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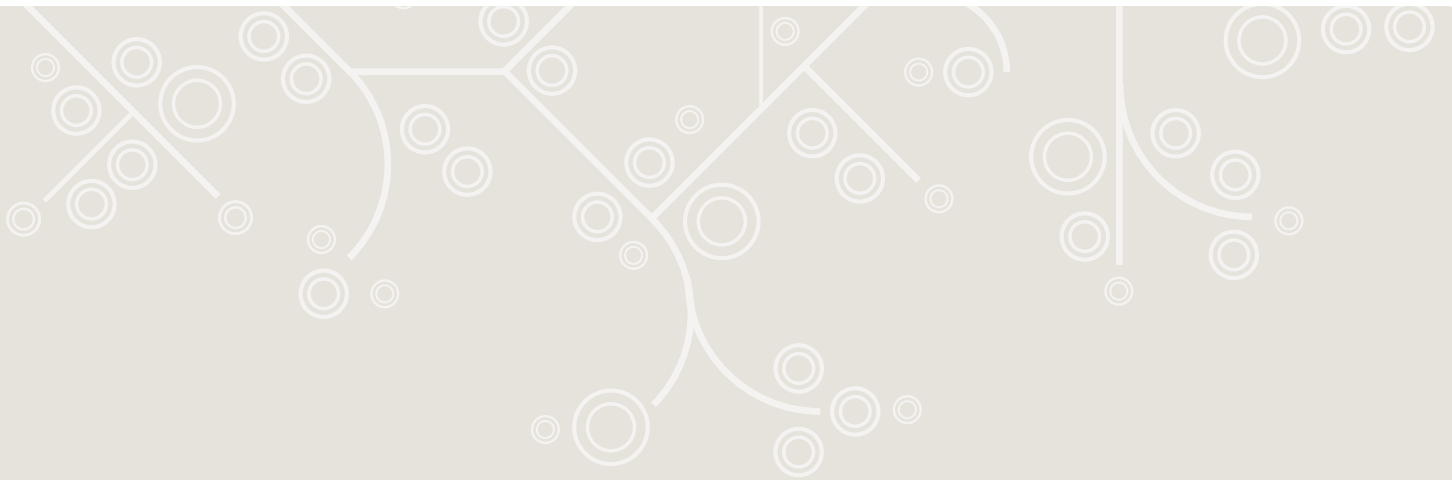
Green Business Model Innovation

Conceptualization report



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Authors:

Kristian Henriksen, Markus Bjerre, Alexandra Maria Almasi, Emil Damgaard-Grann

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Executive summary

There are many terms in the public and academic debate about how companies green their business and how they are categorized as green companies. Therefore, in order to get more concrete and operational, this *Conceptualization Report* focuses on some specific ways of greening businesses which seem promising levers for the increase of business competitive-ness as well for new market opportunities. All the chosen and discussed greening methods have been categorized as being types of Green Business Model Innovation.

Focusing on the concepts of 'business model' and 'innovation' is valuable, because it pre-sents an opportunity to understand the mechanisms that are at the centre of how businesses operate and thus may be motivated. Connecting the term 'green' with the term 'business model' as well as 'innovation' gives the opportunity to generically describe the mechanisms and challenges of greening businesses, value chains, and society seen from a business per-spective. This understanding is essential for both companies and policy makers to pave the way for long-term sustainable growth.

The concept of Green

The concepts of the green economy, green growth, and eco-industries all emphasize sus-tainable use of resources, so that future generations may not experience resource scarcities or be exposed to environmental risks and thus *ceteris paribus* be worse off and have the possibility to improve living standards. Moreover, resource scarcities involving current and expected rising and volatile prices on natural assets, as well as the global challenges of solving and dealing with environmental and climate issues, is one of the main drivers for companies to apply green innovation (eco-innovation).

Businesses can be green by producing green products or provide services that green other businesses or consumers (**green products or services**), or they can be green by greening their own process or the process in other parts of their value chain (**greening of processes**). The case, however, is not always clear-cut, since some businesses may both green by providing a sustainable product or service and at the same time green a process.

Life cycle and Incentive models

The *process* category concerns different processes inside the company as well as in other parts of the value chain. The process category and more specifically the two main subtypes studied in the report were the **life-cycle models** and **incentive models**. They both seem promising levers for companies to increase their resource productivity and ways to enter or create new greener markets. These models are not only relevant for traditional green industries such as clean-tech industry. They may also be implemented in more conventional sectors such as transportation, service, agriculture, construction and so on.

The life-cycle models can be divided into several categories with respect to what part and how much of the value chain is greened by the model (green supply chain management, take-back management, cradle to cradle, industrial symbiosis), whereas the incentive models are based on how a company incentivizes its consumers in a way so that part or the entire value chain is greened (product service systems: functional sales, chemical management systems, Design, Build, Finance, Operate).

Green Business Model Innovation

The business model explains how value is created for the customers and how value is captured for the company and its stakeholders, in other words how the company is doing business.

A company's business model can be analyzed in different ways and many different tools have been developed to analyze business model concepts. The business model canvas (Osterwalder & Pigneur, 2010) gives any company a simple and intuitive tool to describe and think through the different elements of its business models in order to systematically challenge the way it does business and thereby be able to create new strategic alternatives. The canvas tool consists of nine basic building blocks covering four main areas of a business: customers, offering, infrastructure, and financial viability. This gives the company a simple and intuitive map to understand its business models, but also a way to challenge and find successful alternatives of doing business. In the same time, companies can look at other companies' business models to be inspired to do similar changes to their own model or to design a completely new business model. Business model innovation is basically about improving the building blocks of the business model.

Business models often change gradually and do not necessarily imply fundamental revisiting of value propositions, but of course the changes could also focus on improving production processes or reconfiguring organizational structures. Usually the changes

taking place in a business model is represented by one of the following forms:

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

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

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

This is an open definition and it captures many small and large intended or unintended actions of a business. However, it seems problematic to set tighter boundaries on green business model innovation, since it is not easy to argue for or against why different ways of greening a business should or shouldn't be considered as green business model innovation.

1. Preface

This working report is part of the project *Green Business Model Innovation* funded by Nordic Innovation and is joint work by the Nordic partners Vinnova, Innovation Norway, Innovation Center Iceland (NMI), TEKES, and the Danish Business Authority and has been in co-operation with the OECD. The project is a continuation of the project *Green Business Models in the Nordic Region - a key to sustainable growth* by FORA in 2010 funded by the Nordic Council of Ministers. Senior Programme Officer Tomoo Machiba (IRENA) and Dr. Arnold Tukker (TNO/NTNU) have provided invaluable advice to the work in this report. Also, a special thanks to Asel Doranova and Michal Midziensky at the Technopolis Group, Belgium for sharing ideas and their work on this topic.

The team at the Danish Business Authority working on this report consisted of Kristian Henriksen, Markus Bjerre, Alexandra-Maria Almasi and Emil Damgaard-Grann.

Purpose

The main purpose of this report is to conceptualize green business model innovation, and thereby be able to answer the question: *what is green business model innovation?*

The report sets a framework for the rest of the entire green business model innovation project which includes a business case study, an effect measurement study, a policy study, and practical tools for companies to take on green business model innovation. Analysis on the economic and environmental effects, barriers, drivers as well as policy recommendations are published in separate reports and all of these findings will be synthesized in one main document - the synthesis report.

Motivation for green business model innovation

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

Businesses are also increasingly recognizing 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 their business and improve their resource productivity by substituting to greener inputs, selling greener products and services, while others implement cradle-to-cradle elements in their business model or apply functional sales systems (or Product Service Systems, PSS) which may change consumption patterns and practices throughout their entire value chain. In a broad sense this could all be characterized as greening of the companies' business models.

But it is important to obtain a better understanding of what green business model innovation is, so that businesses and policy makers more structurally are able to address the factors that drive or impede businesses in developing new and greener business models. Focusing on the concepts of 'business model' and 'innovation' is valuable, because it presents an opportunity to understand the mechanisms that are at the centre of how businesses operate and thus may be motivated. Connecting the term 'green' with the term 'business model' as well as 'innovation' gives us the opportunity to generically describe the mechanisms and challenges of greening businesses, value chains, and society seen from a business perspective. This understanding is essential for both businesses and policy makers to pave the way for long-term sustainable growth.

What is green business model innovation?

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

In this project we look at green business model innovation from a holistic perspective and define it here as:

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

Generally, it can be said that:

- 1. the more parts of a business model which are changed and have a green effect, and*
 - 2. the more profoundly a green change is taking place within the individual parts of the business model - going from modification, re-design, alternatives, to creation*
- the greener the business model innovation is and the higher potential for creating radical eco-innovation.*

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

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

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

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

on these models, since they seem to affect larger parts of the value chain and the entire business model and then they are also characterized by a high degree of green process innovation which can be applied in many different industries.

Many of these models are not only applicable for the clean-tech industry, since many of them are generic and are characterized by being non-technology focused. They may also be implemented in more conventional sectors as transport, service, agriculture, construction and in the broader industry such as textile companies.

Overview

Chapter 2 gives a basic overview of the different concepts related to 'green growth' and eco-innovation and eco-industries. The chapter describes in which ways businesses may be categorized as green. The concepts closely relate to the overall understanding of green business models and thus form the foundation for a common understanding of the conceptualization. Chapter 3 describes the business model concept from the literature and discusses the different approaches and the key elements of the business model and in particular the business model canvas which is used as an analysis tool for understanding the green innovation taking place in the business model. Chapter 4 combines chapter 2 and 3, and conceptualizes green business model innovation.

2. Why is green growth important?

It is becoming widely recognized that a major global green transition will be needed to preserve long-term growth in the global economy, while at the same time protecting the climate and the natural resources that are the foundation of future growth. If the progress in peoples' living standards is to be continued, we need to find new ways of producing and consuming. Continuing 'business as usual' is unsustainable and is imposing constraints on economic growth and future development (McKinsey, 2011; OECD, 2011).

On average, we are consuming more than the earth can regenerate from materials. In 2007, the World's population was consuming 1.5 Earths to support its consumption. We are thus gradually depleting our finite stock of natural capital (GFN, 2010; US EPA, 2009; McKinsey, 2009).

The population of the World is predicted to reach 9 billion people in 2050. There are high economic growth rates in many parts of the World's most populated areas leading to a growing middle class that will put an even higher and increasing pressure on natural resources.

Over the last 10 years the prices on energy, metals and agricultural products have more than doubled and for some metals there has been a quadrupling in prices and prices have become increasingly volatile, cf. illustration 1.

Illustration 1: Price index for energy, metals and agricultural products

It is not given how prices on natural resources will develop in the long run. It is also difficult to fore-see how prices will develop over the coming years, but the growth in demand for natural resources is likely to continue, since the economic growth in Asia, South America and Africa, in particular, is predicted to continue. This will put an upward pressure on prices as well as making them more volatile. Companies which are able to respond to this challenge and which may offer solutions which mitigate the effects of the increasing resource scarcity will probably be better off than those who will continue with business as usual.

This global 'green transition' presents an enormous economic opportunity as new product markets and new ways of doing business emerge. Markets for low carbon technologies will be worth at least US\$ 500 billion by 2050 if the world acts on the scale required (US EPA, 2009; WWF, 2010).

The global challenges of growth, resource scarcity, environmental and climate change become the key strategic drivers for business in the coming decade (WBCSD, 2010). This requires an increased focus on greener innovation, using fewer resources and creating less waste and pollution. Sustainable business innovations are already being developed and deployed across many sectors in response to the current and expected transformation of markets and societies.

The global climate and environmental challenges are changing the agenda for businesses and policy makers who are shifting their thinking of climate change and resource constraints as environmental problems to seeing them as economic potentials

and opportunities (WBCSD, 2010). More and more companies are acknowledging that greater resource productivity, eco-efficiency, and providing new greener products and services can give them a competitive advantage in the market.

As it has become obvious that technological eco-innovations alone are not capable of creating the change for a sustainable economic development, a more radical eco-innovation approach to achieve a systemic change is needed. There is a need for new ways of doing things besides the invention of new products and services. Non-technological changes as green business model innovation will be important in driving green growth (OECD, 2011a). This aspect is confirmed by the integration in the new 2011 Eco-Innovation Action Plan (EC) of non-technological options like eco-innovation in business models. This is why it has become central to better understand green business model innovation.

2.1 Basic green concepts - understanding the concept 'green'

To be able to conceptualize green business model innovation a short basic overview of the green economy is given, and 'green growth', eco-innovation and eco-industries are described, since these concepts closely relate to the overall understanding of green business model innovation. Also, in section 2.2 it is described in what different basic ways businesses might be green. This will initially help to understand what different areas businesses focus on to become green. Further, in chapter 5 the 'greenness' of a company will be more concretely linked to the business model concept that is described in chapter 4.

The green economy

In the literature, there are many different definitions of a green economy. Some authors define the green economy as specific sectors such as renewable energy, green buildings (e.g. low energy and water usage), cleaner transport (e.g. use of bio-fuel and public transport), water, waste, and land management (Burkart, 2009). However, it seems like the most widely acknowledged definition is provided by the UNEP, cf. Box 1.

BOX 1: DEFINITION OF A GREEN ECONOMY

A Green Economy can be defined as an economy that results in improved human well-being and reduced inequalities over the long term, while not exposing future generations to significant environmental risks and ecological scarcities. In its simplest expression, a green economy can be thought of as one that is low carbon, resource efficient and socially inclusive.

Source: UNEP, 2011

With regard to green business models it is worth noticing the part about not exposing future generations to significant environmental risks and ecological scarcities as well as the focus on resource efficiency, since these issues are aligned with business ability to continue growth in the near future.

What is green growth?

Green growth is about how to maximize economic growth when natural resources are included in the equation as well as how to ensure that the economy is on a sustainable growth path, i.e. that continued economic growth is possible in the future. The potential comparative and competitive advantages may arise from switching to a more resource efficient production when resource prices rise or profiting from technologies, services or ways of doing business on new markets. The OECD definition of green growth is described in Box 2. Thus, businesses contribute to green growth when they act in a way that alleviates the pressure on natural assets (compared to others) and use the opportunities that are created in the transition towards a green economy.

