recycling of materials is a relatively new concept, and one specific challenge in relation to bio-plastics is the lack of recycling facilities in the world.

There are several types of certifications that can be obtained if a company wants to market itself and its products. However, the different certifications vary in content and are not transparent, making it difficult for customer to understand what they stand for. Some C2C companies even claim that the requirements to obtain some of the certifications are so low that instead of raising the bar for how sustainable companies

³⁴ See project case studies for complete case description

can become, they do the opposite and slow down the transformation of companies' greening their business models.

3.8.2 Existing policies

We have identified two policy initiatives that in one way or another promote the use of the cradle to cradle concept:

- Cradle to cradle network, EU
- National Waste Management Plan, NL

They are described briefly below.

Cradle-to-cradle network (EU-Interreg)

The C2C network brings together ten EU regions to share and capitalize on regional good practice in implementing C2C principles in relation to waste prevention and management, and do so by producing sustainable solutions, economic development opportunities and social well-being.

The network has several projects:

- develop a general theoretical framework,
- in depth perspective studies for target areas,
- develop a good practice handbook,
- develop a guide on waste management and C2C,
- develop a set of policy recommendations,
- develop 10 regional action plans,

The results from the C2C Network are at hand for regional policy-makers to disseminate the insights and initiatives and to contribute to the Europe 2020 strategy of the European Commission.³⁵

National Waste Management Plan (NL)

The focus of the National Waste Management Plan (NWMP) is to take a step beyond waste management, where material usage is looked at from a value chain perspective, and not only when a material has become a waste product. Policy intervention will take place early on in the value chain, such as in product development. However, it is important to ensure that the environmental impacts are not shifted to other parts of the value chain.

35 <http://www.c2cn.eu>

The ideas behind the value chain approach in waste policy are largely the same as those of the “Cradle to Cradle” concept.

Based on a study of which materials require a large energy demand during usage phase and the size of the environmental impact in production, seven materials were selected as priority streams.

Over the next few year partnerships with companies will be set up under the NWMP to investigate more closely what can be done to create sustainable materials streams through pilot projects.

Based on the first pilot results, an exploration into the limitations and possibilities of the following types of instruments will also be considered:

- Incentive programmes
- Fiscal regulations
- Producers' responsibility
- Voluntary agreements
- Policy frameworks including sustainable purchasing, eco-design, EU action plan SCP.³⁶

3.9 Industrial Symbiosis

Industrial symbiosis is a systems approach to a more sustainable and integrated industrial economy which identifies business opportunities that leverage underutilised resources (materials, energy, water, capacity, expertise, assets etc.)³⁷. 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.

³⁶ <http://www.agentschapnl.nl/en/programmas-regelingen/national-waste-management-plan>

³⁷ Lombardi and Laybourn, 2012

CASE 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 desulphurisation.³⁸

3.9.1 Barriers

One of the challenges in creating new industrial symbiosis is to identify possible synergies between relevant companies, and map the resources that can be used between the different companies. In most cases, companies are not aware of the synergies than can be created by collaborating with different companies.

Confidentiality and commercial issues can also be a barrier in establishing industrial symbiosis, as many companies are reluctant to sharing information about their resources and production processes.

Another barrier in establishing industrial symbiosis is the lack of available recovery technology that is needed to be able to take advantage of the by-products and transform them into usable resources.

3.9.2 Existing policies

There are several government initiated programmes around the world that promote the use of Industrial Symbiosis. We have found three programmes in three locations around the world that promote the use of Industrial Symbiosis in three different ways. They are described below:

- Industrial Symbiosis Kalundborg, DK
- National Industrial Symbiosis Program, UK
- Kwinana Synergies Project, Australia

There are also other interesting programmes, many based on the NISP model, in e.g. South Korea, China (Tianjin), Brazil, Turkey (Adana region), Hungary (central Hungary), Poland (Lower Silesia), Belgium (Flanders), Romania (Suceava). In addition there are several areas in the USA operating By-Product Synergy Programmes which we have chosen to not describe in order to limit the amount of information related to one specific business model.

