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Contributor(s)	Imola Antal B. (The Ground_Up Centre), Brindusa Fidanza (The Ground_Up Centre), Magalie Leclercq (The Ground_Up Centre), Andreea Rosca (The Ground_Up Centre)
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Internal reviewer	Nadia Ameli (UCL), Sandy Bisaro (GCF)

Changes with respect to the DoA

The present report is - as described in the DoA - deviated into two parts.

Part I focuses on a literature review on 'Green Business Models' and allows a classification of the global development of green business models into the research topic Green Investment. The second part focuses on qualitative as well as methodological question related to the financing of green business models.

Differing from the 'Description of the action', this report does not include expert interviews. While preparing the report we realized that it would be more productive to use the report as background for the interviews. Interviewing experts is scheduled to start in July 2016.

Dissemination and uptake

Public

Short summary of results

The present report includes two parts. The first part is a literature review that covers specific dimensions of knowledge about Green Business Models (GBMs) in respect of conceptual definitions and the assessment of GBMs. The review categorises information into areas that are deemed of interest for any practitioner wishing to support the development and growth of green business models. The second part provides an overview of the 'green finance landscape' and classifies green finance from a structural and from a quantitative perspective within the overall financial market. It further provides an overview of relevant stakeholders in this landscape, and analyses their potential role for financing and developing green business models. Both parts aim at providing background knowledge necessary to find a common understanding across work processes and project partners of the Green-Win project, facilitating the further work process within the project, in particular the identification and evaluation of concrete GBMs.

Evidence of accomplishment

Report

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Executive Summary

The present report is a contribution to the GREEN-WIN project: Green Growth and Win-Win Strategies for Sustainable Climate Action, supported by the European Union's Horizon 2020 programme. It includes two parts. The first part is a literature review that covers specific dimensions of knowledge about Green Business Models (GBMs) in respect of conceptual definitions and the assessment of GBMs. The review categorises information into areas that are deemed of interest for any practitioner wishing to support the development and growth of green business models. The second part provides an overview of the 'green finance landscape' and classifies green finance from a structural and from a quantitative perspective within the overall financial market. It further provides an overview of relevant stakeholders in this landscape, and analyses their potential role for financing and developing green business models. Both parts aim at providing background knowledge necessary to find a common understanding across work processes and project partners of the Green-Win project, facilitating the further work process within the project, in particular the identification and evaluation of concrete GBMs.

The international community has decided to embrace a global sustainability transition involving a reduction in energy and resources consumption, the conservation of natural habitats, and an increasing socioeconomic as well as sociocultural participation of populations. The narrative of *green growth*, interlinking the awareness of environmental and economic needs, plays a major role in the debate of potential pathways towards and implementations of such a global sustainable transformation process. Green growth is expected to improve living conditions on the one hand, and to contribute to solving environment and climate related issues on the other hand, both on a global perspective.

One of the cornerstones of the narrative of green growth is the concept of a market economy, in which producers and consumers are key drivers for making production and consumption more sustainable. For producers of goods and services inclined to embrace this transition and their responsibilities in contributing to it, the existence and development of suitable business opportunities is of great significance. Even if policy can support the evolvement of such business opportunities by different instruments and the generation of enabling environments, the implementation of concrete business models and the success of the transformation will be determined to a large extent by the degree of creativity and risk-taking of investors and entrepreneurs.

Business models that aim at green growth are referred to as green business models (GBMs). The literature on business models in general is quite rich and examines the topic from several perspectives. Broadly speaking a methodological and an application-orientated perspective can be distinguished. The former includes literature that discusses potential classification of BMs and business development stages. The latter further addresses the issue from an assessment approach. This includes the assessment of business viability, an impact assessment as well as an assessment of enabling environments. The analysis of enabling environments addresses the question of how new business models, that arise frequently in competition to existing business models, can survive and penetrate the market.

A key finding from the literature review of green business models is that their success mostly depends on increased consumer awareness, as well as government regulation.

Therefore it will become ever more important to analyse which future development of the markets for green products and services will become possible under given and changing socioeconomic frameworks, consumption behaviours as well as technological progress.

The most common challenges green business development faces that are discussed in the literature are difficulties in the creation of the market, risk and uncertainty of investment, financial barriers, skill shortages, traditional patterns and lock-ins, regulatory hurdles, lack of information about the payoff of investing in green business, benefits not visible in the short-term, split incentives when benefits go to other actors (e.g. the community), and that the contribution of ecosystem services to business growth is undervalued.

The **lack of unified definitions for the term GBM** in the literature is striking. Definitional challenges refer to the term 'business model' as well as to the term 'green' and complicate the classification and the assessment of business models when it comes to their economic role, viability, and environmental effects as well as their quantitative determination. This in turn leads to scarcity of knowledge about GBMs, which makes it difficult for researchers and practitioners to extract a unified view of the scope of business model innovation for sustainability. Therewith an analysis of barriers, needs, sectoral development prospects and a definition of potential policy interventions remain complicated and imprecise.

Apart from the willingness of entrepreneurs to conceive and implement green business models, increased consumer awareness and favourable government regulations, another key aspect in making green growth possible is the **availability of financial capital** directed towards green growth. This part of the financial system, the green finance landscape, is analysed based on a literature review. And, as for green business models, also for the green finance landscape, there is no uniquely valid and commonly accepted definition of the term 'green'.

Currently, **Green finance still represents a relatively small share of financial markets**, irrespective of differences in definitions, data collection methodologies, and whether one focuses on stocks or flows. From an institutional investor perspective as of 2014, the *stock* of impact investment reaches USD 60 billion (J.P. Morgan and GIIN 2013, pp. 4-6), making out only 0.08 % of total assets under management, amounting to USD 74 trillion in 2014 (BCG 2015, p. 7). A complete survey on climate finance goes far beyond institutional investors, who play a minor role in climate finance, and also tracks yearly investment *flows* by other private market participants being individuals, households, corporate actors, project developers and commercial financial institutions as well as public market participants being development agency institutions, governments and agencies. Total climate finance is reported to amount to USD 391 billion throughout 2014 (Buchner et al. 2015, pp. 2), a mere 2.3 % of worldwide capital formation being USD 17 trillion in 2014 (World Bank 2016b).