BOX 2: DEFINITION OF GREEN GROWTH

Green growth is about maximizing economic growth and development while avoiding unsustainable pressure on the quality and quantity of natural assets. Green growth is also about harnessing the growth potential that arises from transitioning towards a green economy.

Source: OECD, 2011a

The World Bank describes green growth as economic growth that is environmentally sustainable and which aims to operationalize sustainable development by enabling developing countries to achieve growth without locking themselves in to unsustainable patterns. Green growth should be seen as inclusive and available and possible to all nations (World Bank, 2012).

Eco-industries

In the EU Commission's study on the EU's eco-industry (EC, 2009), the Commission considers the eco-industry to be diverse. The types of activities range from high-tech and complex services in re-newable energy and air pollution control to mature and well-established applications in recycling and waste treatment.

The OECD and Eurostat definitions result in the identification of 36 activities that together constitute the eco-industry. These activities range from the provision of services for air pollution control to eco-tourism (OECD & Eurostat, 1999).

In the study by Ernst & Young *"Eco-industry, its size, employment, perspectives and barriers to growth in an enlarged EU"* (EC, 2006) the eco-industry is defined by the following activities in the economy:

- Air pollution control
- Waste water treatment
- Solid waste management & recycling
- Remediation & clean up of soil & groundwater
- Noise and vibration control
- Recycled materials
- Renewable energy production
- Environmental monitoring and instrumentation
- Eco-construction
- Private Environmental management
- Environmental research & development
- Water supply
- Nature protection
- General public administration

The Eurostat publication *"The environmental goods and services sector - A DATA COLLECTION HANDBOOK"* (2009) states that the environmental goods and service sector consists of a heterogeneous set of producers of technologies, goods and services that:

- Measure, control, restore, prevent, treat, minimize, research and sensitize environmental damages to air, water and soil as well as problems related to waste, noise, biodiversity and landscapes. This includes 'cleaner' technologies, goods and services that prevent or minimize pollution.
- Measure, control, restore, prevent, minimize, research and sensitize resource depletion. This results mainly in resource-efficient technologies, goods and services that minimize the use of natural resources.

These technologies and products (i.e. goods and services) must satisfy the end purpose criterion, i.e. they must have an environmental protection or resource management purpose as their prime objective.

The European Environmental Agency (EEA) defines the eco-industry as companies

providing goods and services for environmental protection as described in Box 3.

BOX 3: DEFINITION OF ECO-INDUSTRY

Companies providing goods and services for environmental protection. The term includes the provision of clean technologies, renewable energy, waste recycling, nature and landscape protection, and ecological renovation of urban areas.

Source: The EEA Glossary¹

When making an assessment of the ‘greenness’ of an industry it is important to look at the life-cycle impact of the industry’s companies in both their own value chain and other affected areas of the economy, i.e. are the product or services squeezing out other greener product or services.

What is eco-innovation?

To explain eco-innovation the definition of innovation is first needed. Innovation is ‘the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations’ (OECD, 2005).

Eco-innovation relates to innovations aiming at a decreased negative influence of innovations on the natural environment. There is no generally accepted definition of eco-innovation, but various definitions have been proposed in the literature. The OECD/Eurostat definition is described below, cf. Box 4. The definition states that businesses are eco-innovative when their activities measure, prevent, limit, minimize or correct environmental damage.

BOX 4: DEFINITION OF ECO-INNOVATION

Activities that produce goods and services to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. This includes technologies, products, and services that reduce environmental risk and minimize pollution.

Source: This is the definition used by OECD/Eurostat, and Annex 2 lists more definitions as well as sub-categories of eco-innovation (EU, 2006).

Incremental vs. radical innovation eco-innovation in businesses

Eco-innovation involves diverse approaches to help realize resource efficiency and green growth through innovation, including both technological and non-technological changes. The approaches can be roughly categorized into incremental innovation and radical innovation. Incremental innovation primarily contributes to relative decoupling

¹ http://glossary.eea.europa.eu/terminology/concept_html?term=eco-industry

of resources and GHG-emissions, while the latter tends to have larger potential for making absolute decoupling possible. This naturally makes radical innovation interesting with respect to achieving green growth.

Radical eco-innovations may be simple but with a very wide range of applications, or may be highly complex involving many actors and a range of technological and non-technological changes in organizational and institutional arrangements, cf. Box 5 (OECD, 2011b).

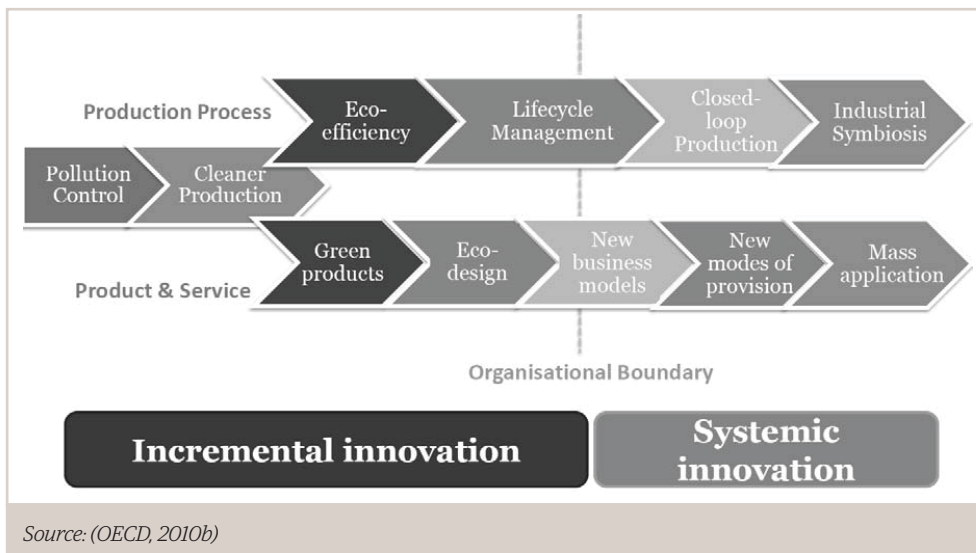
BOX 5: INNOVATION THAT CAN HELP ACHIEVE GREEN GROWTH

- **Incremental innovation** is innovation that aims at modifying and improving existing technologies or processes to raise efficiency of resource and energy use, without fundamentally changing the underlying core technologies. Surveys of innovation in firms demonstrate that this is the dominant form of innovation in enterprises.
- **Disruptive innovation** is innovation that changes how things are done or specific technological functions are fulfilled, without necessarily changing the underlying technological regime itself. Examples include the move from manual to electric typewriters and to word processors, or the change from incandescent to fluorescent lighting.
- **Radical (or systemic) innovation** involves a full-scale shift in the technological regime of an economy, and can lead to fundamental changes in the economy's enabling technologies. This type of innovation is often complex and is more likely to involve non-technological change and diverse actors. Examples include the shift to steam power and the related industrial revolution, the development of the internal combustion engine, and the more recent revolution in information and communications technologies, as well as the wide range of systemic, organizational and institutional changes that emerged from these innovations.

Source: OECD, 2011b

The boundary between incremental and radical eco-innovations is not necessarily clear-cut but Illustration 2 presents a general distinction. New modes of provision, life-cycle management, closed loop production and industrial symbiosis and new business models are all areas of interest to green business model innovation since they potentially affect a larger part of the building blocks of the generic business model, cf. section 3.

Although drawing boundaries between different levels of eco-innovation activity is not necessarily easy and incremental changes are in fact sometimes part of, or even necessary prerequisite for transformative changes, it can generally be considered that radical eco-innovations include those on the right-hand side of the figure.

Illustration 2: Eco-innovations: incremental and systemic innovations

More specific characteristics of such examples are provided in Box 6. A radical innovation may have one or more of these characteristics (OECD, 2010b).

BOX 6: EXAMPLES OF RADICAL ECO-INNOVATIONS

Alternative solution: Innovation that comprises the introduction of alternative or entirely new solutions to existing products, processes, marketing methods or organisational structures that may significantly reduce environmental impacts.

Significant environmental improvement: Innovation that is or has the potential to contribute to a significant reduction in overall environmental impacts.

Significant economic impact: Innovation that has or could bring substantial economic gains, competitiveness, market acceptance and/or job creation as well as environmental improvements.

Wider application: Innovation which involves the introduction of products, processes or new solutions at a wider scale to reduce environmental impacts such as a new transport system, a district energy system or eco-towns.

New business models: Innovation that involves a radically different business model from the conventional ways of providing products and services, with the potential to significantly improve environmental sustainability.

Source: OECD, 2010b

Commonalities of these concepts

The concepts of the green economy, green growth, and eco-industries all emphasize sustainable use of resources, so that future generations may not experience resource

scarcities or be exposed to environmental risks and thus *ceteris paribus* be worse off and have the possibility to improve living standards. Moreover, resource scarcities involving current and expected rising prices on natural assets, as well as the global challenges of solving and dealing with environmental and climate issues, is one of the main drivers for companies to apply eco-innovation.

Eco-innovation is thus a key instrument to achieve the goals of a sustainable growth path and achieve the goals of the green economy and green growth. The radical eco-innovations such as new green business model innovation supplement the incremental eco-innovations such as green products and eco-efficiency and have the potential to achieve sustainability in a faster way compared to only focusing on incremental innovations. With the challenge of climate change and the ability of continued growth in mind, it is important for companies as well as governments to focus on and to address radical eco-innovation including green business model innovation. This is why the following sections investigate which ways businesses may green either themselves or their value chain, and in particular which practices that may have the potential to make radical changes.

2.2 What makes a business green?

In this section different concepts relating to businesses being green are roughly categorized. This is not meant as a complete categorization of how businesses may be green, but merely to get a better understanding of the different aspects of this in play. This, combined with the above macro-level definitions of green, will later contribute to getting a clearer understanding of how the concept of green relates to the business model innovation concept described in chapter 3. Table 1 lists different ways in which businesses green themselves and their value chain.

Businesses can be green by producing green products or provide services that green other businesses or consumers (**green products or services**), or businesses can be green by greening their own process or the process in other parts of their value chain (**greening of processes**). The case, however, is not always clear-cut, since some businesses may both green by providing a green product or service and at the same time green a process, cf. table 1 and illustration 3.

Green products and services

Producers of energy or material efficient products such as cleantech companies help their customers to create a smaller ecological footprint by using less energy, water,

material etc.² Here, the green effect is not necessarily over the entire life time of the products but often in one of the following areas: deployment, use, and maintenance phase of the products.

Companies may also minimize their customers' ecological footprint by providing a service such as their expertise, knowhow, training, monitoring to customers. But also services such as eco-tourism or eco-construction, which minimize customers' supply utility, help customers create a smaller eco-logical footprint. Services directed at cleaning up after other companies, recycling etc. makes the customer of the service company greener.

Close service substitutes such as video conferencing or even telephone meetings instead of physical meetings may also have a green impact on the company's customers although these products or services are not considered as green per se.

Finally, services which centers around sharing or renting of products - a more optimal use of the product - may have a green effect on their customer, since the customers 'share' the product with others resulting in a more optimal use of the product.

Greening of processes

One simple way for a business to limit its ecological footprint on the surroundings would be by in-stalling filters on water, air pipes etc. (end-of-pipe) or removing toxics from the working environment (cleaner production process). Businesses may also be more resource efficient by using less input materials for the same product. This can be done by using better production processes, training own workers to save material, switching to more resource efficient production capital. Another way is to re-use material or energy in the production process (OECD, 2010a).

Emphasis on life-cycle

Some companies may also green their value chain. If the company has a focus on greening the whole value chain there is a higher possibility of the company's *actions* being green seen in a life-cycle perspective. There are many different ways for a company to green its value chain, and companies may implement models such as cradle-to-cradle, green supply chain management, take-back arrangements, and other life-cycle models. Another example is industrial symbiosis, which centers closely on companies' opportunities to identify underutilised resources (materials, energy, water, capacity, expertise, assets etc.) and utilize these in the most optimal way across the involved companies in the industrial symbiosis.

² The greenness of cleantech products should be evaluated with a life-cycle approach so that the effects over the whole life-cycle (as well as any rebound effects).

Emphasis on incentive

Typically a business that keeps the ownership of a product or that is paid by its functionality will be incentivized to produce, maintain and dispose of the product in such a way that the whole value chain is greened. Examples of such are functional sales where the producer is paid by the result of the product or ESCOs where the retrofitter is paid by how much energy he saves for the customer. This gives the supplier incentives to manufacture the product so that it uses less resource and re-quires less maintenance and so on over the entire life-cycle of the product.

Table 1: What makes a company green? A company perspective

Main category	Emphasis	Concept	Example
Products and services	Emphasis on products for others	Products which have a smaller ecological footprint	Producing/selling f. ex. fuel efficient cars/ energy efficient white goods, renewables, noise and vibration reducing products etc. (clean-tech production), ecological farming
	Emphasis on service for others	Services which help (or gives the ability) to minimize customers ecological footprint	Advice/training/education, monitoring, data collecting, analysis and assessment on f. ex. energy efficiency, CSR-, green reporting-, triple-bottom-line services; eco-construction, eco-tourism, minimizing customer's utility (f. ex. water) usage; cleaning up (oil spills), waste handling, recycling services
		Close (product or) service substitutes which have a smaller ecological footprint (dematerialization)	Video/teleconference vs. meetings, e-mail vs. mail, electronic bills or adds vs. on physical paper
		Services (instead of products) which more optimally use products (sharing, renting etc.)	Car-sharing, renting construction materiel, third party logistics, cloud computing

Main category	Emphasis	Concept	Example
Processes	Emphasis on own company	Pollution control/ End-of-pipe	Waste water filter, air pollution filter, Carbon Capture Storage (CCS)
		Cleaner production methods	Substituting toxic chemicals with non-toxic, substituting coal plants with renewable energy etc.
		Eco-efficiency in production, service or delivery	Substituting old production capital with new energy efficient capital; training/ educating employees to act more resource effectively/ environmental friendly
	Emphasis on Life-cycle	Green supply chain management, green (public) procurement	Setting higher 'environmental standards' to suppliers of goods and services
		Take-back arrangements, extended producer responsibility, product Stewardship, Integrated product policy, remanufacturing, life-cycle thinking, closed loop production, cradle-to-cradle	Using 'used' products as input for new products or re-selling used products
		Industrial symbiosis (industrial ecology)	Sharing/using resources such as materials, energy, water, capacity, expertise, assets etc. from neighbor businesses as input
	Emphasis on incentive	Selling products or services in a way which incentivizes consumers/businesses so that the product is more optimally used/ uses less resources	Functional sales, ESCOs, MASCOs, WASCOs, CMS, DBFO etc.