Industrial Symbiosis Kalundborg, DK

The Industrial Symbiosis in Kalundborg was initiated by the companies themselves in the 1970s where focus was on reducing the costs of the resources they used. The municipality played a small role in assisting the companies with practical issues such as permits. In recent years the municipality has started taking on a more active role in helping the companies expand the industrial symbiosis, and include more companies. Today they assist by gathering information from the different companies and help them identify relevant synergies. The municipality acts as facilitator helping companies identify relevant partnerships, in addition to providing technical assistance to companies wishing to become part of the industrial symbiosis.³⁹

The industrial symbiosis in Kalundborg is getting a lot of attention, especially in China, South-East Asia and the US. The world's largest industrial park, located in South Korea near Seoul, has been constructed according the model of Kalundborg. The model of industrial symbiosis has also been written into Chinese environmental legislation, and overall it constitutes a large potential for exports of lessons learnt in Denmark. In Kalundborg, the authorities and the local business forum for growth are now working on establishing a national symbiosis centre, in order to widen the replication of the lessons made in Kalundborg and to explore future cooperation among private companies.⁴⁰

Furthermore, the region of Zealand in Denmark established an industrial symbiosis program, Symbiosis Center, in 2011 to benefit companies in the region. They assist with screening the area to identify potentials for industrial symbiosis, facilitate matchmaking between relevant companies, facilitate the projects when they start up and assist employees in improving competencies related to participating in an industrial symbiosis.⁴¹

Effect

The Kalundborg symbiosis has resulted in three types of effects:

1. Energy cooperation: annual CO₂ reduction of approximately 240,000 tonnes of CO₂.
2. Water cooperation: 3 million m³ of water is recycled and re-used in the symbiosis.
3. By-product cooperation: smoke turned into industrial gypsum, yeast used as feed for pigs, slurry exploited as a nutrition agent, fertilising product made from wastewater.

³⁹ www.symbiosis.dk

⁴⁰ <http://www.erhvkaldk.dk/kalundborg/den-industrielle-symbiose.aspx>

⁴¹ www.symbiosecenter.dk/en

National Industrial Symbiosis Program - NISP (UK)

NISP is a private sector led free facilitated business opportunity program that offers networking opportunities for businesses of all sizes and sectors, and which has received government investment. The aim is for business to meet and identify opportunities that lead to mutually advantageous transactions for innovative sourcing of inputs and value-added destinations for non-product outputs, so that under-used resources such as energy and water, and/or materials from one company can be recovered, reprocessed and re-used by others.

To date, over 2,000 industrial symbiosis projects (synergies) have been completed or are still operating throughout the country and have attracted a total of 15,000 business members, the majority of which are SMEs and micro companies (95% approximately). NISP has also gained an international foothold and NISP projects are now spreading to many countries including Belgium, Brazil, China, Hungary, Mexico, Poland Romania, Turkey, Slovakia and South Africa. Regional programs are likely for 2012 in, Italy, Netherlands and Spain.

Effect

NISP's success in the UK demonstrates that industrial symbiosis has the potential to significantly reduce industrial and commercial waste and comprehensively lessen the adverse environmental impacts of business.

Since April 2005, the programme has diverted 9 million tonnes of waste from landfill, reduced 8 million tonnes of CO₂ emissions and has made virgin material savings of 12 million tonnes. Benefits have been generated in the areas of productivity, employment, regeneration and private sector investment. It estimated that the participating companies made cost savings of GBP 205 million, and additional sales for almost GBP 200 million⁴².

Kwinana Synergies Project, Australia

The Kwinana Synergies Project was established in 2004 as a research project funded by the Western Australian Government and industry, and implemented by Curtin University of Technology. The project was initiated in order to support the development and implementation of profitable exchanges of by-products and services between industrial operations in the Kwinana Industrial Area. Practical support is provided to the companies in the Kwinana region to develop, evaluate and implement synergy opportunities.⁴³

Effects

The Kwinana Synergies Project has generated great savings as a result of 32 by-product

⁴² Read more: <http://www.nisp.org.uk/>

⁴³ <http://www.kic.org.au/Synergies.asp>

and 15 shared utility synergies. Since its inception the effects the project has achieved are:

- water savings of 8,200 gl per year
- energy savings of 3,750 tj per year
- waste reductions of 421,600 tonnes per year
- gas emission reductions of more than 134,000 metric tones per year
- CO2 emission reductions equivalent of removing 73,000 cars from the road

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

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 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 chemistry⁴⁴, which are chemicals developed that do not contain any harmful substances.

The DBFO business model seems to only 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	Suggestion
Green Supply Chain Management (GSCM)	No policies identified	Create new policy
Take Back Management (TBM)	Waste electrical and electronic equipment, EU	Create additional policy
Cradle to Cradle (C2C)	Cradle to cradle network, EU National Waste Management Plan, NL	Create additional policy
Industrial Symbiosis (IS)	Industrial Symbiosis Kalundborg, DK National Industrial Symbiosis Program, UK Kwinana Synergies Project, Australia	Promote policy

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 all 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 three countries have created policy initiatives, there seems as if there is a large group of potential countries that could benefit from implementing similar initiatives. And there are already many countries that are in the process of implementing industrial symbiosis initiatives.

3.11 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 ⁴⁵

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.

⁴⁵

See Appendix I

4. 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.⁴⁶ 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

⁴⁶ See case compendium for more detailed results.