There are **different potential reasons** for the green finance landscape making out only a minor share of the global overall finance landscape that can be related to the green capital supply or demand side, or based on coordination challenges within financial markets:

- There is a limited interest in financing green business cases.
- There is a limited offer of green business cases seeking capital.
- Green business cases seeking capital do not meet selection criteria of investors.
- Green business cases secure capital from outside the green finance market.
- There are other structural reasons for the offer of and demand for green finance not matching up.

For a **sustainability transition of the economy** to take place, the green finance market has to develop further in size and depth, covering the offer and demand side of capital, and also including all intermediaries in, and other relevant actors surrounding this market landscape.

Part 1 - “Green Business Models: A Literature Review”

1. Introduction

With increasing environmental challenges, particularly concerning climate change impact and overuse of natural resources, governments, decision makers, economic actors and civil society organizations are turning their attention towards green growth strategies and win-win solutions for climate action and sustainability.

The scope of this review is to provide an overview of the existing literature on green business models. It aims to clarify the basic concepts, classifications and development stages. It also looks at what are some of the most commonly described green business model assessment methods, approaches to measure both impact and viability, as well as types of funding most commonly described as suitable and available for green business models. Finally, the review looks at the literature on drivers and barriers, policy and regulation. Based on these findings, some initial conclusions are formulated. In addition, the review highlights potential research questions that are not covered yet by the literature and that are key for unpacking what works and what doesn't in green business models and for offering potential for scale or replication.

A few definitions of the concept of green growth provide context for this literature review:

According to OECD (2011) "green growth means fostering economic growth and development, while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies. To do this, it must catalyse investment and innovation which will underpin sustained growth and give rise to new economic opportunities". The general objective of green growth is to decouple economic growth from environmental degradation.

The World Bank defines 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).

The most widely acknowledged definition of green economy is provided by UNEP (2011) "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".

Economic growth relies on economic actors and how they do business. Green growth implies a shift from the traditional values of extended economic gains towards considering also the environmental and social impact of economic activities and green business models have a significant contribution to make to this change. 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 (Nordic Innovation, 2012).

2. Some Basic Concepts

2.1 Defining the Green Business Model and other related concepts

Summary: This section provides an overview of the business model definition, what makes a business model “green” and also defines the concept of eco-innovation as a key element for green business development. In the multitude of business model definitions, the common element identified is the concept of value, as value proposition, value creation, capturing value etc. A definition that grasps the meaning of business model in relation to value is the one by Alexander Osterwalder in which a business model “describes the rationale of how an organization creates, delivers, and captures economic, social, and other forms of values”. In a green economy this definition also adds the environmental value that an organization creates, delivers and captures. We also discuss here the concept of eco-innovation as the means for creating new technologies, products and services that reduce environmental risk and pollution.

2.1.1 What is a Business Model?

The literature review on business models by Zott et al. (2011) states that there is a lack of clarity about the meaning of a business model. In part this is because it is still a new concept that became prevalent in the literature only in the mid 1990's. It has also been approached from various angles in different fields of research and contexts where every author emphasized aspects that were most relevant to their activity.

Most business model definitions describe the concepts of value, value proposition and value creation.

Even though there is not one common understanding about the concept of business model, Zott et al. (2011) identified the themes that seem to be common about the concept and described the business model “...as a new unit of analysis, offering a systemic perspective on how to “do business”, encompassing boundary-spanning activities (performed by a focal firm or others), and focusing on value creation as well as on value capture”.

In a similar definition, a business model shows how a company is creating value for its customers and how it is producing revenue, through sets of actors, activities and collaborations (Rajala and Westerlund, 2007). The elements of a business model include resources, value proposition to the customer, relationships, costs and revenues, and mechanisms to capture value for the company.

Value creation can result from the newness of the product or service, its improved performance, customization and convenience in comparison to existing alternatives, improved design, better price, potential cost reduction and savings, higher accessibility, offering a result or function instead of a product and other aspects that make the product or service to be preferred by customers compared to the alternatives (Osterwalder et al, 2010).

In their work, Bocken et al. (2013) define a business model through value proposition (product/service, customer segments and relationships), value creation and delivery (key activities, resources, channels, partners, technology) and value capture (cost structure and revenue streams).

In his book *Value Migration* (1999), Adrian Slywotzky is using the following definition: “A business (model) design is the totality of how a company selects its customers, 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”.

Alexander Osterwalder, developer of the Business Model Canvas tool (2010) states that “a business model describes the rationale of how an organization creates, delivers, and captures economic, social, and other forms of values”.

One point of caution in defining a business model is raised by Markides (2015) and relates to the potential overlap between descriptions of the business model and of the strategy in the literature. If the business model is viewed as a description of the activities that a firm has put together in order to execute its strategy, then this is almost synonymous with the strategy. One way to distinguish between the two is to view the business model as a model of value creation that transcends industry boundaries (Arend, 2013). Another way is to define the business model in terms of how the firm operates, but in this case the strategy and the business model must be clearly differentiated. (Markides, 2015).

2.1.2 Green Business Models

According to the literature, there are several ways to identify what makes a business model green:

- By focusing on the impact of products and services and as a part of the value chain

In the Green Paper on green business models in the Nordic Region, FORA (2010) defines green business models as “business models which support the development of products and services (systems) with environmental benefits, reduce resource use/waste and which are economically viable. These business models have a lower environmental impact than traditional business models”.