Source: Team analysis, the Danish Business Authority 2012.

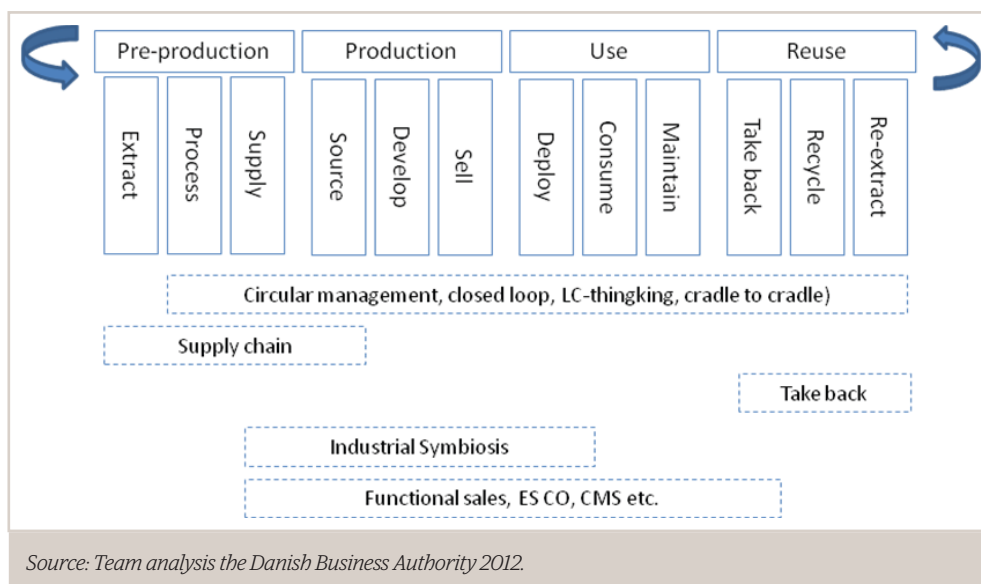
How is the value chain greened?

The *products and services* category concerns the production of physical goods and services which green the business' customers, because the product or service in question is a greener alternative to what the customer could otherwise have chosen or previously had. This is mainly in the use-phase, cf. illustration 3.

The *process* category concerns different processes inside the company as well as in other

parts of the value chain. In the value chain this can be illustrated in the pre-‘production’, ‘production’, ‘use’, and ‘re-use’ -phases. The ‘emphasis on own company’ in the above table, naturally, concerns the processes in ‘production’ phase in the company. The *life-cycle* emphasis in the above table can green most parts of the entire value chain, depending on the sub-models, e.g. cradle-to-cradle, green supply chain management, as well as the application and degree of implementation of the model. The industrial symbiosis model normally greens the value chain of a group of companies that participate in the symbiosis. The *incentive emphasis* in the above table primarily greens processes down-stream in the value chain, but it will sometimes also green the product involved, e.g. making the product more durable and constructing it in a way which makes it more resource efficient.

Illustration 3: The value chain – understanding how companies green the value chain



2.3 Zooming in on the life-cycle and incentive emphasis models

Here the process category and more specifically the life-cycle and incentive emphasis are in focus, since these sub-categories seem to potentially affect several elements of a companies' business model as described in section 4. The life-cycle and incentive models are also more prone to entail radical innovation, since the models both involve a relatively high degree of non-technological eco-innovations in the business model, often complimented by technological innovations, whereas the product and services category primarily focus on technological innovation. These models have the potential to significantly improve the environment and economic impact as well as holding the potential for wider application and alternative solutions.

The focus is on green supply chain management, Take back management, cradle-to-cradle and industrial symbiosis with respect to the life-cycle emphasis models and primarily on the result oriented product service systems with respect to the incentive emphasis. These are defined in the two tables in the following pages. For each of the life-cycle models *key elements* in the definition are highlighted.

The life-cycle models can be divided into several categories with respect to what part and how much of the value chain is greened by the model. For example green supply chain management and green procurement focus on the up-stream part of the value chain while product stewardship, extended producer responsibility, and take back management focus on the down-stream value chain. Remanufacturing, life-cycle management, closed-loop-production, and cradle-to-cradle more or less influence the whole value chain by taking in aspects all the way from pre-production, production, use as well as re-use, cf. table 2.

Table 2: The life-cycle models

Green Supply Chain Management (GSCM)	Green Supply Chain Management is an integrated concept of greening activities in the supply chain focusing on upstream flow, cost reductions of and innovation in raw materials, components, products and services.³ Key elements in the definition • manage to green most activities in the supply chain • engage in partnerships to green the supply chain
Take back management	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 (Van Rossem et al, 2006). Related Product Stewardship, Extended Product Responsibility (EPR). Key elements in the definition • establish take back mechanisms for the used products

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

Cradle-to-cradle	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 (Kelly, 2010) Related Closed-loop production Key elements in the definition • manage to green most activities in the supply chain • establish take back mechanisms for the used products • recycle materials or components in own production • design products that can be integrated in fully recyclable loops or bio-degradable processes Alternatives: • design products with a lower environmental impact • design new products for recyclability and materials reduction. • creating efficient and waste free products and services
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.). The aim of industrial symbiosis is to reduce costs and environmental impact of participating companies and municipalities. Key elements in the definition At the basic level- re-use or re-cycle resources in other companies of the industrial symbiosis

The incentive models are based on how a company incentivizes its consumers in a way so that part or the entire value chain is greened. These models differ from the ones above by using incentive schemes and changed ownerships structures as well as the company entering new markets in the value chain (e.g. service), cf. Table 3. One example is the Design, Build, Finance, Operate (DBFO) model where the Builder also is involved in the operation and maintenance of the building hence giving incentives for building with low costs for energy and water usage as well as incentives for low maintenance costs.

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

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

Table 3: The models – Incentive models

Generic incentive model	Green Product Service Systems (result-oriented)	Function-oriented sales offers a mix of both products and services and the provider offers the customer to pay for the functionality or performance of the product instead of buying the product itself (FORA, 2010) Related Functional Sales, Energy Saving Companies (ESCO), Chemical Management Services (CMS) and Design Build Finance Operate (DBFO) Key elements in the definition • maintain product ownership • sell the functionality of products Alternatives: • being paid by the outputs of products
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Source: Team analysis.

Focus in this report is thus on green business model innovation in life-cycle models and incentive models. In order to discuss how companies can green their business models, it is first necessary to introduce the concept of business model innovation in the following chapter.

3. The Business model

The business model basically explains how the company is doing its business. The business model explains how value is created for the customers and how value is captured for the company and its stakeholders (Linder and Cantrell, 2000, Magretta 2002, Rajala and Westerlund, 2007). The business model is composed by different elements like revenues and costs, resources, activities and internal and external relationships and networks, the value proposition to the customer, and mechanisms to capture value for the company.

Business models as a concept emerged in the literature in the mid-1990s and there have been many different opinions on the concept. The business model concept has been described in many different ways using various definitions and interpretations that are more or less explicit Weill, P. et al, 2005) cf. appendix 3 for an overview.

Adrian Slywotzky, a consultant in global management, used in his book Value Migration (1999) the following definition: *“A business (model) design is the totality of how a company selects its custom-ers, defines and differentiates its offerings (or responses), defines the tasks it will perform itself and those it will outsource, configures its resources, goes to market, creates utility for customers and captures profits. It is the entire system for delivering utility to customers and earning a profit from that activity”.*

Markides (1999) pointed out that the identification of the “who”, “what” and “how” forms the core elements of a business model. “Who” is the target group and the customers and what are their needs? “What” is the company’s value proposition to the targeted segment? And “how” is the company configuring its business operations, using which types of product and process technology, and which kind of interactions with other supply chain elements?

Alexander Osterwalder, consultant and Ph.D., stated in the book Business Model Generation (2010) that *“a business model describes the rationale of how an organization creates, delivers, and captures economic, social, and other forms of values”.*

Although there exists no general acknowledged conceptualization of business models,

a literature review study on business models by Zott et al. (2010) concludes, that there seems to emerge a common understanding of the business model concept among researchers. It is thus widely accepted that the business model concept is emerging as a new unit of analysis, that business models emphasize on a system-level a holistic approach towards explaining how firms do business, that organizational activities play an important role in the various conceptualizations of business models, and that business models seek to explain how value is created and captured.

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

3.1 The business model canvas

A company's business model can be analyzed in different ways and many different tools have been developed to analyze business model concepts. To mention but a few, the innovation Radar by Professor Robert Wolcroft at Kellogg School of Management, the Ten Types of Innovation by Doblin Research (for details see (Carlson,2004)) and the Seizing the White Space by Mark Johnson (2010) at Innosight. They are all examples of models or canvases that frame the key building blocks of a business.

However, the business model canvas tool developed by Dr. Alexander Osterwalder (2010) is an intuitive way of understanding the business model concept and is a good starting point for analyzing green business model innovation. Therefore the Business Model Generation (BMG) canvas is chosen for further analysis, and moreover, this canvas is internationally acknowledged and based on open source, so that it can be applied as a basis for the practical tools for companies.⁶

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

The business model canvas tool of Osterwalder consists of nine basic building blocks covering four main areas of a business: customers, offering, infrastructure, and financial

⁶ The tool is described in the book Business Model Generation which has been developed and published through open source collaboration with an international group of 470 practitioners. (Osterwalder and Pigneur, 2010)

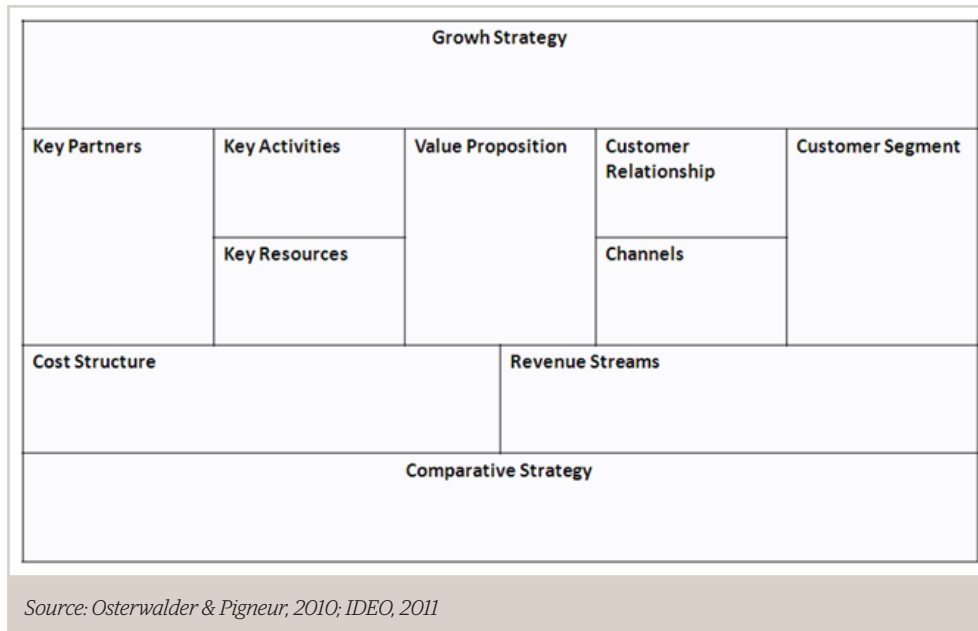
viability. Besides these nine blocks from the Osterwalder business model canvas, two additional building blocks on comparative strategy and growth strategy have been added. The two additional building blocks are inspired by IDEO (2011), cf. Box 7.

BOX 7: THE ELEVEN BUILDING BLOCKS OF THE BUSINESS MODEL CANVAS

1. **Customer Segments** - the different groups of people or organizations that the company aims to reach and serve by its products or services.
2. **Value Propositions** - the bundle of products and services that create value for a specific Customer Segment.
3. **Channels** - how a company communicates with and reaches its Customer Segments to deliver a Value Proposition.
4. **Customer Relationships** - the types of relationships a company establishes with specific Customer Segments.
5. **Revenue Streams** - the cash a company generates from each Customer Segment
6. **Key Resources** - the most important assets required to make a business model work
7. **Key Activities** - the most important activities a company must do to make its business model work
8. **Key Partnerships** - the network of suppliers and partners that make the business model work
9. **Cost Structure** - all costs incurred to operate a business model
10. **Comparative Strategy** - how the offering of the company differs from its competitors
11. **Growth Strategy** - the dynamic part of the business model in the sense, that in order to have a sustainable business, the company needs a growth strategy.

Source: Osterwalder & Pigneur, 2010; IDEO, 2011

These 11 building blocks constitute the structure of the business model canvas, cf. Illustration 4, which is applied to understand green business models and green business model innovation.

Illustration 4: Business Model Canvas

The business model canvas can be used to conceptualize green business model innovation. The business model canvas appears as a very usable tool to uncover the main elements of a business model in relation to businesses green or sustainable practices.⁷

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

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

⁷ The business model canvas was tested in the version of IDEO, which is very close to the Osterwalder and Pigneur’s business model canvas. Therefore, most of the conclusions from the workshops are transferable to the extended Osterwalder and Pigneur’s business model canvas.