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 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.⁴⁷

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 policies⁴⁸. Policy that promotes increasing taxes on resources, waste and emissions while lowering them on labour will also have a positive effect on promoting green business model innovation by increasing efficiency on resource use⁴⁹.

While the micro level policies are presented according to how they influence specific

⁴⁷ Mont, 2010

⁴⁸ OECD (2012), Business Models for Systemic Eco-innovations, Forthcoming

⁴⁹ <http://www.unep.org/resourcepanel/Publications/Decoupling/tabid/56048/Default.aspx>

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.

4.1 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.

4.2 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 recycled⁵⁰. 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 partnerships⁵¹.

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. Encouraging companies to take back their obsolete and old products, or hire other companies to do it for them, 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

⁵⁰ Cirkulær Økonomi i Danmark, maj 2012

⁵¹ <http://www.bis.gov.uk/files/file34926.pdf>

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.⁵²

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).⁵³

The Nordic countries have already developed the Nordic Ecolabel⁵⁴ 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.

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,

⁵² FORA, 2009

⁵³ www.how2recycle.info

⁵⁴ www.nordic-ecolabel.org

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 toxic chemicals 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.⁵⁵

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 redesigned⁵⁶. One focus area could be on the development for research of new materials and chemicals, for example in partnerships with universities. In addition it seems as if providing access to information of new methods in production and the use of new materials and chemicals also could benefit companies significantly⁵⁷. 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.

4.3 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.

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

⁵⁵ 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

⁵⁶ Josiassen & Rosted, 2010

⁵⁷ Mont, 2010

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.⁵⁸ 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.

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 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.⁵⁹

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).

⁵⁸ Innovation Network Denmark, 2010

⁵⁹ Brown, 2008

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.

4.4 Overview of policy suggestions to promote green business model innovation

Several challenges to employing green business model innovation in companies were identified. Based on these challenges, policy recommendations have been developed together with experts on sustainability and policy. Focus has been placed on developing policy for some of the key barriers experienced by companies, and which are feasible to be implemented in a Nordic context. Some of the policies make more sense to implement nationally in each of the Nordic countries, while other policies can be implemented in a regional Nordic perspective through the work of the Nordic Council of Ministers.

An overview of the business model elements, the barriers and policy suggestions are given in the table below:

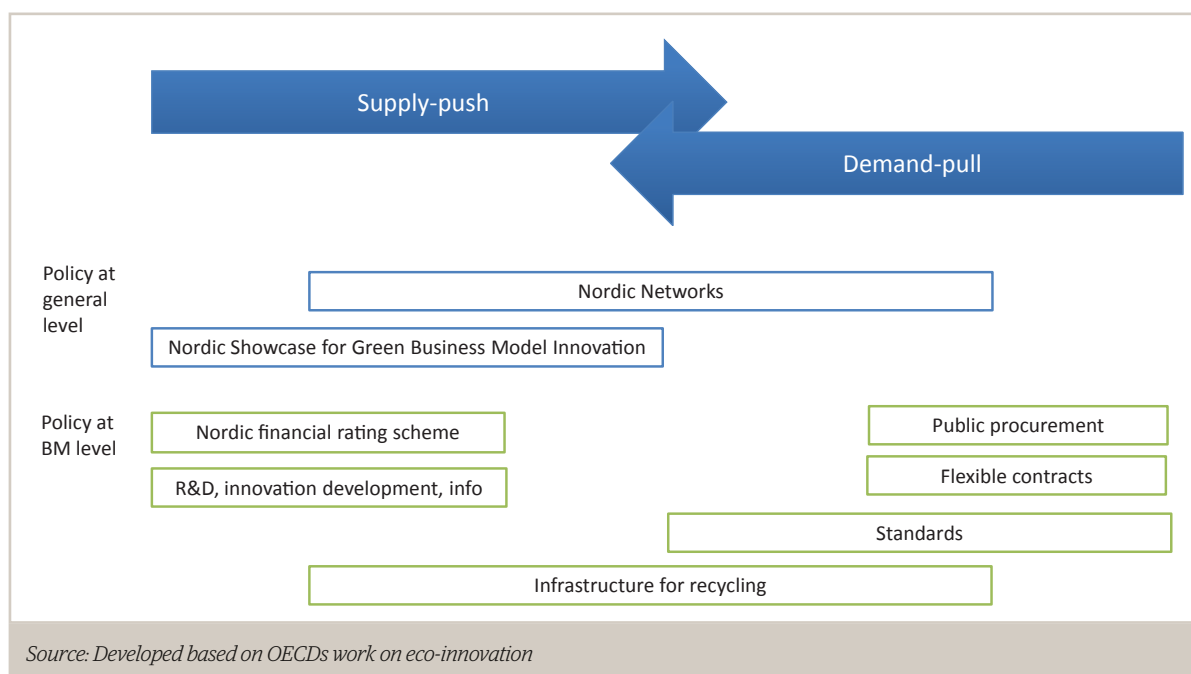
Table 7. Policy recommendations to overcome key barriers