A business can be considered green by producing green products or providing green services, or by greening their own process or parts in their value chain. Green products involve energy or material efficient products, in this case the green effect is on deployment, use, and maintenance phase of the products. Green services contribute to the reduction of the ecological footprint by providing expertise to customers or renting, sharing resources. The greening of processes means limiting the ecological footprint of the company by cleaner production processes, reduction or reuse of materials and energy (Nordic Innovation, 2012).

- By examining the environmental benefits achieved in the supplier-customer relation

The same Nordic study makes a distinction between classical green businesses such as clean technology and green business models, stating that “Generally, green business models compared to ‘classical’ green businesses (e.g. clean-tech) are characterised by focusing on the potential in the supplier’s management of the customer’s production, innovative business strategies and business to business relations reducing either energy consumption, resource use or waste, thus creating economic and environmental benefits for both supplier and customer – a win-win situation” (FORA, 2010).

- By identifying environmental impact in various parts of a business model

The three factors that determine the green potential of a business model are:

- Macro-level environmental performance – represented by eco-efficiency gain instead of “business as usual” at individual consumer level
- Market potential – the capacity to obtain a particular economic function or service on the market
- Environmental significance – decreased level of emissions, pollutants or resource demands of the new business model compared to a traditional business to which the green business model constitutes an alternative (US EPA, 2009).

- By focusing on business model innovation

According to Nordic Innovation (2012) “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 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”.

Bocken et al. (2013) defines business model innovations for sustainability as: “Innovations that create significant positive and/or significantly reduced negative impacts for the environment and/or society, through changes in the way the organization and its value-network create, deliver value and capture value (i.e. create economic value) or change their value propositions”.

2.1.3 A special concept: Eco-Innovation

As a result of eco-innovation new technologies, products and services are developed that reduce environmental risk and pollution, including GHG emissions, and this is often the key element for green businesses to emerge and grow.

Eco-innovation represents innovation that explicitly emphasizes the reduction of environmental impacts, whether intended or not. Eco-innovation shares the characteristics of general innovation (OECD/Eurostat, 2005), and as such includes “the implementation of new, or significantly improved, products (goods and services), processes, marketing methods, organizational structures and institutional arrangements”. OECD/Eurostat defines eco-innovation as “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”.

According to the European Innovation Observatory (2010) eco-innovation “contributes both to environmental “clean-up” and to the dematerialization of society. It is not just about clean technologies, but encompasses all changes that reduce resource use across the life-cycle, regardless of whether these changes were intended to be ‘environmental’ or not”.

The concept of eco-innovation can be divided in three main categories, incremental, disruptive and radical innovations (Scrase et al, 2009). Incremental innovation aims at modifying and improving existing technologies or processes to raise the efficiency of resource and energy use, without fundamentally changing the underlying core technologies. This contributes to relative decoupling of resources and GHG-emissions and it is the dominant form of innovation and eco-innovation in industry. Disruptive innovation changes how things are done or specific technological functions are fulfilled, without necessarily changing the underlying technological regime itself. Radical innovation involves a shift in the technological regime of an economy and can lead to changes in enabling technologies and tends to have larger potential for making absolute decoupling possible. Systemic innovations or transformative innovations result from a combination of the three types of innovation, including organizational and managerial changes, contributing to major green transformation with a broad economic impact (Scrase et al, 2009). Examples of radical innovation include the shift to steam power and the related industrial revolution, the radical innovation in information and communication technologies together with the organizational and institutional changes that these developments bring (OECD, 2011).

2.2 Categorising Green Business Models

Summary: This section covers the different types of green business models and categories described in the literature. The two main green business model categories are the Incentive models and Life-cycle models. Incentive models are based on incentives a company provides to its consumers in a way that part or the entire value chain is greened and includes Functional sales, Energy service companies, Chemical management services and Design-build-finance-operate models. Life-cycle models consist in greening a company’s value chain and can be divided into several categories with respect to what part and how much of the value chain is greened. Life-cycle models include Industrial symbiosis, Cradle to cradle,

Green supply chain management and Take back management models. Other green business models that don't fit these two categories are also described here. The second part includes a detailed description of the green business model archetypes identified by Bocken et al., which allow the classification of green business models into eight groups according to technological, social and organizational aspects.

2.2.1 Types of Green Business Models

In the relevant literature the different types of green business models are grouped into two main categories incentive models and life-cycle models. Other green business models are also identified without being integrated into a specific category.

Incentive models

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" (Nordic Innovation, 2012). Nordic Innovation includes in this category the Functional sales, Energy service companies (ESCOs), Chemical management services and Design-build-finance-operate (DBFO) model.

- *Functional sales* provide the function and benefits of the product instead of the physical product as such. Instead of paying for the product, a consumer pays for the function as a service. The service provider is in charge of using the product and this creates an incentive to improve the output yield and to extend the life-span of the product by making the product more durable, reducing the need for spare parts, making it more energy efficient and improving the maintenance of the product. "One example is the Swedish company Volvo Aero, which produces airplane engines and offers their customers to buy the power of the airplane engines ('power by the hour') instead of buying the engine itself. The structure of the business model gives the provider the incentives to optimize and maintain the product (the engines in the Volvo case) to ensure life-cycle cost effectiveness which will reduce the environmental impact (less fuel consumption)", (FORA, 2010).
- *Energy service companies (ESCO)* provide energy-efficiency-related and other value-added services and assume performance risk for their project or product. There are paid according to the energy efficiency improvements and savings achieved (EPA, 2009).
- *Chemical management services (CMS)* is based on long-term contract in which the service provider provides and manages the customer's chemicals and related services. Under a CMS contract, the provider is compensated primarily according to the quantity and quality of services delivered, not to chemical volume (EPA, 2009).
- *Design-build-finance-operate (DBFO)* model is a contractual relationship between a customer and a private contractor used for construction projects requiring long-term investments. These are often a Public-Private Partnership (FORA, 2010). "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" (Nordic Innovation, 2012).