Examples of analytical use of the canvas

The canvas can be used to visualize and understand how a business model is briefly described. The Danfoss Solutions ESCO model is showed in Illustration 1. The value proposition of the ESCO provider is a service offer to optimize the energy use of the client (e. g. building, production apparatus etc.). The revenue scheme in the ESCO is performance payment by part of the savings achieved. An example from the private sector is the Danish company Danfoss Solutions that guarantees energy savings for industrial companies and is paid according to the energy performance of their installations. Customers are compensated if savings are less than guaranteed. Below the business model is illustrated for Danfoss Solutions.

Illustration 5: Business model of Danfoss Solutions (ESCO model)

Growth Strategy ▪Scale to EU, NA in core segments ▪Scale in new segments ▪Expand to Asia				
Key Partners	Key Activities Retrofitting	Value Proposition Reduction of energy costs through retrofitting	Customer Relationship Co-creation with clients	Customer Segment Industrial food & beverages companies
	Key Resources Highly experienced engineers		Channels Multicompany sales directed at diff. levels in clients' org.	
Cost Structure Full funding of costs and risks		Revenue Streams Performance payment		
Comparative Strategy Experienced use of existing technology in a smarter way				

Source: Team Analysis, the Danish Business Authority 2012.

3.2 Business model innovation

As industries and markets change, companies need to challenge, re-think or re-invent their business model in order to stay competitive - e.g. by re-thinking their value proposition to the customers (e.g. a service or pay-per-use instead of a product), seeking new ways to capture new market segments (e.g. blue ocean strategy), generating new types of producer-consumer relationships (e.g. co-creation), applying a new profit formula (e.g. performance payment), and restructuring their activities, resources and partnerships (e.g. green supply chain management).

Professor Mahadevan (2004) points out that *“Business model innovation enables a firm to uniquely deploy available alternatives with respect to product, technology, process and markets with a view to create new value propositions and appropriate value arising out of the competitive advantage”*.

As business models consist of complex interdependencies between the different business model elements, business model innovation relates to radical and transformative innovations and systemic shifts like restructuring the entire value chain, generate new types of producer-consumer relationships, alter the consumption culture/traditions, etc. (Johnson et al, 2008, Johnson, 2010).

3.3 Business model canvas to understand innovation in business models

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

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

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

Each of the 11 building blocks can be a starting point for generating new ideas to do business model innovation. Due to the complex system of interdependencies between the different elements in the business model, the transformation of one building block will affect multiple building blocks. For example if a company changes its value proposition to the customers of delivering a service instead of a product, the customer relationship, the distribution channel, the revenue streams and cost structures would also need to be adjusted accordingly.

Osterwalder and Pigneur (2010) distinguish between four epicenters of business model innovation and a multiple-epicenter innovation. The five forms of innovation are listed in Box 8 below.

BOX 8: FIVE FORMS OF BUSINESS MODEL INNOVATION

Resource driven innovation is transforming the business model from the company's infrastructure, key partners, and key resources.

Offer driven innovation is offering customers a radical new value proposition affecting the other business model building blocks.

Customer driven innovation is based on new customer needs, facilitated access or increased convenience.

Finance driven innovation is finding new revenue streams, pricing mechanisms or reduced cost structures.

Multiple-epicenter driven innovation is characterized by several epicenters in the business model canvas.

Source: (Osterwalder and Pigneur, 2010)

The canvas can be used to visualize how the company has *innovated* the business model. This is illustrated again by Danfoss Solutions' business model and how they changed their traditional business model of selling a product into an ESCO model where they provide a service, cf. Illustration 6.

Danfoss Solutions was at the time facing a downturn in the food and beverages industry market and saw ESCO solutions as a way to approach the market from a different approach using its existing experiences and networks in the industry. Therefore, it changed its value proposition from selling energy products to offering energy savings for the industrial companies and it transformed the revenue streams from one time product sales to performance payment according to the energy saved for the client by their installations. They also changed their Key Activities from production to retrofitting, and when providing this service, they do it in cooperation with the customers. The relationship with the customer is thereby changed from a traditional buyer-seller relationship to a service relation with the client with elements of co-creation. The business model innovation is in that way multiple-epicenter driven as the value proposition, the revenue streams, the key activities and the Customer Relationships are transformed substantially.

Illustration 6: The business model innovation of Danfoss Solutions – changing for product to ser-vice by an ESCO model

Growth strategy				
Key Partners	Key activities	Value proposition	Customer Relationship	Customer Segments
	Key Resources		Channels	
	Production Retrofitting	Energy products Reduction of clients' energy costs through retrofitting	Seller—Buyer Co-creation	Industrial food & beverage companies
Cost Structures		Revenue Streams		
		One-time product payment Performance payment		
Comparative strategy				

Note: *Former* and *new* business model
Source: Team Analysis.

3.4 Characteristics of the business model innovation in life-cycle and incentive models

The ways companies can green their business model can be described using the logic of Osterwalder and Pigneur (2010) epicentre-driven business model innovation. When a company is greening its **products and services**, the business model innovations are primarily taking place on the left hand side of the business model canvas with epicentres in Key Activities and Key Resources (resource driven innovation). The innovation is centred on efficiency in the value chain that also leads to a greener value proposition to the customers.

When a company is greening **processes**, the business model innovations can take place in the middle as well as on both sides of the business model canvas with epicentres in Key Partnerships, the Value proposition, the Customer Relationships, the Channels, the Customer segments and the Revenue streams. The company can set 'green demands' on its partners, go into new relationships with their existing or new customers using new channels and payment schemes in order to green the value chain.

In **processes** with emphasises the **life-cycle approach**, the business model innovation is foremost taking place on the left hand side of the business model canvas (efficiency side) around transformation of the internal processes of the company with epicentres in key resources, key activities and key partners (resource driven innovation). The

innovation is foremost centered on efficiency and sustainability in the value chain and as a consequence also the value proposition to the customers is changed, as the offering will have significantly green value attached. For example when Maersk Line is starting to construct container ships according to the cradle-to-cradle principles, it will be able to offer their customers' cradle-to-cradle certified transportation, cf. illustration 7.

Illustration 7: Maersk Line's business model innovation using 3E-ships and C2C-passport

Growth strategy				
Key Partners	Key activities	Value proposition	Customer Relationship	Customer Segments
Traditional suppliers		Traditional shipping		Asia-Europe trade customers
New design based on C2C passport	Key Resources	Slower transportation Less CO2 emissions Reusing materials	Channels	Companies with green profile, less focus on fast transport, etc.
	Traditional vessels			
	Triple E vessels			
Cost Structures		Revenue Streams		
		Traditional scrapping Increased scarp value from mapping		
Comparative strategy				

Note: *Former* and *new* business model

Source: Team Analysis.

In **processes** that emphasise the **incentive approach**, the business model innovation is foremost taking place on the right hand side of the business model canvas (value side) around transformation of the external processes of the company with epicentre in the revenue streams (finance driven innovation). Incorporating new incentives in the pricing model will usually have a radical transformative effect on the value proposition and involve a new kind of customer relationship.

In both the processes that emphasise life-cycle and incentive models, the value proposition to the customers is normally changed significantly and are thereby often characterized by more radical transformations of the business model.

4. Green business model innovation - combining the concepts

In this chapter we go through the previous descriptions and definitions on green business model innovation and describe relevant work which centers on how companies green their business. Combining these elements with the findings in the above chapters we synthesize all of the work in a framework of green business model innovation.

4.1 Literature related to green business model innovation

Green business model innovation has so far not been widely structurally covered in the literature. In this chapter green business model innovation is synthesized on the basis of the previous chapters as well as the following literature review.

A comprehensive study focusing on the promotion of innovative business models with environmental benefits carried out for the European Commission found that a greater spread and application of such models has the potential to bring substantial environmental benefits (EC, 2008). This finding was echoed by FORA (2010) in our previous work, and which confirmed the significant lower environmental impacts and high economic potential of these business models. FORA's green paper *Green Business models in the Nordic Region - A key to promote sustainable growth* has the following definition:

"Green business models are business models which support the development of products and services (systems) with environmental benefits, reduce resource use/ waste and which are economical viable. These business models have a lower environmental impact than traditional business models."

Following the typical business thinking, sustainability can become an integral part of

business models only if it can deliver additional value to the company and its customers. Therefore the value of sustainability has to be translated into sustainable revenue streams or reduction of company costs in the future. Eco-innovation is a suitable concept in this respect as it concerns both economic and environmental benefits. Therefore eco-innovation in business models concerns converting innovation activities of companies into both economic value and environmental benefits (Technopolis, 2011).

In other words eco-innovation at the business model level has the potential to transform the way companies, markets, and even entire societies operate, resulting in business models that support the development of products and services (systems) with environmental benefits, reduce resource use/waste and which are economically viable (WBCSD, 2010).

One of the first papers that define eco-innovation in business models is a merger between Osterwalder's (2005, 2010) explanations of the business model and OECD/EIO's (2010) definition of eco-innovation that was presented at the DRUID Academy Conference 2012:

"Eco-Innovation in business models is a change in the logic/way/rationale of how an organization offers its customers value (and creates sustainable revenue streams) while reducing the use of natural resources and decreasing the release of harmful substances across the whole life-cycle" (Joller, 2012).

The result of this process is the Green Business Model, a concept coined by FORA (2010), which is expected to have a lower environmental impact than traditional business models, and enables companies to for example focus more on long-term carbon reductions, security of supply and to offer energy-efficient advances to customers.

Because the 'greening' potential of a business model has generated a flow of theoretical discussions among researchers related to the parameters involved in determining this variable, the US Environmental Protection Agency stated in its report Green Servicing (2009) that the green potential of a business model is a function of three main factors:

1. **Macro-level environmental performance.** That is, eco-efficiency gain over 'business-as-usual' at the level of the individual customer unit or function
2. **Market potential.** The potential of a business model to become the 'business-as-usual' means to obtain a particular economic function or service
3. **Environmental significance.** The portion of national emissions, pollutant loads or resource demands that can be attributed to the manufacture, use, delivery and end of life management of the principal goods or services to whose 'business-as-usual' consumption the model constitutes an alternative.

The Forum of the Future⁸ describes sustainable business models as models that must be:

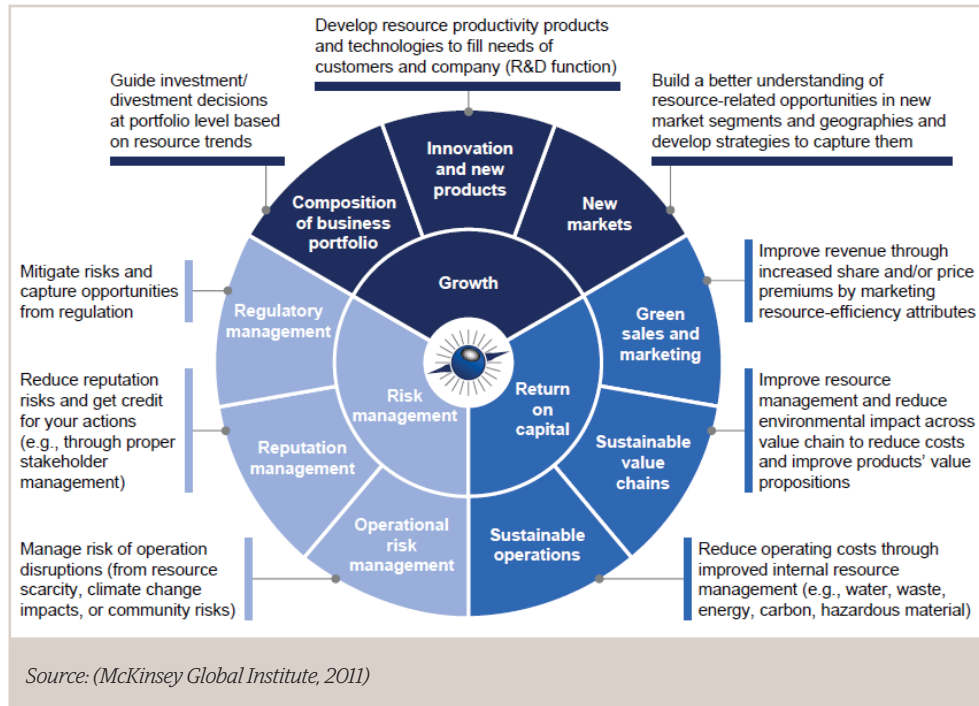
- **Commercially successful** - why is this proposition valuable to the customer and how can you deliver at a profit from it?
- **Future ready.** For instance, it will succeed in a world of rising, volatile energy and commodity prices.
- **Part of a sustainable society.** It is not possible to be a sustainable business in an unsustainable economy. All business models rely on particular external conditions. To be called sustainable, those conditions must match with a thriving economy that is delivering social progress within environmental limits. For instance, does the business model enable absolute decoupling of economic growth from environmental damage? Does it rely on nature providing materials or services for free? Does it rely on unfair terms of trade? (Bent, 2011)

In the chapter *The Private Sector Opportunity* in the McKinsey Global Institute's *Resource Revolution* report (2011) it is stated that businesses need a better understanding of how resources may shape their profitability across their operations, produce new growth opportunities, and pose new challenges of risk management. The McKinsey report does not explicitly focus on green business model innovation, but their work gives insight on how the World's increased resource scarcity affects how companies can rethink their business to retain or increase their competitiveness as well as creating new markets. These issues are the same that are addressed in this report. The key illustration shows how businesses may re-orient their business model to capture new markets resulting from resource trends (growth), improve resource management and reducing the environmental impact of the value chain (return on capital), and pursuing more sophisticated operational and risk management (risk management) cf. illustration 8.

According to Michael Porter and Mark Kramer (2011) companies are trapped in an outdated approach to business where their focus on short-term financial performance comes before understanding what will create long-term success. According to the two authors companies need to take a new approach to value creation. Companies need to redefine their purpose as creating "shared value" where generating economic value produces value for both businesses and society by addressing societal challenges. A shared valued approach could bring business and society back together, instead of viewing business as the cause of social, environmental and economic problems. Shared value could also drive the next wave of innovation and productivity growth in the global economy.