Business model	Key barriers	Policy recommendations
Incentive models		
FS	<ul style="list-style-type: none"> • 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 	Efficient public sector. Nordic financial rating scheme. Networks and Partnerships. Showcase.
ESCO	<ul style="list-style-type: none"> • 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. 	Efficient public sector. Flexibility of long-term contracts. Standards. Nordic financial rating scheme. Networks and Partnerships. Showcase.
CMS	<ul style="list-style-type: none"> • 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 	Flexibility of long-term contracts. Nordic financial rating scheme. Networks and Partnerships.
DBFO	<ul style="list-style-type: none"> • 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 	Efficient public sector Flexibility of long-term contracts. Nordic financial rating scheme. Showcase and demonstration projects.

Business model	Key barriers	Policy recommendations
Life cycle models		
GSCM	<ul style="list-style-type: none"> • 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 	Green Public Procurement. R&D of new materials and chemicals, and access to information. Networks and Partnerships.
TBM	<ul style="list-style-type: none"> • 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 	Infrastructure for recycling. Standards. R&D of new materials and chemicals, and access to information. Networks and Partnerships.
C2C	<ul style="list-style-type: none"> • 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. 	Green Public Procurement. Infrastructure for recycling. Standards. R&D of new materials and chemicals, and access to information. Networks and Partnerships. Showcase and demonstration projects.
IS	<ul style="list-style-type: none"> • 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 	Green Public Procurement. R&D of new materials and chemicals, and access to information. Networks and Partnerships. Showcase and demonstration projects.

While it seems to make sense to develop policy at a business model specific level, it also seems to make sense to implement both supply-side policies as well as demand-side policies. Demand-side policies are increasingly being used by countries to promote innovation within the areas of green growth.^{60 61} An overview of the suggested policies in this report consist of a mix of both supply-side policy and demand-pull policy. See figure 1 below:

Figure 1. Overview of policy recommendations



4.4.1 Further work

While some policies are popular with industry and used by companies, work should also be done to evaluate the benefits of the existing policies before similar policies are implemented in the Nordic region. The costs of the programmes should be considered in relation to the benefits that are achieved at company level and for society at large, and whether certain industries will benefit more than others.

We therefore suggest looking at the most popular policies and measuring their effects in order to determine if the policies are efficient in driving change while at the same time creating value for all.

⁶⁰ OECD, 2011

⁶¹ OECD, 2012b

Appendix I: The Danish Business Innovation Fund

Pilot programme targeting green business model innovation

In September 2012 the Danish Business Innovation Fund launched a pilot programme targeted development and implementation of innovative green business models in Danish companies. The programme will most likely be the first policy initiative specifically targeted green business model innovation. The initiative is furthermore distinguished by a unique focus on broad green transformation of Danish companies thus not only targeting traditional cleantech companies.

Purpose

The pilot programme serves four overall purposes. The first is to generate attention to green business model innovation in small and medium-sized Danish companies. Secondly, the purpose is to help companies clarify whether green business model innovation can increase turnover and revenue in the companies. Thirdly, the purpose is to support selected companies developing and implementing new innovative green business models. And at last, on a policy level the pilot programme shall provide input for a potential long term anchoring of policy.

The initiative is primarily inspired by the research carried out by the Danish Business Authority while the design of the pilot programme mainly is based on explorative research carried out by the Business Innovation Fund. The small-scale research indicated that Danish SMEs only modestly engage in green business model innovation. It also indicated that green business model innovation could appear complex and resource demanding to SMEs. Likewise the complexity and uncertainty of a new area such as green business model innovation could make it difficult for SMEs to clearly assess whether or not they could profit from green business model innovation. Potentially, this could inhibit strategic decisions and funding of innovation activities. Finally the research indicated that Danish SMEs could not necessarily be expected to possess all the

relevant capabilities to carry out green business model innovation as it often demanded in-depth knowledge of several highly specialised areas concerning e.g. technical, legal and financial issues to create truly innovative green business models.