Life-Cycle Models

"Life-cycle models focus on the greening of a companies' value chain and can be divided into several categories with respect to what part and how much of the value chain is greened by the model" (Nordic Innovation, 2012).

Examples of life-cycle models given by Nordic Innovation (2012) include:

- *Industrial symbiosis* is based on a shared utilization of resources and by-products amongst industrial actors through inter-firm recycling linkages. The waste of one company becomes the raw material of another. Industrial symbiosis has the role to

reduce the costs and environmental impacts of participating companies (FORA, 2010).

- *Cradle to cradle (C2C)* based business models design innovative and essentially waste free products that can be integrated into fully recyclable loops or biodegradable processes. This bio-inspired approach aims to create products and systems where nature is seen as a closed loop production system with solar energy as the only external input. It stimulates innovation through the development of new products with a competitive edge (FORA, 2010).
- *Green Supply Chain Management (GSCM)* 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 (Nordic Innovation, 2012).
- *Take back management (TBM)* 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 (Nordic Innovation, 2012).

Technopolis Group (2012) in addition to the categories and models described above mentions the following 7 types of green business models:

- *Integrated pest management (IPM)* and performance based pest management (PPMS) is a models where the pest management services provider commits to achieving a certain standard or level of pest control, instead of being compensated for a particular treatment or application (EPA, 2009).
- *“Sharing” or “renting”* based business models provide solutions where instead of private ownership, the product is shared among a number of users, whenever the individual user needs access to the product. For example, car-sharing, car-pooling, sharing of holiday houses and laundry facilities. In the sharing models, the consumer does not pay for buying a product but only for using it (FORA, 2010).
- *ICT solution based models* provide solutions for energy and resource use control, the establishment of smart grids and cloud computing. ICT is also an important part of many new technologies and systems solutions like industrial ecosystems and green mobility systems (Technopolis Group, 2012).
- *Tele-presence and videoconferencing services* is a business model built on ICT innovations which enables people in different locations to communicate in “face to face” exchanges and which is far superior to traditional video-conferencing. The main environmental benefit is that it avoids extensive travel and associated eco-footprints (EPA, 2009).
- *Eco-cities* are complex urban systems combining many eco-innovative solutions. An eco-city is designed with regard of environmental impact, where people are committed to minimising the inputs of energy, water and food, and waste output of heat, air and water pollution. Eco-cities aim to function with minimal reliance on the surrounding countryside, and power itself with renewable sources of energy (Technopolis Group, 2012).
- *Urban transport systems based on bio-gas*: bus and car systems that switched fully from fossil based fuel to biogas/ bio methane. The system contains several elements, including:
 - Bio-gas production using organic industrial and agricultural waste such as food and manure and also sewage waste;
 - Specifically adopted transport vehicles such as buses, cars and lorries;
 - An infrastructure of bio-gas filling stations;
 - Bio-gas storing and transportation infrastructure (Technopolis Group, 2012).

- *Electric mobility systems* including battery charging/replacement and additional IT/GPSR technologies for the mass application of electric vehicles. It often incorporates a full car sharing/renting system (Technopolis Group, 2012).

2.2.2 Green Business Model archetypes

Bocken et al. (2013) introduced 8 archetypes in order to group the approaches that businesses can take to build green business models. They are divided in 3 main groups: technological, social and organizational.

According to Bocken: “[green] business model archetypes are groupings of mechanisms and solutions that contribute to building up the business model for sustainability. The aim is to develop a common language that can be used to accelerate the development of [green] business models in research and practice.”

The identified archetypes are explained in the table below with examples:

Group	Technological			Social			Organizational	
Archetypes	Maximise material and energy efficiency	Create value from waste	Substitute with renewables and natural processes	Deliver functionality rather than ownership	Adopt a stewardship role	Encourage efficiency	Repurpose for society/ environment	Develop scale-up solutions
Examples	Low carbon manufacturing/ solutions	Cradle 2 Cradle	Solar and wind power based energy innovations	Result oriented PSS – pay per use	Ethical trade (fair trade)	Consumer education	Hybrid businesses, Social enterprises	Crowd sourcing/ funding

Table 1: Green business model archetypes (Bocken et al., 2013)

The green business model archetypes (Bocken et al, 2013):

- Maximise material and energy efficiency* is defined as doing more with fewer resources, generating less waste and pollution, and it is distinct from mere process innovation in the sense that it should run through the entire business and subsequently enhance the value proposition (e.g. through significant price reduction). Business models focusing on lean manufacturing, low carbon manufacturing/solutions or dematerialization (of products/ packaging) are included in this archetype.
- Create value from “waste”* is about turning waste streams into useful and valuable input to other production and making better use of under-utilised capacity and is distinct from the efficiency archetype, in that rather than seeking to reduce waste to minimum, it seeks to identify and create new value from what is currently perceived as waste. Industrial symbiosis, closed loop business models or cradle-to-cradle models are considered examples of this archetype.
- Substitute with renewables and natural processes* archetype seeks to reduce environmental impact of industry by substitution with renewable sources and natural

processes to create significantly more environmentally benign industrial processes. This includes models that focus on local renewable energy solutions, environmentally benign materials and production processes or zero emissions.