8 A UK based NGO working globally with business and government to create a sustainable future.

Illustration 8: Resource-related value-creation levers for businesses



In order to give a comprehensive and generic description on how companies green their business model, the next section presents a framework and synthesizes the previous analysis.

4.2 A framework for Green Business Model Innovation

For businesses to be able to retain and further strengthen their market position, they have to continuously rethink and reinvent their business models. Innovation is relevant for all firms and organizations as it is about staying in the 'game', or being at the forefront of competition while assuring viability and sustainability of their operations. Radical changes in business models imply revisiting the customer base and value chain or redefining products and services. Business models often change gradually and do not necessarily imply fundamental revisiting of value propositions, but of course the changes could also focus on improving production processes or reconfiguring organizational structures (OECD, 2011c).

Corporate sustainability is now in many companies playing an integral role in shaping the mission or driving force of a firm (Cocklin and Subbs, 2008). Emerging markets for greener products and services on the one hand, and the rise of sustainability and green growth agendas in corporate management on the other, are increasingly leading firms to integrate non-financial metrics into their decision-making processes, to revisit the

concepts of value and profitability that drive their business models, and to reconsider the balance between the dual objectives of short-term profitability and long-term sustainability (Bryson & Lombardi, 2009).

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

The OECD has a very rich portfolio of studies which focus on eco-innovation, and one of their projects⁹ proposes that this can be understood and analyzed from three dimensions, namely in terms of an eco-innovation's:

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

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

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

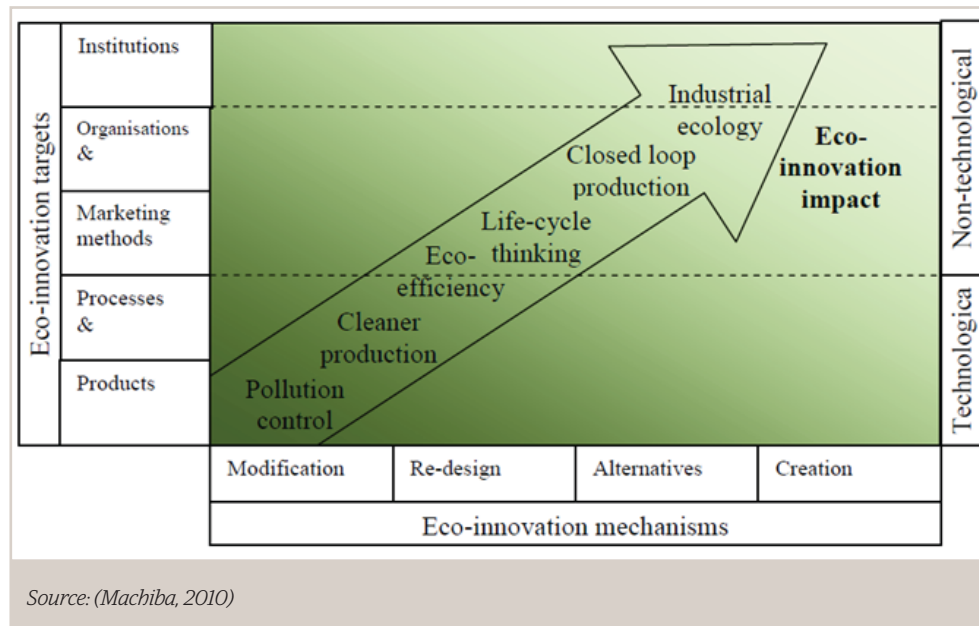
- » Modification - such as small, progressive product and process adjustments;
- » Re-design - referring to significant changes in existing products, processes, organizational structures;
- » Alternatives - such as the introduction of goods and services that can fulfill the same functional need and operate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

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

⁹ http://www.oecd.org/document/37/0,3746,en_2649_34173_40695077_1_1_1_1,00.html

The three dimensions and their linkages are shown in illustration 9 below.

Illustration 9: Conceptual relationships between sustainable manufacturing and eco-innovation



Inspired by the OECD analysis directions, this section intends to create a framework that can integrate eco-innovation at business model level. In order to understand the eco-innovation mechanisms resulting in green business models, it is suggested that the up-mentioned targets should be replaced by the building blocks of the Osterwalder's and Pigneur's business model canvas (2010). In this way the eco-innovation targets proposed by the OECD transform into business model target blocks.

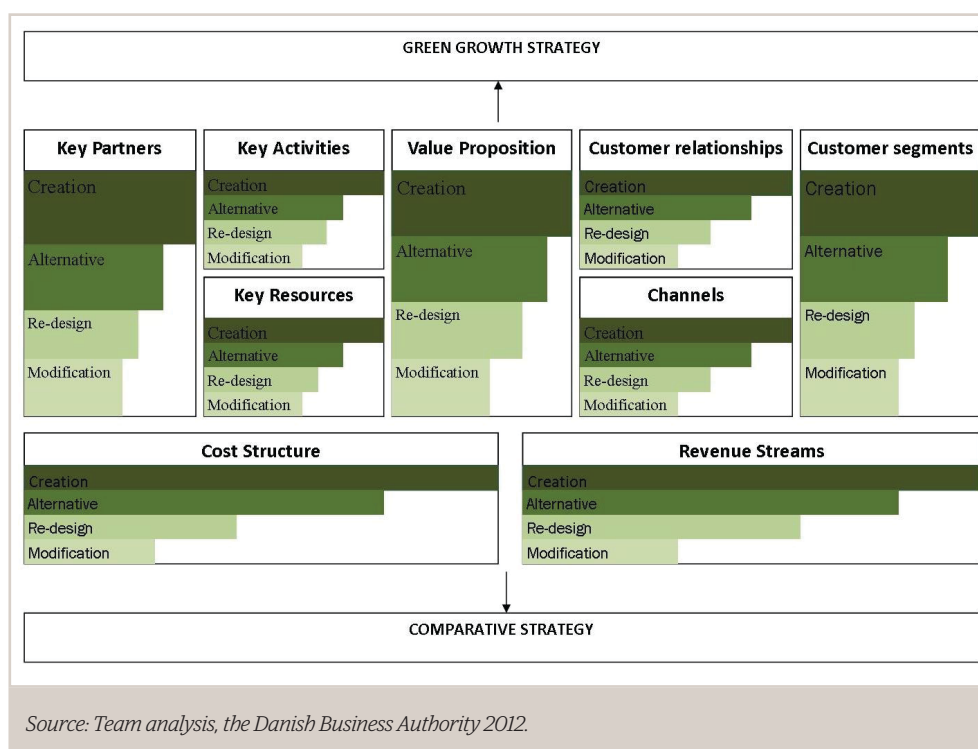
Green Business Model Innovation reflects the concept's explicit emphasis on the reduction of environmental impact, and this can vary according to the method by which the change in the targeted business model block(s) takes place:

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

Potential environmental impacts stem from the eco-innovation's target blocks and change mechanisms, and their interplay under the business model canvas umbrella.

Given a specific target block, the potential magnitude of the environmental benefit tends to depend on the eco-innovation's mechanism, as more radical changes, such as alternatives and creation, generally embody higher potential benefits than modification and re-design (Machiba, 2010). Therefore in this section's approach the environmental impact is not a third dimension of analysis but a variable determined by the chosen target blocks and mechanism, c.f. illustration 10.

Illustration 10: Green Business Model Innovation



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

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

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

Conclusion

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

Generally, it can be said that:

1. the more parts of a business model which are changed and have a green effect, and
2. the more profoundly a green change is taking place within the individual parts of the business model - going from modification, re-design, alternatives, to creation - the greener the business model innovation is and the higher the potential for creating radical eco-innovation.

This is an open definition and it captures many small and large intended or unintended actions of a business. However, it seems problematic to set tighter boundaries on green business model innovation, since it is not easy to argue for or against why different ways of greening a business should or shouldn't be considered as green business model innovation. Also, Green business model innovation may be implemented to a smaller or larger degree in different businesses and thus have different effects.

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

Innovation in business models can be more or less radical in the change of using resources to production, offering a service to customers, making profits, addressing new markets and so on. The more interesting green business model innovations are, naturally, the ones that radically change the business model.

The two main models that were studied here were the **life-cycle models** and **incentive models**. They both seem promising levers for companies to increase their resource productivity and ways to enter or create new greener markets. These models are not only relevant for traditional green industries such as clean-tech industry. They may also be implemented in more conventional sectors such as transportation, service, agriculture, construction and the broader industry.

Further research

While a lot of ground has been covered in relation to understanding and defining green business model innovation, we still have a lot of work to do before we truly understand the nature of green business model innovation and what it will take for

business to transform itself into greener alternatives. A few suggestions to further work that could be done are presented below:

- What are the main characteristics of the eco-innovations in the individual parts of the business model and how can that they be systematized?
- Which kinds of green business model innovation hold a high potential in different sectors / industries?
- How should green business model innovation be addressed in existing businesses vs. start-ups?
- Are there differences in how green business model innovation should be addressed in small and medium sized businesses vs. large businesses?
- Does green business model innovation have industry-specific similarities? And if so, how could industry-specific green business model innovation be transferred to different industries - e.g. could the ESCO model be used on other areas than energy efficiency?
- What are the combinations of environmental and economic outcomes associated with the different building blocks that are eco-innovated?
- What are the pre-steps that foster business model eco-innovation? (e.g.: membership in business networks, business transparency, communication with customers)
- What are the benefits in terms of marketing and company image that come with the green business model innovation?

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Annex 1: Methodology

This report partly builds on the work that FORA undertook in the green paper '*Green Business Models in the Nordic Region*' for the NCM in 2010. This new report partly builds on a top-down approach and a bottom-up approach.

A desk research was carried out on respectively the terms: 'green', 'innovation', and 'business model' – basic concepts that are key to understanding green business model innovation.

A main task of this conceptualization report has been to supplement and expand the focus area of the green paper which primarily focused on product service systems to identify different ways which businesses can green themselves or others, cf. the 'long list' in annex 4.

The long list in annex 4 shows different ways in which companies green their business. The long list does of course not contain every way a business may be green. The list has been used to structure our ideas of commonalities and characteristics of how businesses may be green. The different ways a business may be considered green were evaluated with respect to the value chain and a generic business model canvas (Osterwalder and Pigneur, 2010) to understand which parts as well as how much of the business model was affected.

This report was updated with learning points from the business case study, and learning points from the workshop *The Future of Eco-Innovation: The Role of Business Models in Green Transformation* on 19-20 January 2012 in Copenhagen.

Annex 2: Definitions of eco-innovation

Innovation definition

Oslo Manual (OECD 2005)

Innovation process: *'the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations'*.

Eco-innovation definitions

European Commission (2006):

"Activities which produce goods and services to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. This includes technologies, products, and services that reduce environmental risk and minimize pollution."

The SYSTEMATIC Eco-Innovation panel (2006):

"the creation of novel and competitively priced goods, processes, systems, services, and procedures designed to satisfy human needs and provide a better quality of life for everyone with a life-cycle minimal use of natural resources (materials including energy and surface area) per unit output, and a minimal release of toxic substances".

ETAP (EC, 2004):

'The production, assimilation or exploitation of a novelty in products, production processes, services or in management and business methods, which aims, throughout its life-cycle, to prevent or substantially reduce environmental risk, pollution and other negative impacts of resource use (including energy).'

WBCSD - eco-efficiency (2000):

"the delivery of competitively priced goods and services that satisfy human needs and bring quality of life while progressively reducing environmental impacts of goods and resource intensity throughout the entire life-cycle to a level at least in line with the Earth's estimated carrying capacity"

Eco-Innovation Observatory (2010)

Types and features of eco-innovation

Material flow eco-innovation

Because of its focus on resource efficiency, the E-IO seeks to explore activities of **material flow innovation**. This type will capture innovations across the material value chains of products and processes that lower the material intensity of use while increasing service intensity and well-being. It aims to move societies from the extract, consume, and dispose system of today's resource use towards a more circular system of material use and re-use with less total material requirements overall.

While the EIO acknowledges that the categories of process, product and system innovation (and organizational and advertising innovation) have their merits, the claim can also be made that many forms of innovation ought to be related to materials in order to capture innovation activities such as:

Developing new materials (with better environmental performance)

- Substituting environmentally-intensive materials and products by
- New materials
- Functionally new products
- Functionally new services, which lower the demand for the related product

Establishing life-cycle wide processes of resource efficiency e.g. by

- Sustainable mining
- More efficient production and application of materials
- Optimising transport logistics
- Enhancing re-use and recycling
- Recapturing precious materials from previously open loop systems (e.g. critical metals,
- phosphorus)
- Functionally integrating modules and materials in complex goods (e.g. solar cells
- integrated in roofs)
- Increasing the lifetime and durability and offer related services
- Increase the information of consumers on the resource efficiency of products

Transforming infrastructures towards a steady-state stocks society e.g. via

- Improved maintenance systems for roads and buildings

- Developing new resource-light buildings and transportation systems and other network
- goods (such as waste water systems)
- Establishing a solarised technosphere for dwellings and other systems of provision
- Slowing down urban sprawl and include resource efficiency aspects in urban and spatial planning

Process eco-innovation

Process eco-innovations are integral to the reduction of material use and thus one of the most important aspects to consider under the umbrella of eco-innovation. This is because of their low risk and cost saving character. Moreover, relevant gains to resource productivity are to be made when tackling the 'upstream' or production part of a supply chain. Process innovation includes both improvements to production or the delivery method (including equipment and software changes).

Process eco-innovations minimize or reduce effects and emissions of production and consumption, for instance through recycling. Examples of types of process eco-innovations include the substitution of harmful inputs during the production process (for example replacing toxic substances), optimization of the production process (for instance improving energy efficiency) and reducing the negative impacts of production outputs (such as emissions) (Reid and Miedzinski, 2008). In addition, reducing material inputs, i.e. the so-called 'ecological rucksacks', of production and consumption processes can also be captured as process eco-innovation. Common terms heard in connection with process eco-innovations include cleaner production, zero emissions, zero waste and material efficiency (Bleischwitz et al. 2009).