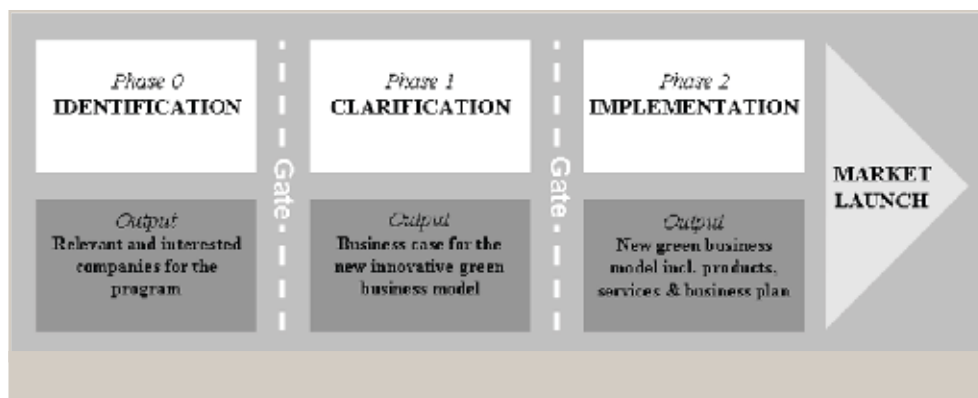
Target group

The pilot programme is primarily targeted SMEs that have an existing product portfolio which potentially can be made greener through green business model innovation. This priority is in concordance with the Danish government's focus on a green transformation of the business sector. The definition of the target group ensures a large group of potential participants; it ensures that the innovation efforts mainly are focused on development of new business models in stead of new products and services and it ensures a relatively short time to market for the new business models. The programme will therefore first and foremost support development of innovative green incentive and lifecycle business models such as e.g. new WASCO or cradle-to-cradle business models. The business models need to be new to a substantial market segment in order to be supported. Innovations mainly focussing on for instance product innovation will not be supported under the pilot programme.

Process

The programme has a funnel-based stage-gate design which generates competition between the participating companies throughout the programme. The companies are initially screened for fit with the pilot programme and only a limited number of companies are allowed to pass through each gate in the programme thus ensuring that only the most green, innovative and profitable new business models are supported. The process is visualised in figure 1 below.

FIGURE 1: PROCESS MODEL



Phase 0

The purpose is to recruit relevant and interested companies for the pilot programme. Interest is, among other things, achieved through workshops presenting examples successful green business model innovation and the most recent research on the field.

Phase 1

The purpose is to help companies clarify whether and if so 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 which e.g. can finance consultancy on some of the above mentioned issues. Participants for phase two are selected based on the most promising and viable business cases.

Phase 2

The purpose is to help the selected companies develop and implement the new innovative green business model in their company. Companies are supported through grants given for the development and adaptation of products and services to a new green business model and for the development of the new business model itself. After this phase the new business model including new or adapted products and services should be ready for market launch.

Facilitation and funding

Day-to-day administration of the programme is handled by a facilitator, which also provides guidance to the companies on issues such as business model innovation and business development in general.

The Business Innovation Fund has allocated approximately € 1.3 million to the pilot programme in total. In phase one the Business Innovation Fund will finance 75 % of the companies' expenses capped at approx. € 40.000. In the second phase, when the selected companies have a stronger incentive to develop and implement the new business models due to the viable business case, the fund will finance only 33 % of the companies' expenses capped at approx. € 160.000.

Output

The main result of the pilot programme will be the market launch of new innovative green business models by the participating companies showing how a green transformation

can be realised through green business model innovation. Aside from these positive examples the programme will also gather knowledge of both barriers and best practice in relation to green business model innovation. Learning from the pilot programme will provide input for a possible long term anchoring of policy promoting green business models in Denmark.

Appendix II: Policies for Green Growth in Nordic countries

Green growth policy in Finland

In 2009, the Finnish government published a foresight report on long-term climate and energy policy "Towards a Low-Carbon Finland" in which carbon neutrality should be seen as a possibility to improve the competitiveness of companies, well-being of people and prove that a small country can take a leading role in climate protection. The targets listed in the foresight report includes aims of cutting emissions by at least 80 percent from 1990 level in 2050 and to raise the share of renewable energy to at least 60 percent of all energy use in 2050.

The report lists several important policy measures for achieving the targets. For example the energy standards for new buildings will be revised in order to improve energy efficiency, and efficiency improvements will be required in renovations of existing buildings. An ecological tax reform will also be continued, feed-in tariffs will be implemented and carbon capture and storage (CCS) will be developed and tested. Municipalities are also required to draw up a regional and municipal climate programme that includes targets and measures for reducing emissions.

Public procurement is worth 15 per cent of the Finnish GDP and in 2009 Finland passed a green public procurement resolution that means increased public purchase of energy from renewable sources, reduction in the amount of travel, low-energy standards for new buildings. This should both benefit the environment, save money in the long run and open markets to innovations.

Growth in the Finnish cleantech industry is guided by a national cleantech programme with the goal of propelling the sector into a cornerstone industry. Funding provided for companies and research institutes for cleantech is growing and different networks - for example "The Finnish Cleantech Cluster" - have been formed to bring companies and research institutes closer together.