- iv. *Deliver functionality rather than ownership* is about providing services that satisfy users' needs without having to own physical products and thus shifting substantially towards the pure service model – that is, delivering functionality on a pay-per-use basis, rather than selling ownership of a product. In doing so, this may fundamentally change the material throughput requirements of the industrial system. For example, use-oriented PSS (Product Service Systems) – maintenance, extended warranty, result oriented PSS – pay per use or DBFO (Design, Build, Finance, Operate) models are included in this category.
- v. *Adopt a stewardship role* is about proactively engaging with all stakeholders to ensure their long-term health and well-being and seeks to maximize the positive societal and environmental impacts of the firm on society by ensuring long-term health and wellbeing of stakeholders (including society and environment). Fair trade, biodiversity protection or consumer care are some of the models under this archetype.
- vi. *Encourage efficiency* means solutions that actively seek to reduce consumption and production. It tackles sustainability from the perspective of sustainable consumption. Of particular relevance in developing the sufficiency-based business model is the reframing of the value proposition to better address the broader range of stakeholders. Energy saving companies (ESCOs), consumer education models (awareness, communication), slow fashion, product durability and longevity through redesign, frugal business models and second-hand markets are some of the models included in this archetype.
- vii. *Re-purpose the business for society/environment* is about prioritizing delivery of social and environmental benefits rather than economic profit maximization, through close integration between the firm and local communities and other stakeholder groups. This archetype focuses on social and environmental (rather than economic and shareholder) benefits maximization of the organization and groups concepts that collectively see firms integrating more fully with their stakeholders. This archetype refers to hybrid businesses (social enterprise, for profit), non-profit organizations, cooperatives, social and biodiversity regeneration initiatives or localization models.
- viii. *Develop scale-up solutions* seeks to deliver sustainable solutions at a large scale to maximize benefits for the society and the environment. This archetype is introduced to consider the scale-up and widespread presence of business models for sustainability. This archetype refers to incubators and entrepreneur support models, licensing and franchising, crowd sourcing/funding or collaborative approaches (sourcing, production, lobbying).

Bocken et al. (2013) concluded that businesses can use one or a combination of archetypes in shaping their development and evolution, however, strong sustainability can be achieved more likely through a combination of different archetypes.

2.3 Stages of development

Summary: This chapter describes the stages of development of a business, according to Churchill & Lewis (1983). Their model identifies five characteristics - management style, organizational structure, extent of formal systems, major strategic goals and the owner's involvement in the business - to consider in describing each stage of business development. The model gives an overview of how businesses evolve and what are the main challenges encountered in each of the five stages of development: Existence, Survival, Success, Take-off and Maturity. There are also eight significant factors, which determine the success of a company. Four of them are business related: financial, personnel, system and business resources. The four factors that relate to the owner are: owner's goal for himself and the business, his operational abilities, management abilities and strategic abilities. The


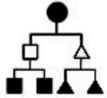
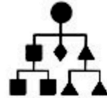
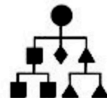
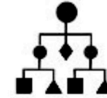
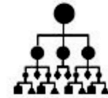






importance of these factors change as the business moves through the different stages of development.

According to Churchill & Lewis (1983) the literature often uses business size as one dimension and company maturity or stage of growth as a second dimension to distinguish the stages of development of a business. They say that the reason these models might not be suitable for analysing small businesses is that they fail to capture the important early stages in a company's origin and growth, they assume that a company must grow and pass through all stages of development and they relate the company size mainly to annual sales and sometimes number of employees, but ignore other factors such as value added, number of locations, complexity of product line, and rate of change in products or production technology.

Understanding stages of development of a business model helps anticipate the key requirements businesses may have at various points and the support they need at different stages. Neil C. Churchill and Virginia L. Lewis (1983) distinguish five stages of business growth. They state that despite their variety, businesses experience common problems at each stage.

The five stages are described according to five factors: management style, organizational structure, extent of formal systems, major strategic goals, and the owner's involvement in the business.

Figure 1: Characteristics of small businesses at each stage of development (Churchill & Lewis, 1983)

Characteristics of Small Business at Each Stage of Development						
	Stage I	Stage II	Stage III - D	Stage III - G	Stage IV	Stage V
	Existence	Survival	Success - Disengagement	Success - Growth	Take - off	Resource Maturity
Management Style	Direct supervision	Supervised supervision	Functional	Functional	Divisional	Line and staff
Organisation						
Extent of formal systems	Minimal to nonexistent	Minimal	Basic	Developing	Maturing	Extensive
Major strategy	Existence	Survival	Maintaining profitable status quo	Get resources for growth	Growth	Return on investment
Business and owner						

*Smaller circle represents owner. Larger circle represents business.

In *Existence stage* the main problem of the business is to acquire customers and to deliver the product or service they contracted. The organization is simple and the owner is in charge of running the business and performs all the important tasks. The goal of the company is to remain alive, some of them don't gain sufficient customer acceptance or product capability and the owners close the business when the start-up capital runs out.

By the time it reached the *Survival stage*, the business has already demonstrated that it is a workable business entity. It has enough customers and keeps them by satisfying their needs

sufficiently through its products or services. The key problem becomes the relationship between revenues and expenses. The questions that come up at this stage are:

- “In the short run, can we generate enough cash to break even and to cover the repair or replacement of our capital assets as they wear out?”
- Can we, at a minimum, generate enough cash flow to stay in business and to finance growth to a size that is sufficiently large, given our industry and market niche, to earn an economic return on our assets and labour?”

The main strategy is still survival and the owner is still synonymous with the business. The number of employees is limited and may be supervised by a sales manager or a general foreman. In this stage the company may grow in size and profitability and move on to the next stage.

In the *Success stage* the decision that entrepreneurs are faced with is whether to build on their accomplishments and expand or to keep the company stable and profitable, providing a base for alternative activities. A key issue is whether to use the company as a platform for growth (Stage III-G) or as a means of support for the owners as they completely or partially disengage from the company (Stage III-D).

In the *Success-Disengagement* substage, the company has attained true economic health and earns average or above-average profits and can stay in this stage indefinite time if environmental change does not interfere or management problems don't reduce its competitive abilities. Cash is plentiful and the main concern is to avoid cash drain in prosperous periods. Professional staff members come on board and basic financial, marketing and production systems are in place.