Product eco-innovation

Product eco-innovation includes both goods and services. Eco-innovative goods are those produced in such a way that the overall impact on the environment is minimized. This includes environmentally improved material products, such as passive houses, and eco-design is a key word in this area. It may come as a surprise that a service society can be just as, or even more, resource demanding than a commodity based society (Reid and Miedzinski, 2008), but this can be the case, especially in relation to the resource intensity of those patterns and the 'rebound effect'. Eco-innovative services include green financial products (such as eco-leases), environmental services (such as waste management) and services that are less resource intensive (for instance car sharing) (Kemp and Pearson, 2007).

Organizational eco-innovation

Organizational eco-innovation is the introduction of organizational methods and management systems for dealing with environmental issues in production and

products (Kemp and Pearson, 2007). The EIO considers such organizational changes to be *the socio-economic dimension of process innovation*, especially as it is closely linked to learning and education (see Bleischwitz, 2003). It includes pollution prevention schemes, environmental management and auditing systems and chain management (cooperation between companies to close material loops and avoid environmental damage across the whole value chain) (Kemp and Pearson, 2007). As such, organizational eco-innovation may also include an enquiry into various collaborative organizational forms and their potential eco-innovative qualities; this can range from business networks and clusters to advanced solutions in industrial symbiosis.

Marketing eco-innovation

Marketing eco-innovation involves changes in product design or packaging, product placement, product promotion or pricing. It involves looking at what marketing techniques can be used to drive people to buy, use or implement eco-innovations. In marketing terms, brand (a collection of symbols, experiences and associations connected with a product or service by potential customers) has become key to understanding the process of commercialization of products and services. Buying into a brand through purchasing a product, service or technology is to a large extent about choosing to trust in the organization owning the brand, which implies that the consumers' choices are not always rational. Better understanding of the specificity (or lack of it) of the market and consumer response to brands related to eco-innovations, i.e. products, services, technologies or companies, becomes strategic knowledge in the market, for actors such as SMEs.

To this end, green branding is very important, but in practice it may not be the only or best way of selling eco-innovations. For instance, a hybrid automobile may have more success on the market when it is marketed as a premium product instead of an eco-product. Labeling is also an aspect of marketing eco-innovation, i.e. eco-labeling, as well as product guarantees, which promise customers a certain level of performance for a given time-period.

Social eco-innovation considers the human element integral to any discussion on resource consumption. It includes market-based dimensions of behavioral and lifestyle change and the ensuing demand for green goods and services. Product-Service-Systems (Mont and Lindhqvist 2003) are but one example of how features of new products might underline a shift to eco-innovative services. Towards new markets, some firms are experimenting with so-called user-led innovation, meaning that the functionality of new goods is developed with stakeholders thereby minimizing the risk of superfluous product features. Another important aspect is product-sharing activities that may lead to an absolute decrease of material use without diminishing the quality of services they provide to users. However, the social dimension also involves discussions on the creative potential of society, with examples of innovative green living concepts such as guerrilla

gardening, and on corporate social responsibility. Sustainable consumption is a key word in the context of social eco-innovation and research to this end is being performed by e.g. the European Topic Centre on Sustainable Consumption and Production at the European Environment Agency.

Infrastructure eco-innovation

The EIO will also enquire about infrastructure that is about integrated systemic solutions for housing, urban parks, transport and other larger infrastructural forms. This is to better analyze the larger scale solutions that may provide the context for better understanding of the impacts of product, process or organizational changes.

UN Global Compact Network

Global Compact Principle 7¹⁰

“Businesses should support a precautionary approach to environmental challenges.”

What is the precautionary approach?

Introducing the precautionary approach, Principle 15 of the 1992 Rio Declaration states that “where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation”.

Precaution involves the systematic application of risk assessment (hazard identification, hazard characterization, appraisal of exposure and risk characterization), risk management and risk communication. When there is reasonable suspicion of harm and decision-makers need to apply precaution, they have to consider the degree of uncertainty that appears from scientific evaluation. Deciding on the “acceptable” level of risk involves not only scientific-technological evaluation and economic cost-benefit analysis, but also political considerations such as acceptability to the public. From a public policy view, precaution is applied as long as scientific information is incomplete or inconclusive and the associated risk is still considered too high to be imposed on society. The level of risk considered typically relates to standards of environment, health and safety.

Why is the precautionary approach important for business?

The key element of a precautionary approach, from a business perspective, is the idea of prevention rather than cure. In other words, it is more cost-effective to take early action to ensure that irreversible environmental damage does not occur. Companies should consider the following:

- While it is true that preventing environmental damage entails both opportunity – and im-plementation – costs, remediation environmental harm after it has occurred can cost much more, e.g. for treatment costs, or in terms of company image.
- Investing in production methods that are not sustainable (i.e. which deplete resources and degrade the environment) has a lower, long-term return than investing in sustainable operations. In turn, improving environmental performance means less financial risk, an important consideration for insurers.
- Research and development related to more environmentally friendly products can have significant long-term benefits.

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<http://www.unglobalcompact.org/AboutTheGC/TheTenPrinciples/principle7.html>

What steps could companies take in the application of the precautionary approach?

Issues for the company to deal with under this approach include providing better information to the consumer, communicating potential risk for the consumer, the public or the environment. It also includes obtaining prior approval before certain products, deemed to be potentially hazardous, may be placed on the market.

Steps that the company could take in the application of this approach include the following:

- Develop a code of conduct or practice for its operations and products that confirms commitment to care for health and the environment.
- Develop a company guideline on the consistent application of the approach throughout the company.
- Create a managerial committee or steering group that oversees the company application of precaution, in particular risk management in sensitive issue areas.
- Establish two-way communication with stakeholders, in a pro-active, early stage and transparent manner, to ensure effective communication of information about uncertainties and potential risks and to deal with related enquiries and complaints. Use mechanisms such as multi-stakeholder meetings, workshop discussions, focus groups, public polls combined with use of website and printed media.
- Support scientific research, including independent and public research, on the issue involved, working with national and international institutions concerned.
- Join industry-wide collaborative efforts to share knowledge and deal with issues, in particular production processes and products around which high level of uncertainty, potential harm and sensitivity exist.

Global Compact Principle 8¹¹

“Businesses should undertake initiatives to promote greater environmental responsibility.”

What is environmental responsibility?

In Chapter 30 of Agenda 21, the 1992 Rio Earth Summit spelled out the role of business and industry in the sustainable development agenda as: *“Business and industry should increase self regulation, guided by appropriate codes, charters and initiatives integrated into all elements of business planning and decision-making, and fostering openness and dialogue with employees and the public.”*

The relevant principle in the Rio Declaration says we have the responsibility to ensure that activities on our own yard should not cause harm to the environment of our neighbors. Society also expects business to be good neighbors. Business gains its legitimacy through meeting the needs of society, and increasingly society is expressing a clear need for more environmentally sustainable practices.

What steps could companies take to promote environmental responsibility?

Steps that the company could take to promote environmental responsibility would be the following:

- Re-define company vision, policies and strategies to include the ‘triple bottom line’ of sus-tainable development – economic prosperity, environmental quality and social equity.
- Develop sustainability targets and indicators (economic, environmental, social).
- Establish a sustainable production and consumption program with clear performance objectives to take the organization beyond compliance in the long-term.
- Work with suppliers to improve environmental performance, extending responsibility up the product chain and down the supply chain.
- Adopt voluntary charters, codes of conduct or practice internally as well as through sectoral and international initiatives to confirm acceptable behavior and performance.
- Measure, track and communicate progress in incorporating sustainability principles into business practices, including reporting against global operating standards.

- Ensure transparency and unbiased dialogue with stakeholders.
- In doing the above, the existence of appropriate management systems is crucial in helping the company to meet the organizational challenge. Key mechanisms or tools for the company to use would be (a) assessment or audit tools (such as environmental impact assessment, environmental risk assessment, technology assessment, life-cycle assessment); (b) management tools (such as environmental management systems and eco-design) and (c) communication and reporting tools (such as corporate environmental reporting and sustainability reporting).

Annex 3: Business model definitions

Author(s)	Description of business model concept
Timmers (1998)	An architecture for products, services and information flows, including a description of various business actors and their roles; a description of the potential benefits of various business actors; and a description of sources of revenues.
Venkatraman & Henderson (1998)	A strategy that reflects the architecture of a virtual organization along three main vectors: customer interaction, asset configuration, and knowledge leverage.
Linder & Cantrell (2000)	The organization's core logic for creating value. The business model for a profit-oriented enterprise explains how it makes money.
Gordjin et al (2000)	A BM answers the questions: "who is offering what to whom and expects what in return?" A BM explains the creation and addition of value in a multi-party stakeholder network as well as the exchange of value between stakeholders.
Petrovic et al (2001)	A business model describes the logic of a "business system" for creating value that lies beneath the actual processes.
Amit & Zott (2001)	A business model depicts the design of transaction content, structure, and governance so as to create value through exploitation of new business opportunities.
Torbay et al (2001)	The organization's architecture and its network of partners for creating, marketing, and delivering value and relationship capital to one or several segments of customers in order to create profitable and sustainable revenue streams.
Stähler (2002)	A model of an existing business or a planned future business. A model is always a simplification of a complex reality. It helps to understand the fundamentals of a business or to plan how a future business should look.
Chesbrough & Rosenbloom (2002)	The business model provides a coherent framework that takes technological characteristics and potentials as inputs, and converts them through customers and markets into economic inputs. The business model is thus conceived as a focusing device that mediates between technology development and economic value creation.
Magretta (2002)	The business model tells a logical story explaining who your customers are, what they value, and how you will make money in providing them that value.

Author(s)	Description of business model concept
Bouwman (2002)	A description of roles and relationships of a company, its customers, partners and suppliers, as well as the flows of goods, information and money between these parties and the main benefits for those involved, in particular, but not exclusively to the customer.
Hedman & Kalling (2003)	Business model is a term often used to describe the key components of a given business. That is customers, competitors, offering, activities and organization, resources, supply of factors, and production inputs as well as longitudinal process components to cover the dynamics of the business model over time.
Campanovo & Pigneur (2003)	A detailed conceptualization of an enterprise's strategy at an abstract level, which serves as a place of the implementation of business processes.
Leem et al (2004)	A set of strategies for corporate establishment and management, including a revenue model, high-level business processes, and alliances.
Shafer et al (2005)	A representation of a firm's underlying logic and strategic choices for creating and capturing value within a value network.
Osterwalder et al (2005)	A conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It is a description of the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners for creating, marketing, and delivering this value relationship capital, to create profitable and sustainable revenue streams.
Haaker et al (2006)	A blueprint collaborative effort of multiple companies to offer a joint proposition to their customers.
Andersson et al (2006)	Business models are created in order to make clear who the business actors are in a business case and how to make their relations explicit. Relations in a business models are formulated in terms of values exchanged between the actors.
Kallio et al (2006)	The means by which a firm is able to create value by coordinating the flow of information, goods and services among the various industry participants it comes in contact with, including customers, partners within the value chain, competitors and the government.
Rajala & Westerlund (2007)	The ways of creating value for customers and a way in which a business turns market opportunities into profit, through sets of actors, activities, and collaborations.
Janssen et al (2008)	A business model reflects the core business of an organization and is useful to describe (and even prescribe) the organization from the perspective of its main mission, and the products and services that it provides to its customers.
Rappa (2008)	A method of doing business by which a company can sustain itself, that is, generate revenue. The business model spells out how a company makes money by specifying where it is positioned in the value chain.

Source: Technopolis, 2011

Annex 4: Long list of ways for a business to green itself or others

Ways for businesses to green	Example	Description
Product Service Systems (PSS)		
Energy Saving Companies (ESCO) Energy Performance Contracting (EPC)	Danfoss Solutions	Energy Saving Companies (ESCOs) optimize energy optimizes companies and public buildings and in return gets paid by part of the savings achieved. The customer does not have to pay up front. Most examples stems from the public sector (buildings) (FORA, 2010).
Chemical Management Systems (CMS)	AGA gas	A Chemical Management Services (CMS) company engages in a strategic, long-term contract to supply and manage the customer's chemicals and related services. The providers of CMS are typically remunerated in some form of the customers' output (e.g. painted car doors). This gives the provider the incentives to reduce the input products (e.g. paint for car doors) (FORA, 2010).
Design Build Finance Operate (DBFO)	Allfarveg AS	In the construction industry the green business model Design, Build, Finance and Operate (DBFO) has emerged. In this business model long term contracts involving the construction, maintenance and operation phase (typically 20-30 years) of the project (a building) give incentives to improving the quality of the construction project so that the life-cycle costs are lowered (FORA, 2010).
Functional Sales (FS)	Volvo Aero	Functional Sales is a generic model that holds common characteristics of all 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 (FOR A, 2010)

Ways for businesses to green	Example	Description
IPM & Performance-based Management Services ¹²	-	IPM is an ecological approach with a main goal of significantly reducing or eliminating the use of pesticides while at the same time managing pest populations at an acceptable level (VFL, 2011). ¹²
Sharing (car, equipment, clothes etc.)	Move About	Instead of private ownership, the product is shared among a number of users whenever the individual users need access to the product. The economic benefits of this model are less evident than in the other business models, but the sharing of products may pave the way for new products to the market (FORA, 2010).
Circular economy		
Cradle-to-cradle (C2C)	Schüco	Cradle-to-cradle (C2C) is at its core a holistic design and production paradigm striving for a society that produces no waste and recycles everything. The cradle-to-cradle concept is based on a bio-inspired approach to the design of products and systems where nature is seen as a closed loop production system with solar energy as the only external input. The vision of the concept is to shift from traditional sustain-ability looking to minimize the negative environmental impact to strive for a positive environmental impact (FORA, 2010).
Industrial Symbiosis (IS) / Industrial – Ecology	Kalundborg IS	The core of 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. In industrial symbiosis traditionally separated industries engage in an exchange of materials and energy through shared facilities. The waste of one company becomes another's raw material. The benefits for the public partners are primarily reduced waste management costs. Both substantial and minor environmental benefits accrue from these industrial symbiosis exchanges (FORA, 2010)