In 2010 Finnish politicians agreed on a renewable energy package raising the share of renewable energy to 38 percent in 2020, which should create 15,000 new “green” jobs and help Finland become a global front-runner on sustainable energy know-how.^{62 63 64 65}

Tekes – the Finnish Funding Agency for Technology and Innovation launched a five-year Green Growth programme in 2011. The aim of the programme is to identify potential new growth areas for the sustainable economy business, which are essentially based on lower energy consumption and sustainable use of natural resources. The programme aims at a leap forward in resource efficiency of production and service chains over the entire life span of products.

The programme is aimed for companies seeking to grow or renew their business in the face of changes in energy and raw material prices and impacts of laws and regulations. The programme will support the generation of new innovations especially on boundaries between sectors, as future sustainable economy solutions will not be defined by traditional sectoral divisions.

Research organisations play an important role in generating new anticipatory information and skills. Current research themes consist of three areas:

1. industrial ecology – sustainable networking in industry and society: fresh operational models applying life-cycle-thinking, i.e. closing loops and upcycling,
2. green business model innovations: strengthening companies’ understanding in consumer behavior and market knowledge through co-creation practices during shift to sustainable economy, and
3. policy tools in supporting socio-economic transition to sustainable economy: how policies and regulations work as enablers of systemic change.

⁶² <http://www.ymparisto.fi/download.asp?contentid=135391&lan=en>

⁶³ Finish Ministry of the Environment, 2011

⁶⁴ Finland, 2009

⁶⁵ Arnkil, 2010

Green growth policy in Norway

In 2009 the Norwegian Ministry of Finance released a White Paper addressing key challenges which the Norwegian economy will have to face in coming decades, including global warming, globalisation and an ageing population. In their vision, the environmental challenges need to be solved through national policies and by pressing forward for the implementation of ambitious international agreements.

In order to reach a greener economy, the White Paper sets a number of measures to be undertaken by the Norwegian Government:

- *Further develop and improve the Norwegian social model.* This is seen as an important measure which will permit to continuously ensure equal opportunity for everyone and equitable income distribution. An adequate safety net will, as in the past, enhance the ability of the society to restructure, also when faced with changes in the composition of the population.
- *Make Norway a leading country in the field of environmental and climate policy.* This requires an offensive environmental and climate policy domestically, inter alia through strong and targeted public support to research and development of new climate technology, and fulfilment of international climate obligations.
- *Invest in human capital.* Focus on children's and young people's formative environment, and on good research and education. Education and research of high international quality and relevance are seen as highly important to future value creation.
- *Improve the functioning of the economy.* The Government will inter alia combat tax evasion, give increased emphasis to green taxes and further develop a tax system that enables egalitarian distribution and high labour utilisation.
- *Renew and increase public sector efficiency.* The Government will put a high emphasis on improving service provision and ensuring more efficient resource use in the public sector.
- *Pursue a coherent industry policy that promotes innovation, ability to restructure and high economic growth.* As the petroleum activity on the continental shelf is estimated to decline, measures to channel idle and new resources to other high-growth activities are considered to be vital.
- *Shift resource inputs from treatment to prevention.* The Government will work to prevent injuries and give higher importance to measures able to prevent the exclusion of many people from working life.

The overall focus of the paper is clearly exposed in a simple sentence: *Economic policy must be sustainable*. It is also mentioned that the Norwegian economic policy should contribute to continued economic growth and ensure that this takes place within environmental tolerance levels⁶⁶, in other words, Green Growth.

Other governmental initiative that contributes to the Norwegian overall Green Growth strategy is the establishment of the Council for Environmental Technologies. Having as a point of departure the Government's White Paper on Innovation Policy from 2009, which is focused on the development of environmentally friendly technology, the Norwegian Ministries of Industry and Environment established this strategic council.

The council identified a gap between R&D and the commercialisation of environmental technologies, an aspect that generated a new initiative in May 2011. The Government nominated Innovation Norway to lead the new strategy for environmental technology known as Business Development and Green Growth with a NOK 500 million budget from 2011-2013. The largest industry that received investments so far, has been offshore wind farming.

66 NMF, 2009

Green growth policy in Denmark

The Agreement on Green Growth signed in 2009 in Denmark is an ambitious long-term plan that shapes the environmental and natural policies as well as the agricultural industry's growth conditions. Until 2015, a total of DKK 13.5 billion has been set to be invested in Green Growth, which is approximately a 50% increase in investments in comparison to previous initiatives, a measure which was adopted to help Denmark to fully meet its environmental obligations while strengthening growth and employment.