In the *Success-Growth* the owner consolidates the company and invests resources into growth. The goal is to maintain the basic business profitable and to develop managers for both the current condition and also managers with an eye to the company's future. If successful, the *III-G* company moves on into *Take-off* stage.

In the *Take-off stage* the key problem is how to grow rapidly and how to finance that growth. The most important questions, then, have to do with delegation and cash-flow. Can the owner delegate responsibility to subordinates and control the performance for a good management of fast growing and complex company? “Will there be enough cash to satisfy the great demands growth bring (often requiring a willingness on the owner's part to tolerate a high debt-equity ratio) and a cash flow that is not eroded by inadequate expense controls or ill-advised investments brought about by owner impatience?” The company is decentralized and it has operational and strategic planning. The owner and the company become more separated, however the company is still under the influence of both the owner's presence and stock control. If the owner can deal with the financial and management challenges of the growing company, the next step will be *Maturity* stage.

Finally, the greatest concerns of a company that enters the *Maturity stage* are first to consolidate and control the financial gains brought on by rapid growth and second to retain the advantages of the small size, including the flexibility of response and the entrepreneurial spirit. In this stage the company has the staff and financial resources for detailed operational and strategic planning, the management is decentralized and properly staffed, systems are extensive and well developed.

If it can preserve its entrepreneurial spirit, the company will be a formidable force in the market. If not, it may enter a sixth stage of sorts: *ossification*. *Ossification* is characterized by a lack of innovative decision-making and the avoidance of risks. This is common to large corporations, which remain viable until there is a major change in the environment. “Unfortunately for these businesses, it's usually their rapidly growing competitors that notice the environmental change first.”

In their research Churchill & Lewis have also identified eight significant factors, which change in importance as the business evolves and influence the level of success of a company. The company related four factors are: the financial resources, personnel resources, system resources (information, planning and control systems) and business resources (customer

relations, market share, supplier relations, manufacturing and distribution processes, technology and reputation). The four factors that relate to the owner are: owner's goal for himself and the business, his operational abilities, management abilities and strategic abilities.

The importance of each factor changes as a business moves from one stage of development to another. For example, the owner's abilities to sell, produce, invent are essential in the *Existence* stage, but the ability to delegate is not so relevant, since there are few if any employees. Being aware of which are the most important factors in each stage can determine the level of success of a business.

So far the literature review of the definitions, categories and development stages of green business models gives us a clear overview of the basic concepts and provides the basis for a common understanding of what green business models are.

Despite the large number of existing approaches and definitions of business models the main concept of value has been identified as the key element in a business model and we can understand how a company works by looking at its value proposition and how is economic and social value created, delivered and captured in the company. For understanding green business models examining the environmental value created, delivered and captured by the company is just as important as the economic/social values. Eco-innovation through its new technologies, products and services that reduce environmental risk and pollution often is the driving force for green business development.

Defining the different types and categories of business models encountered in the literature is also part of the conceptualisation. Identifying the elements along which specific business models are formed and understanding how their value chain is greened is essential before going into a more detailed research of green business models. The identified models give us a common understanding of how these models work and what is the environmental value they bring.

The development stages model by Churchill & Lewis gives us an overview of how businesses evolve, what are the main challenges encountered in each of the five stages of development and also explains the significant factors that determine the success of a company. It is still to be researched how these development stages apply for green business models. After having clarified the basic concepts, for a thorough understanding of how business models work and what kind of research tools are available for studying green business models and their environmental impact, in the following chapter we discuss the methods encountered in the literature for analysing green business models, understanding green business models in terms of viability and measuring their impact.

3. Assessing Green Business Models

There are multiple ways to go about assessing a green business model. The literature contains a wealth of reports and papers written on specific case studies or from different practitioners' perspectives.

3.1 Describing and analysing green business models

Summary: This chapter looks first at existing methods for describing a green business model, then turns to perspectives on assessing a business model's viability and finally looks at how the literature describes measuring results. The methods for analysing green business models covered in this chapter include Business Model Canvas, Strongly Green Business Model Canvas, Triple Bottom Line Objective, Eco-Innovation Business Model, Capitalism 1.0 vs. Capitalism 2.0 and an overview of the existing green business model analysis methods used by other researchers.

3.1.1 Business Model Canvas (BMC) and the Strongly Sustainable Business Model Canvas (SSBMC)

The Business Model Canvas tool developed by Dr. Alexander Osterwalder (2010) is widely used for mapping out the business model concept. The tool consists of nine basic building blocks. Osterwalder conceptualized the BMD by doing a synthesis of the existing business model literature going a step further by conceptualizing every singly element and then integrating them into a whole (Osterwalder, 2010). Those nine building blocks cover the four main areas of a business: customers, offer, infrastructure and financial liability (Osterwalder and Pigneur, 2009). The author's aim is to present a clear/simple business model concept that can be used with ease and be applied to any type of business.

The BMC's aim is for companies to understand the business model and also to do business model innovation. It appears to be a tool to uncover the main elements of a business model in relation to green businesses or sustainable practices (Osterwalder, 2010).

The BMC has been completed with two additional blocks introduced by IDEO (an innovation and design consulting firm) resulting in the following canvas:

Growth Strategy: Set development goal on the mid-term (5 years)				
Key Partnerships: The network of suppliers and partners that optimize the business model, reduce risk or acquire resources.	Key Activities: Most important actions a company must take to operate successfully	Value Proposition: The bundle of products and services that create value for a specific Customer Segment	Customer Relationship: The type of relationships a company establishes with specific Customer Segments	Customer Segment: Different groups of people or organizations targeted
	Key Resources: Most important assets required to make a business work (physical, financial, intellectual or human)		Channels: How a company communicates with and reaches its Customer Segments to deliver a Value Proposition (communication, distribution and sales channels)	
Cost Structure: All costs incurred to operate a business model		Revenue Streams: The cash a company generates from each Customer Segment (costs must be subtracted from revenues to create earnings)		
Competitive Strategy: Identifying existing competitors and new entrants, and elaborating a plan to stand out				

Table 2: Business Model Canvas (from Osterwalder & Pigneur, 2010; IDEO, 2011).