¹² <http://www.whatisipm.org/>

Ways for businesses to green	Example	Description
Closed-loop production ¹³	-	A sustainable system in which a product is created using renewable energy, with no pollutant output and no waste. The materials used in production are recycled and reused rather than discarded (Kelly,2010) ¹³
Life-cycle management ¹⁴ ¹⁵	- ¹⁴	"Life-cycle Management (LCM) is an integrated concept to assist in businesses managing the total life-cycle of products and services towards more sustainable consumption and production patterns". ¹⁵
Remanufacturing (RM) ¹⁶ ¹⁷	- ¹⁶	A series of manufacturing steps acting on an end-of-life part or product in order to return it to like-new or better performance, with warranty to match. ¹⁷
Take back agreements ¹⁸	NEWCAL ¹⁸	Purchase, leasing or rental agreements that force the provider/supplier to take back the product they have supplied when it is no longer useful to the customer. --> Transferring the responsibility for recycling to the provider, to which the old product can have reuse value.
IT Lifecycle Solutions ¹⁹	Circuit ¹⁹	Cover a business solution in which a company deals with the whole process of selling, inspection, repairing, recycling/ remarketing and IT solutions. (Can have environmental benefits because the IT lifecycle solution company has better knowhow on how to better remarket or recycle the used equipment).
EPR (extended producer responsibility) ²⁰ ²¹	-	"EPR uses financial incentives to encourage manufacturers to design environmentally-friendly products by holding producers liable for the costs of managing their products at end of life". ²⁰ ²¹

¹³ <http://www.cleanproduction.org/Steps.Closed.php>

¹⁴ <http://www.epa.vic.gov.au/lifecycle/LCM-in-action/default.asp>

¹⁵ <http://www.epa.vic.gov.au/lifecycle/default.asp>

¹⁶ <http://www.remanufacturing.org.uk/remanufacture-companies.lasso>

¹⁷ <http://www.remanufacturing.org.uk/reuse-repair-recycle.lasso?-session=RemanSession:C158B9D4144a70C7D7ISI106870A>

¹⁸ http://www.newcal.com/jsp/newcal_earth.jsp

¹⁹ <http://www.circuituk.com/>

²⁰ http://en.wikipedia.org/wiki/Extended_producer_responsibility

²¹ <http://www.ilsr.org/recycling/epr/index.html>

Ways for businesses to green	Example	Description
Product stewardship ²²	-	Often used interchangeably with EPR, but product stewardship extends the responsibility of waste management from the producers to everyone involved in the life-cycle of the product. This includes not only the manufacturers, but also the retailers, consumers and recyclers as well. ²²
Integrated product policy (IPP) ^{23 24}	-	Policy tool to reduce the environmental harm caused by manufacturing, usage or disposal of products. The policy tries to embrace all areas of the lifecycle of a product (natural resources, design, manufacturing, distribution etc.). Because of this, the policy includes several policy tools, including economic instruments, substance bans, voluntary agreements, environmental labeling and product design guidelines. ^{23 24}
Eco-effectiveness ²⁵	(Newton, 2006)	Eco-effectiveness seeks to design industrial systems that emulate the healthy abundance of nature. The central design principle of eco-effectiveness is waste equals food. ²⁵
Recycling schemes ²⁶	Green Dot (symbol) ²⁶	Recycling schemes are widespread as a government tool of encouraging recycling and thereby reducing waste among citizens and companies. Some companies also use recycling schemes as a part of their business model.
Retrofitting ^{27 28}	- ²⁷	Retrofitting refers to the addition of new technology or features to older systems, e.g. improving power plant efficiency, improving existing buildings with energy efficiency equipment. ²⁸
Waste management (solid / water) ^{29 30}	-	Waste management is the collection, transport, processing or disposal, managing and monitoring of waste materials. ^{29 30}

²² http://en.wikipedia.org/wiki/Product_stewardship

²³ <http://ec.europa.eu/environment/ipp/home.htm>

²⁴ <http://www.iisd.org/business/issues/ipp.aspx>

²⁵ <http://www.smartcommunities.ncat.org/business/ecoeffec.shtml>

²⁶ [http://en.wikipedia.org/wiki/Green_Dot_\(symbol\)](http://en.wikipedia.org/wiki/Green_Dot_(symbol))

²⁷ <http://www.teknologisk.dk/projekter/28784>

²⁸ <http://en.wikipedia.org/wiki/Retrofitting>

²⁹ http://en.wikipedia.org/wiki/Waste_management

³⁰ <http://en.wikipedia.org/wiki/Waste-to-energy>

Ways for businesses to green	Example	Description
Life-cycle assessment/thinking (LCA) ^{31 32} ³³	-	A life-cycle assessment (LCA, also known as life-cycle analysis, eco-balance, and cradle-to-grave analysis) is a technique to assess environmental impacts associated with all the stages of a product's life from-cradle-to-grave. ^{31 32} EU's LCA Resources Directory ³³
Deconstruction ^{34 35}	-	The orderly and selective disassembly of a building, structure or part of a home, saving select components for re-use or recycling. ^{34 35}
Environmental partnerships ³⁶	- ³⁶	Cover a broad range of partnerships regarding the environment. Public-private. Private companies together, private companies and NGO's, and community-based environmentally partnerships (behavior change among multiple actors, often including individuals)
Supply chain management		
Green Supply Chain Management (GSCM) and Sustainable supply chain management ^{37 38}	IKEA (IWAY)	Green Supply chain management (GSCM) is the individual company's systematic and strategic coordination of activities in the entire supply chain that is the coordination of the flows of products, services, information etc. from an upstream source of raw material to down-stream customer consumption. The purpose is to improve the performance of both the individual company and the supply chain as a whole through efficiency and focus on customer requirements. ^{37 38}
Green Public (/ Private) Procurement (GPP) ³⁹	-	A process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life-cycle when compared to goods, services and works with the same primary function that would otherwise be procured. ³⁹

³¹ http://en.wikipedia.org/wiki/Life_cycle_assessment

³² http://www.ami.ac.uk/courses/topics/0109_lct

³³ <http://lca.jrc.ec.europa.eu/lcainfohub/directory.vm>

³⁴ <http://www.greendeconstructionservices.net>

³⁵ <http://www.thedailygreen.com/living-green/definitions/deconstruction>

³⁶ <http://www.nvenergy.com/renewablesenvironment/environment/partnerships.cfm>

³⁷ <http://www.aktivitet.dk/~media/858769ECCD3A45E1BA7D59B5DD06246E.ashx>

³⁸ <http://www.business.otago.ac.nz/mgmt/research/omgr/09fortes.pdf>

³⁹ http://ec.europa.eu/environment/gpp/index_en.htm

Ways for businesses to green	Example	Description
⁴⁰ Corporate Social Responsibility (CSR)	The North Face ⁴⁰	CSR can be described as a form of corporate self-regulation integrated into a business model, where a company monitor and ensure its compliance with ethical standards, sustainability targets etc.
⁴¹ Green Reporting Initiative (GRI)	-	Lack of information on "Green Reporting Initiative", besides that it seems to be an optimal reporting initiative regarding environmental issues. ⁴¹ Global Reporting Initiative (GRI) produces one of the world's most prevalent standards for sustainability reporting - also known as ecological footprint reporting. ⁴²
⁴²		
Internal management		
Environmental management System (EMS)	-	EMS refers to the management of an organization's environmental programs in a comprehensive, systematic, planned and documented manner. It includes the organizational structure, planning and resources for developing, implementing and maintaining policy for environmental protection. ⁴³
⁴³		
Resource efficiency	-	Mainly about managing raw materials, energy and water in order to minimize waste and reduce the cost of production. ^{44 45 46 47 48}
^{44 45 46 47 48}		
Exploitation of waste heat	- ⁴⁹	Waste heat, sometimes called secondary heat or low-grade heat, can be categorized as heat produced by machines, electrical equipment and industrial processes for which no useful application is found. The burning of transport fuels is a major contribution to waste heat. ^{50 51 52 53}
⁴⁹ ^{50 51 52 53}		

⁴⁰ <http://expeditionsustainability.com/reporting/introduction-to-reporting.php>

⁴¹ <http://books.google.dk/books?id=Py-lvHlcbDYC&pg=PR26&dq=%22green+reporting+initiative%22&hl=da#>

⁴² http://en.wikipedia.org/wiki/Global_Reporting_Initiative

⁴³ <http://www.google.dk/search?q=%22environmental+management+system%22&hl=da&source=hp&aq=f&aqi=g3&aql=&oq=>

⁴⁴ <http://www.energymap.dk/Technology-Areas/Environmental-Technologies/Resource-Efficiency>

⁴⁵ <http://www.wired.com/epicenter/2011/06/sixth-wave-of-innovation/>

⁴⁶ <http://ec.europa.eu/resource-efficient-europe/>

⁴⁷ http://ec.europa.eu/governance/impact/planned_ia/docs/2011_env_003_resource_efficient_europe_en.pdf

⁴⁸ <http://www.unep.org/resourceefficiency>

⁴⁹ <http://www.greentechmedia.com/articles/read/a-new-type-of-battery-startup-and-waste-heat-technology-for-meeting-cafe-st/>

⁵⁰ http://en.wikipedia.org/wiki/Waste_heat

⁵¹ <http://wasteheatrecovery.com>

⁵² <http://news.sciencemag.org/sciencenow/2011/05/turning-waste-heat-into-electric.html>

⁵³ <http://www.greentechmedia.com/articles/read/will-waste-heat-be-our-next-power-source/>

Ways for businesses to green	Example	Description
⁵⁴ Resource Management ⁵⁵	⁵⁴	In organizational studies, resource management is the efficient and effective deployment of an organization's resources when they are needed. Such resources may include financial resources, inventory, human skills, production resources, or information technology (IT). ⁵⁵
Substitute “green” inputs for “brown” inputs	-	Replacing “brown” inputs such as coal and oil with green inputs such as solar power and wind power.
⁵⁶ Redesign	-	Redesign means to change the design of something. Redesign is for example used in relation to clothes, design, software and architecture. ⁵⁶
Waste minimization ⁵⁷ ⁵⁸	-	Waste minimization can be described as a management process of minimizing the amount of waste produced by a company, a person etc. Waste minimization usually requires knowledge of the whole production process of a good. ⁵⁷ ⁵⁸
Pollution control/ prevention (End-of-pipe) ⁵⁹ ⁶⁰ ⁶¹ ⁶² ⁶³	-	Pollution prevention is an environmental management strategy, and encompasses sub-disciplines such as green chemistry and green design. Shares attributes with “cleaner production”. ⁵⁹ ⁶⁰ ⁶¹ ⁶² ⁶³
Green finance		
⁶⁴ Green banking ⁶⁵ ⁶⁶ ⁶⁷	Merkur Andelskasse ⁶⁴ Other examples ⁶⁵	Green banking can broadly be defined as any type of banking that benefits the environment, ranging from online banking to green loans. ⁶⁶ Triple bottom line analysis: People, planet profit. ⁶⁷

⁵⁴ <http://www.resourcemanagementtips.com/index.php/benefits-of-resource-management/energy-conservation/>

⁵⁵ http://en.wikipedia.org/wiki/Resource_management

⁵⁶ <http://rum1.aarch.dk/index.php?id=146073>

⁵⁷ http://en.wikipedia.org/wiki/Waste_minimisation

⁵⁸ http://www.who.int/water_sanitation_health/medicalwaste/058to060.pdf

⁵⁹ http://en.wikipedia.org/wiki/Pollution_prevention

⁶⁰ <http://www.epa.gov/opptintr/greenengineering/pubs/ch3intro.pdf>

⁶¹ <http://peakstoprairies.org/AboutP2.cfm>

⁶² http://en.wikipedia.org/wiki/Pollution#Pollution_control

⁶³ <http://www.centric.at/services/cleaner-production/cleaner-production-versus-end-of-pipe>

⁶⁴ <https://www.merkur.dk>

⁶⁵ <http://mlcwideangle.exbdblogs.com/2011/06/14/the-best-green-banking-initiatives/>

⁶⁶ <http://greenbankreport.com/eco-friendly-banking/what-is-green-banking/>

⁶⁷ Elkinton 2004

Ways for businesses to green	Example	Description
⁶⁸ Eco-leasing ⁶⁹ ⁷⁰ ⁷¹	"A bright green laptop" ⁶⁸ ⁶⁹	"Eco-leasing happens when manufacturers, resellers, or service providers sell a service instead of a product by essentially renting the use of that product to the customer through equipment financing". ⁷⁰ ⁷¹
Green mortgages ⁷² ⁷³ ⁷⁴ ⁷⁵	-	Green mortgages are also known as Energy Efficient Mortgages or Energy Improvement Mortgages are loan products that allow borrowers to reduce their utility bill costs by allowing them to finance the cost of incorporating energy-efficient features into a new housing purchase or the refinancing of existing housing. ⁷² ⁷³ ⁷⁴ ⁷⁵
⁷⁶ Revolving funds ⁷⁷	-	A fund established for a certain purpose, such as making loans, with the stipulation that repayments to the fund may be used anew for the same purpose. ⁷⁶ Revolving loan fund (RLF) is a source of money from which loans are made for multiple small business development projects. ⁷⁷
Carbon finance ⁷⁸ ⁷⁹	-	Carbon finance is a new branch of environmental finance. The general term is applied to investments in GHG emission reduction projects and the creation (origination) of financial instruments that are tradable on the carbon market. ⁷⁸ ⁷⁹
Environmental insurance ⁸⁰ ⁸¹	Chartis ⁸⁰	Environmental insurance is a risk management tool for brownfield project financiers and/or sponsors to transfer their risk to the insurer (insurance company) for potential clean up costs or liability related to environmental conditions at a property or project. ⁸¹

⁶⁸ <http://designprocessen.dk/baeredygtigt/computer/a-bright-green-laptop-den-vision%C3%A6re-pc/>