The Agreement on Green Growth incorporates:

1. The Environment and Nature Plan up to 2020. The aim of the plan is to secure not only a better environment and climate, but also more high quality nature areas that are accessible to everyone.
2. A strategy for a green agriculture and food industry undergoing growth. The agreement states that a collective and focused initiative has to be implemented in order to create better framework conditions for self-sustaining agriculture which develops according to a dependency on market conditions, which will protect the environment and nature, and will deliver green energy.

In 2011 Denmark created the Global Green Growth Forum (3GF) that is intended to facilitate and accelerate the global transition to a green economy and the next industrial revolution. The Forum is an opportunity to explore and demonstrate how better collaboration among leading businesses, investors and key public institutions can effectively realise the potential for long-term global green growth (3GF, 2011).

In January 2012 Denmark took over the presidency of the EU and in line with the Global Green Growth Forum (3GF), launched Green Growth as a focal topic in all the development to come.

Among the priorities of the Danish Presidency it is stated, "In the context of the current economic difficulties, new, balanced measures related to energy, climate and the environment can contribute to much needed growth and employment in Europe. Green Growth can be encouraged by integrating such efforts across a range of European policies" (MFA, 2012).

In March 2012 the majority of the Danish parties made an ambitious new energy agreement which established a framework for the Danish policy on energy and climate up to 2020 and outlines the direction until 2050. The initiatives in the agreement will contribute to the Danish CO₂ emissions in 2020 being 34 % lower than in 1990. The agreement involves a decision to build a total of 3300 MW new wind power which will

create new green jobs and help fulfil the new goal involving 50% of Denmark's electricity consumption coming from wind power in 2020. The parties behind the agreement will also work for a continued high level of research, development and demonstration with particular focus on technologies that have commercial and export potential. Overall the initiatives in the new energy agreement results in increased investments in renewable energy and energy efficiency of 90-150 billion DKK and is estimated to employ 6.000 to 8.000 people by 2020.

"State of Green" acts as the official green brand of Denmark and is an initiative gathering all leading public and private players in the fields of climate, energy, water and environment. State of Green fosters relations with international stakeholders wanting to learn from the ambitious Danish plans and innovative experiences

As the Danish governments wants to strengthen the growth conditions in the areas of energy and climate, a "growth team" of leading persons with special expertise in these areas was established in June 2012. The growth team shall make recommendations on how to create more growth and take advantage of the current Danish strengths in these areas. A similar growth team has been established for the areas of water, bio and environmental solutions.

The Energy Technology Development and Demonstration Programme (EUDP) is a funding programme with the objective of ensuring the development and demonstration of new and innovative energy technologies and thus help to make Denmark independent of fossil fuels by 2050. Besides the abovementioned objectives, EUDP is also supporting projects as a way of developing potentials for growth and employment. 371 mio. DKK have been set aside for EUDP in 2012. A similar Environmental Technology Development and Demonstration Programme (MUDP) has been established which will provide grants for business development, testing and demonstration of innovative environmental technology solutions.

In June 2012 The Danish government launched an Action Plan for organic production towards 2020, which shall help achieving the government's goal of doubling the Danish organic area by 2020. The plan aims at the development of new management techniques, new machinery and new creative products which can all contribute to green transition and employment in Denmark.

Green growth policy in Iceland

In 2010, the Icelandic Parliament created a nine-member Parliamentary Committee on the Enhancement of Green Economy, comprised of representatives from all the parties to prepare a proposal for strengthening Iceland's green economy.

After consulting different stakeholders, including government institutions, private businesses and NGOs, the committee developed a proposal illustrating the ambitious vision of making Iceland the leading nation in the world regarding green economy. To achieve this, focus would be on a clean natural environment, sustainable use of energy and education to increase sustainability.

Eight strategic policy points outline the base for the vision:

1. The national government and its institutions will serve as role models and create the conditions for a green economy
2. Economic incentives will be used to promote the green economy
3. The 'Polluter Pays' principle will be the basis for structuring the needed taxes and fees
4. The Precautionary Principle will be an integral part of the national fiscal and employment policy
5. The number of green jobs has to be increased
6. Emphasis should be placed of promoting environmentally friendly investments
7. Education for sustainable development and environmental management has to be extended
8. The green economy in Iceland should be an underlying theme in official promotions to investors and tourists.⁶⁷

Overall, the committee proposed 48 initiatives that are scheduled to be implemented in the coming years and are intended to help fulfil the proposal's goals. These initiatives are grouped in eight categories:

- I.** Responsibilities, coordination and implementation
- II.** The public sector as role model
- III.** Support structure for the economy
- IV.** The educational system
- V.** Economic stimuli
- VI.** Green business
- VII.** Environmentally friendly transportation
- VIII.** Certification and image work.

⁶⁷ Jansdottir, 2012

The focus of the proposal takes a holistic view by proposing that the Prime Minister should be in charge of the green economy, which indicates that the green economy should be filtered through the entire society.