Central to the BMC is the business value proposition. The literature that uses the BMC as a method to analyse green business models is based on surveys and adds to the canvas a description of the environmental (green value) and of the social contribution. The key is how environmental and social impact drive value through the business model.

In their research, Bocken et al. (2013) grouped the nine blocks of the BMC in three main categories of value:

Value proposition Product/ service, customers segments and relationships	Value creation & delivery Key activities, resources, channels, partners & technology	Value capture Cost structure & revenue streams
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These categories can be used to define the values of the archetypes Bocken et al. identified (2013) which were mentioned in chapter 2. For example, for the “Substitute with renewables and natural processes”, the categories of value result as follows:

<p>Value proposition</p> <p>Reduce environmental impacts and increase business resilience by addressing resource constraints associated with non-renewable resources and man-made artificial production systems.</p>	<p>Value creation & delivery</p> <p>Innovation in products and production process design by introducing renewable resources and energy and conceiving new solutions by mimicking natural systems. New value networks based on renewable resource supply and energy systems. New partnerships to deliver holistic “nature inspired” solutions.</p>	<p>Value capture</p> <p>Revenue associated with new products and services. Value for the environment is captured through reducing use of non-renewable resources, reducing emissions associated with burning fossil fuels, reducing synthetic waste to land-fill.</p>
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Additional examples of value generated by GBMs are mainly illustrated in the work by Osterwalder (2010), Nordic Innovation (2012) and other authors that mentioned:

- Better performance: eco-innovation leads to costs reduction, thus positively impacting a company's result.
- Customization: a company which tailors its offer according to its customers creates value and this strategy has gained importance in the recent years
- Life cycle cost management:
- Better price: it is a result of costs reduction. Offering similar value at a lower price satisfies price-sensitive customers
- Risk reduction: for customers, it can be the result of the non-ownership of product because a company offers the service to use it (e.g. the customer is not responsible for maintenance costs of a rented car)
- Higher accessibility: Product-Service Systems are a good example because they enable to use a product to customers that could not afford to buy it.
- Comfort, flexibility, convenience: this has become a vector of value, companies providing product or service that are easy to use dominate the market (e.g. Apple provides convenience in searching, buying, downloading and listening to digital music)
- Spreading green consumption behaviours: nowadays people pay more and more attention to their environmental impact and tend to buy products that are environmentally friendly (Pickett, 2008). Green companies are naturally providing those and therefore pushing green consumption behaviours.
- Brand value and reputation: green companies tend to have a better image and to be vectors of trust, reliability, and customer satisfaction and loyalty (Chen, 2009; Chang & Fong, 2010)

Upward (2013) developed a “strongly sustainable business model ontology” (SSBMO) and “canvas” (SSBMC) by combining Osterwalder (2010) with an extensive review of the current knowledge available from the natural and social sustainability sciences.

In his work, Upward follows the Ecological Economists’ definition of strong sustainability as the “impossibility of replacing natural capital with any other kind: human, manufactured, intellectual, social or financial”.

According to Upward, the objective of Osterwalder’s canvas is to determine how a business can do well (a profitable business), and his addition extends this idea by emphasizing on how a business can do good (a sustainable business). Thus it extends the BMC to be able to describe a “strongly sustainable” business model: one that is sufficiently profitable, while simultaneously creating social and environmental benefits.

Upward's work is the result of a three-year study tested with 7 experts, 12 business experts and groups of universities and students¹. Five questions were added to the initial 9 blocks of the business model canvas model, resulting in the following canvas:

ENVIRONMENTAL							
		SOCIETY					
		ECONOMY					
Biophysical stocks		PROCESS		VALUE	PEOPLE		Ecosystem actors
		Resources	Partnerships	Value co-creation	Relationships	Stake holders	
Ecosystem services		Activities	Governance	Value co-destructions	Channels		
Costs		Goals			Benefits		
		OUTCOMES					

Table 3: Strongly Sustainable Business Model Canvas, Upward (2013)

3.1.2 The Eco-innovation Business Model

An OECD case study analysis (2009) introduces an analysis scheme that integrates eco-innovation at the business model level. It identifies three levels at which eco-innovation can be described:

1. Level targeted by eco-innovation:

- Institutions: includes the broader societal implications a business has beyond its own boundaries, such as institutional arrangements, social norms and cultural values
- Organizations themselves: management structure and distribution of responsibilities
- Marketing methods: for example, promotion and pricing of the products
- Processes: production methods/procedures
- Products: goods/services

2. Change mechanisms for eco-innovation:

- Modification: this refers to the first stage of eco-innovation where small, progressive product and process adjustments occur

¹ Upward is currently working on a toolkit and renamed the SSBMC as "*Flourishing Business Canvas*". His goal is to provide a tool that could be used by both businesses and researchers.

- Re-design: significant changes in existing products, processes, organizational structures
 - Alternatives: including for example the introduction of goods and services that can fulfil the same functional need and operate as substitutes for other products
 - Creation: the design and introduction of entirely new products, processes, procedures, organizations and institutions
3. The eco-innovation's impact on the environment, which can be captured in each of the two previous dimensions and is separated by:
- Technological impact: includes pollution control, cleaner production, eco-efficiency
 - Non-technological impact: includes Life-cycle thinking, closed loop production and industrial ecology.

According to the OECD, the more radical is the eco-innovation, the more environmental benefits (OECD, 2009).