⁶⁹ <http://www.csr.dk/hg/cs/artikel.nsf/0/ALRN-7MLENP>

⁷⁰ <http://www.ecologicleasing.com/on.htm>

⁷¹ <http://www.fabrikderzukunft.at/results.html/id3029>

⁷² http://en.wikipedia.org/wiki/Energy_efficient_mortgage

⁷³ <http://www.thedailygreen.com/going-green/tips/green-mortgage>

⁷⁴ <http://www.thedailygreen.com/living-green/definitions/green-mortgages>

⁷⁵ http://www.msnbc.msn.com/id/24203028/ns/business-going_green/t/how-cultivate-green-mortgage/

⁷⁶ <http://www.thefreedictionary.com/revolving+fund>

⁷⁷ http://en.wikipedia.org/wiki/Revolving_Loan_Fund#Types_of_Green_Revolving_Funds

⁷⁸ http://en.wikipedia.org/wiki/Carbon_finance

⁷⁹ http://www.ifc.org/ifcext/gfm.nsf/Content/CarbonFinance_AboutCF

⁸⁰ http://www.chartisinsurance.com/US-business-environmental_295_183267.html

⁸¹ <http://www.epa.ohio.gov/portals/30/vap/docs/VAP%20INS/What%20is%20Environmental%20Insurance.pdf>

Ways for businesses to green	Example	Description
Green IT		
⁸² Tele medicine	Dansk Telemedicin A/S ⁸²	Telemedicine is the use of telecommunication and information technologies in order to provide clinical health care at a distance. It helps eliminate distance barriers and can improve access to medical services that would often not be consistently available in distant rural communities. It is also used to save lives in critical care and emergency situations. ^{83 84}
^{83 84} Tele/video conference	-	Videoconferencing is the conduct of a videoconference (also known as a video conference or videoteleconference) by a set of telecommunication technologies that allow two or more locations to interact via two-way video and audio transmissions simultaneously. ^{85 86 87 88}
^{85 86 87 88} E-commerce	-	E-commerce refers to the buying and selling of products or services over electronic systems such as the Internet and other computer networks. However, the term may refer to more than just buying and selling products online. It also includes the entire online process of developing, marketing, selling, delivering, servicing and paying for products and services. ^{89 90 91}
^{89 90 91} Cloud computing with renewable energy sources	Green Qloud	Cloud computing is the delivery of computing as a service rather than a product, whereby shared resources, software and information are provided to computers and other devices as an utility (like the electricity grid) over a network (typically the Internet). ^{92 93 94 95 96 97 98 99}

⁸² <http://www.telemed.dk>

⁸³ <http://en.wikipedia.org/wiki/Telemedicine>

⁸⁴ http://www.danskenergi.dk/Aktuelt/Arkiv/2009/Oktobre/09_10_23A.aspx

⁸⁵ <http://en.wikipedia.org/wiki/Videoconferencing>

⁸⁶ <http://green-broadband.blogspot.com/2011/06/greenstar-network-demonstrates-worlds.html>

⁸⁷ <http://www.guardian.co.uk/sustainable-business/carbon-emissions-video-conference>

⁸⁸ <http://www.ivci.com/pdf/top-ten-ways-your-company-can-use-video-conferencing-to-go-green.pdf>

⁸⁹ http://en.wikipedia.org/wiki/Electronic_commerce

⁹⁰ http://www.cmu.edu/news/archive/2009/March/march3_onlineshopping.shtml

⁹¹ <http://www.davechaffey.com/E-marketing-Insights/Internet-marketing-articles/Green-Ecommerce/>

⁹² http://en.wikipedia.org/wiki/Cloud_computing

⁹³ <http://www.cloudtweaks.com/2011/07/saving-money-on-energy-by-going-on-the-cloud/>

⁹⁴ <http://www.cloudtweaks.com/2011/08/sustainable-energy-sources-to-power-cloud-computing/>

⁹⁵ <http://www.cloudtweaks.com/2011/03/how-green-is-cloud-computing-201/>

⁹⁶ <http://www.smartplanet.com/blog/thinking-tech/just-how-green-is-cloud-computing/5949>

⁹⁷ <http://www.greenpeace.org/international/Global/international/planet-2/report/2010/3/make-it-green-cloud-computing.pdf>

⁹⁸ http://www.readwriteweb.com/archives/greenpeace_calls_for_renewable_energy_in_cloud_com.php

⁹⁹ http://borsen.dk/nyheder/it/artikel/1/205477/danmark_savner_en_maerkningsordning_for_cloud.html

Ways for businesses to green	Example	Description
Other		
¹⁰⁰ CO ₂ -offsetting companies ^{102 103}	Clear ¹⁰⁰ CO ₂ -neutral websites ¹⁰¹	Carbon offsetting works by “offsetting” greenhouse emissions through the use of renewable sources of energy in another location. Organizations with a large carbon footprint for example may indirectly reduce their greenhouse emissions by hiring the services or funding carbon-offsetting companies to decrease their carbon profile. ^{102 103}
¹⁰⁴ CO ₂ -neutral energy providers ^{105 106}	Swedish CO ₂ -neutral energy company ¹⁰⁴ Samsø as the largest carbon-neutral settlement on the planet ¹⁰⁵ Meridian is New Zealand’s first carbon neutral electricity supplier. ¹⁰⁶	Energy providers that have achieved carbon-neutrality, which refers to having a net zero carbon footprint. This is often achieved by balancing the measure of carbon released with offsets and buying an equivalent amount of carbon credits.
Micro factory retailing (MFR) ¹⁰⁷	-	Micro factory retailing is about placing small factories within the different markets a company serves - and so eliminating the distinction between production and retailing. This is opposed to highly centralized manufacturing. ¹⁰⁷
CSA (community supported agriculture) ^{108 109}	Fødevarefællesskabet is a cooperative food community. ¹⁰⁸	Community-supported agriculture, a form of an alternative food network is a socio-economic model of agriculture and food distribution. A CSA consists of a community of individuals who pledge support to a farming operation where the growers and consumers share the risks and benefits of food production. ¹⁰⁹

¹⁰⁰ <http://www.clear-offset.com/about-clear.php>

¹⁰¹ <http://www.co2neutralwebsite.com>

¹⁰² <http://www.selfgrowth.com/articles/carbon-offsetting-companies-making-the-world-a-greener-place>

¹⁰³ http://en.wikipedia.org/wiki/Carbon_offset

¹⁰⁴ <http://www.co2ne.se/en/om-oss-en-GB/>

¹⁰⁵ http://en.wikipedia.org/wiki/Carbon_neutral#Denmark

¹⁰⁶ <http://www.scoop.co.nz/stories/BU0702/S00387.htm>

¹⁰⁷ <http://www.greenleaf-publishing.com/productdetail.kmod?productid=731>

¹⁰⁸ <http://kbhff.dk/om>

¹⁰⁹ http://en.wikipedia.org/wiki/Community-supported_agriculture

Ways for businesses to green	Example	Description
Eco-tourism ¹¹⁰	-	Ecotourism is responsible travel to fragile, pristine, and usually protected areas that strive to be low impact and (often) small scale. ¹¹⁰
Eco-construction and retrofitting ¹¹¹	-	Green building (also known as green construction or sustainable building) is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from sitting to design, construction, operation, maintenance, renovation, and demolition. ¹¹¹
Eco-transport ¹¹²	-	Seems to be a broad concept covering all types of sustainable transport modes/vehicles. ¹¹²
Bio farming/ Ecological farming ^{113 114}	-	Ecological farming is recognized as the high-end objective among the proponents of sustainable farming. The goal of ecological farming is not only sustainable food production, but is to optimize the provision of ecosystem services, both in the design of the farm and by significant reduction of the ecological footprint made by the post-harvest consumers of the farm produce. ^{113 114}
Eco-efficient Services (ESS) ^{115 116 117}	-	Eco-efficient Services are all kinds of commercial market offers aimed at fulfilling customer needs by selling the utilization of a product (system) instead of providing just the hardware for these needs. Eco-efficient Services are services, related to any kind of hardware, in which some of the properties rights are kept by the supplier. ^{115 116 117}
Third Party Logistics (3PL) ^{118 119 120}	Genco ^{118 119}	"A firm that provides multiple logistics services for use by customers. Preferably, these services are integrated, or "bundled" together, by the provider. Among the services 3PLs provide are transportation, warehousing, cross-docking, inventory management, packaging, and freight forwarding. ¹²⁰

¹¹⁰ http://en.wikipedia.org/wiki/Ecotourism#Improving_sustainability

¹¹¹ http://en.wikipedia.org/wiki/Green_building

¹¹² <http://carbonpig.com/article/eco-transport-road-rail-land-and-water>

¹¹³ http://en.wikipedia.org/wiki/Ecological_farming

¹¹⁴ <http://www.chacha.com/question/what-is-bio-farming>

¹¹⁵ http://www.communauto.com/images/Meijkamp_CarSharing_in_NL.pdf

¹¹⁶ http://www.score-network.org/files/828_18.pdf

¹¹⁷ http://www.score-network.org/files/806_1.pdf

¹¹⁸ <http://www.genco.com/Third-Party-Logistics/3PL-green-supply-chain.php>

¹¹⁹ <http://www.genco.com/Third-Party-Logistics/third-party-logistics-3PL.php>

¹²⁰ http://en.wikipedia.org/wiki/Third-party_logistics

Ways for businesses to green	Example	Description
Win-Win transportation solutions? ¹²¹ ¹²² ¹²³ ¹²⁴	-	Win-Win Solutions are technically feasible, cost effective, market-based strategies that provide a combination of economic, social and environmental benefits. They remove distortions, increase consumer choice, and encourage more efficient travel behavior. They are justified for their economic benefits (reductions in congestion, facility costs, vehicle costs, crash costs) and also help achieve environmental and social objectives. They are particularly appropriate for creating more sustainable transportation systems. ¹²¹ ¹²² ¹²³ ¹²⁴
¹²⁵ Energy Management Service ¹²⁶ ¹²⁷ ¹²⁸ ¹²⁹ ¹³⁰	ENXSUITE ¹²⁵ Honeywell ¹²⁶	Energy Management Service is a term describing energy saving solutions targeting enterprises, the public sector, households, etc. ¹²⁷ ¹²⁸ ¹²⁹ ¹³⁰
Technology		
Production of renewables	-	Refers to production of energy coming from natural resources such as wind, sunlight, tides and geothermal heat, which are renewable as they are natural replenished.
Operating renewables and (co-fired) biomass plants	-	Refers to the operation of renewables and biomass plants or co-fired plants. Co-firing is defined as simultaneous combustion of different fuels in the same boiler, for example by replacing fossil fuels with biomass.
¹³¹ CCS	ICO ₂ N ¹³¹	CCS, carbon capture and storage, refers to technology with the attempt of preventing carbon emission by capturing carbon and storing it in such a way that it does not enter the atmosphere.

¹²¹ <http://www.vtpi.org/tdm/tdm52.htm>

¹²² <http://www.vtpi.org/winwin.pdf>

¹²³ <http://www.vtpi.org/wwclimate.pdf>

¹²⁴ http://thegardenisland.com/business/local/article_5e215205-0f7c-5ab6-8abf-6ed846827d04.html

¹²⁵ <http://www.enxsuite.com>

¹²⁶ <https://buildingsolutions.honeywell.com/Cultures/en-US/ServicesSolutions/MaintenanceUpgradesRenovations/EnergyManagementServices/?referer=www.clickfind.com.au>

¹²⁷ <http://www.frost.com/prod/servlet/press-release.pag?docid=158725257>

¹²⁸ http://www.mass.gov/Eoeea/docs/doer/green_communities/pubs_reports/EMS-Guide.pdf

¹²⁹ <http://www-01.ibm.com/software/tivoli/solutions/green>

¹³⁰ <http://www.ibtimes.com/articles/72401/20101015/ibm-smart-grid-technology-energy.htm>

¹³¹ <http://www.ico2n.com>

Ways for businesses to green	Example	Description
Manufacturing of eco-efficient products A++ white goods, hybrid cars, low water intensive goods etc.	-	Refers to the manufacture of products using less material, water, power, energy inputs etc. Eco-efficient products are as well durable, repairable and reusable.
2nd generation biofuels	-	Also known as advanced biofuels. In comparison with first generation biofuels that are made from the sugars and vegetable oils found in arable crops, which are easily extractable using conventional technology, second generation biofuels are made from lignocellulosic biomass or woody crops, agricultural residues or waste, which makes it harder to extract the required fuel.
Service eco-innovation		
Advisors on energy, material efficiency etc.	-	Refers to advisors dealing with how to improve energy efficiency, material efficiency, energy management and related disciplines.
Environmental analyzers, testers, monitors, samplers, detectors, cleaners, ...	-	Refers to professions related to service eco-innovation with emphasis on optimizing processes in terms of achieving resource efficiency for example.
Green certification ¹³²	-	Certification scheme covering green, sustainable, etc. products/companies/services. ¹³²

Table of abstract

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Abstract: In the light of the today's societal challenges regarding resource scarcity and environmental degradation level, it is essential for both companies and policy makers to understand the changes that need to be addressed within business structures and value chains in order to approach green growth. Concrete examples of already available sustainable business activities (focusing on life-cycle and incentive models) have been gathered within this report under the name of <i>Green Business Model Innovation (GBMI)</i>. This process takes place when a business changes part(s) of its business model and thereby captures economic value as well as reduces the environmental footprint in a life-cycle perspective. The focus on the concept of business model is considered as being of high value, since it of-fers an opportunity to understand the mechanisms that are at the centre of how businesses operate GBMI. Generally, it can be said that the more parts of a business model which are changed and have a green effect, and the more profoundly a green change is taking place within the individual parts of the business model – going from modification, re-design, al-ternatives, to creation – the greener the business model innovation is.		
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Green Business Model Innovation

Conceptualization report

In the light of the today's societal challenges regarding resource scarcity and environmental degradation level, it is essential for both companies and policy makers to understand the changes that need to be addressed within business structures and value chains in order to approach green growth.

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