In this connection two task-programs have been specifically developed: replacing fossil fuel energy consumption in transportation with eco-friendly renewable energy, and dramatically reducing CO₂ emissions.

The substantial contribution of tourism to the Icelandic economy needs attention since most tourists visit Iceland for the country's pristine nature. Other committee proposals are to market Iceland as a green-economy country, to further strengthen the tourism industry, and to create opportunities in rural areas because green tourism relies on local resources.⁶⁸

The committee's entire proposal was submitted to the Parliament in October 2011. The Icelandic Government has approved an Investment Plan for 2013-2015 that includes a proposal for providing 25 million euro towards implementing the first phase of an Action Plan on the Strengthening of the Green Economy. It has been decided that priority will be given to projects that support R&D and innovation, increase investments, introduce economic incentives and create green jobs.⁶⁹

⁶⁸ Helgason, 2012

⁶⁹ Jansdottir, 2012

Green growth policy in Sweden

Framtidskommissionen (Commission on the Future) was established by the Swedish Government in 2011 with the aim of identifying future societal challenges the country may face, which in turn can give a foundation to prepare long-term strategies and policies. The commission is chaired by the Swedish Prime Minister and consists of leaders from the four political parties in the government and eight individuals with different perspectives and from different parts of the Swedish society.

This project wants to analyse and develop scenarios for how Sweden can move towards a green economy in the next decades, and is led by the Swedish Environmental Institute in cooperation with the Swedish Research Agency and participation of the Swedish Agency for Growth Policy Analysis. The project is scheduled to run into the fall of 2012 and will be finalised through the publication of a concluding memorandum.⁷⁰

The Government has identified four challenges that the Commission on the Future of Sweden is analysing more closely. The leaders of the four Government parties each have special responsibility for managing and assessing the progress of one identified area, but citizens and stakeholders from all over the country are invited to give their views as well.

The four identified challenges are:

- Demographic development
- Integration, gender equality and democracy
- Sustainable growth in a globalised world
- Justice, cohesion and an inclusive society of the future

It is important to mention that Sweden is also part of the Baltic Sea Parliamentary Conference (BSPC) that was established in 1991 as a forum for political dialogue between parliamentarians from the Baltic Sea Region. The BSPC has several working bodies, which serve as resources for driving and implementing BSPC priorities and objectives. Among them, BSPC Working Group on Green Growth and Energy Efficiency, which aims at elaborating joint BSPC policy recommendations within this policy area.

The scope of work of the Working Group should cover, but not be limited to, issues such as:

- Knowledge- and competence building in green growth/green economy;
- Best practices in green growth and energy efficiency;
- The role of parliamentarians in promoting green growth;
- Challenges and opportunities for innovation, investments and solutions in green growth;

⁷⁰ shiftN, 2012

- Business opportunities for the Baltic Sea Region through green growth;
- Green growth as a competitive advantage for the Baltic Sea region;
- The role of SME's in developing innovations and technologies for green growth;
- Potential for energy efficiency;
- Green public procurement for green growth;
- Including sustainable development in the curricula on all levels in the educational systems in the Baltic Sea States - "From kindergarten to further education"
- Private-public partnerships for green growth;
- Awareness-raising about potential benefits from green growth.⁷¹

71 BSPC, 2011

Appendix III: Policy table from OECD case template

The graph shown on page 35 is a summary of answers to question 6 in the OECD case reporting template:

6. Did you receive support from Government policies/programmes?

Please rank the **five most important** policy instruments for advancing your green business model (1 = the most important; 5 = the least important). Please also provide reasons and comments.

Policy Instruments	1 – 5
Regulations on harmful substances and activities	
Eco-tax, carbon tax	
Cap and trade scheme	
Removal of harmful subsidies (e.g. fossil fuel subsidies)	
R&D funding and support	
Business development funding and support	
Support for testing and demonstrations	
Standardisation of technical elements	
Performance standards, labelling, certification	
Support for networks, partnerships and matchmaking	
Public procurement	
Consumer subsidies and pricing	
Support for technology transfer	
Information brokering and advisory services	
Education and training	
Provision of enabling infrastructures	
Foresight, roadmapping, scenario development	
Other (Please specify)	

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Green Business Model Innovation

Policy report

Companies are increasingly recognising that sustainability can be a source of innovation that can help them become more competitive by either developing new products and services based on new technology or by making changes to their business models. These changes are here referred to as companies' green business model innovation. This report focuses on identifying policy initiatives that contribute to promoting the use of green business model innovation and the direct effects that policy has on enabling companies to implement it. By uncovering barriers to implementing green business model innovation and creating an overview of some of the existing policies and their effect, the work aims to suggest and develop new policy initiatives that can promote green business model innovation in the Nordic region.

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