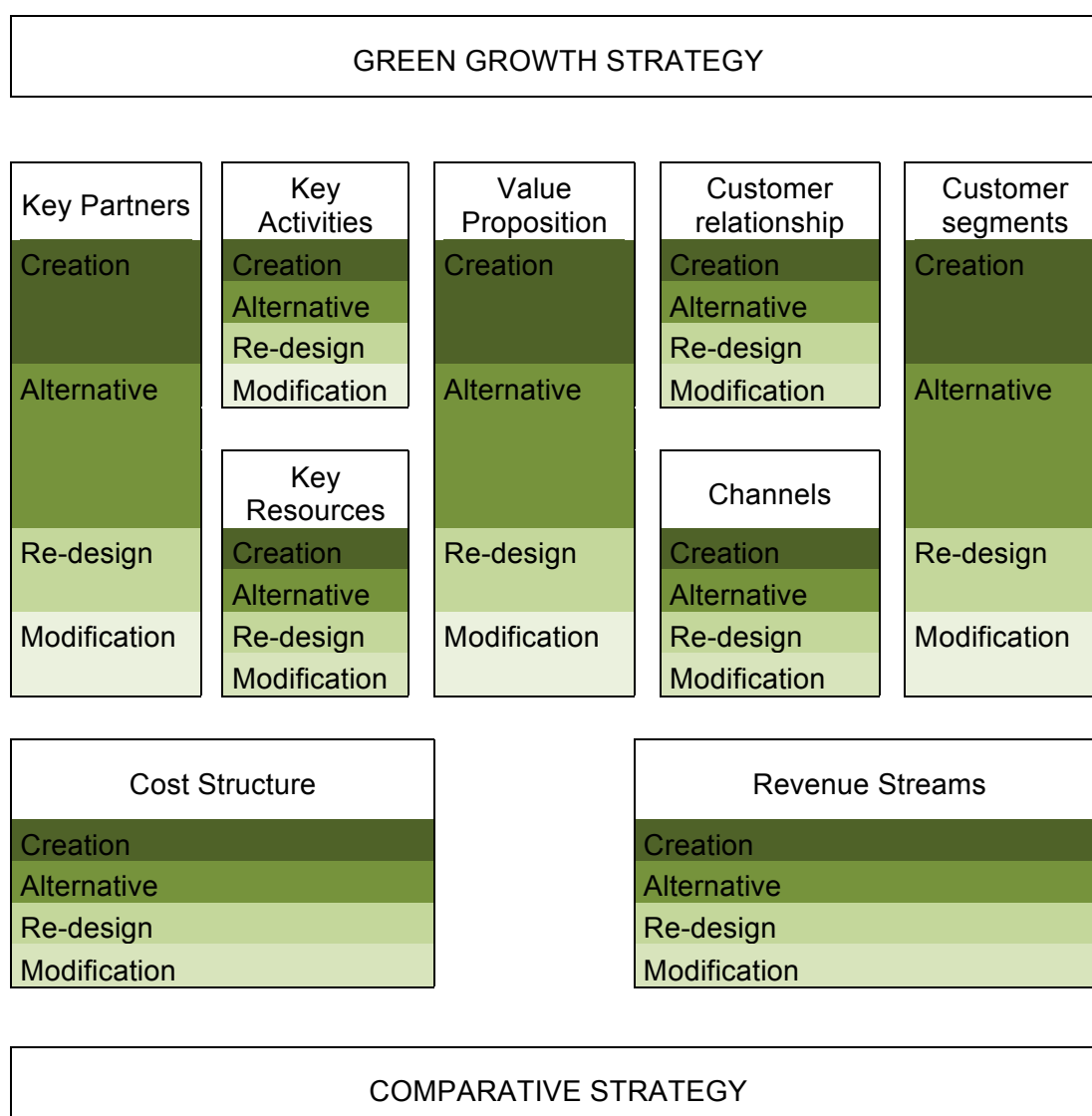


Table 4: Green Business Model Innovation, Nordic Innovation (2012)

The OECD suggests that these levels could be overlaid with the BMC building blocks. The interplay between the level at which eco-innovation is targeted and the mechanism of the eco-innovation create a scale of magnitude for the environmental benefits realized by a GBM. For example, more radical changes such as the mechanisms of Alternatives and

Creation embody higher potential benefits than Modification and Re-Design (OECD, 2010). Environmental impact is therefore a variable determined by targets and mechanisms chosen.

3.1.3 Capitalism 1.0 vs. Capitalism 2.0: comparing GBMs to traditional business models

A GBM can also be assessed by comparing it to traditional business models. The Natural Step is a global network of non-profit organizations that has been operating for over twenty-five years. Its goal is to accelerate the transition to sustainability through a science-based framework.

The aim of their research (2014) is to focus on defining truly sustainable businesses, which they describe as firms for which sustainability activity is the core business, in contrast with companies that incorporate sustainable practices in the business. Their definition of a truly sustainable business is one that creates positive environmental, social and economic value. Their study was based on work made by The Generation Foundation (2012), Toronto Sustainability (2013), Economia (2012), treating about this new generation capitalism.

The purpose of a firm is to satisfy its owners, which means maximizing profits (single bottom line). This goal can be in contradiction with other stakeholders (e.g. a project which will force communities to relocate). This new form of capitalism is not only focused on its shareholders needs but is widened to integrate all stakeholders: people, planet and profit (triple bottom line).

There are 6 types of capital according to the Integrated Reporting (2013): financial, manufactured, intellectual, human, social and natural. Capitalism 2.0 extends considered capital from only taking into account financial capital to adding natural, social and human capitals. Capitalism 2.0's value proposition is that stewardship of multiple capitals is the essence of long- term prosperity.

This way of conducting business changes the entire dynamic of a firm. The goal is no longer to show growth from one year to another and to extend its presence worldwide but to consider every stakeholder's welfare and community needs.

Capitalism 1.0 firms do not take into account their negative impact outside of their company which is contrary to the logic of Capitalism 2.0. The firm's whole value chain is assessed to comprehend the firm's overall impact. The goal of Capitalism 1.0 companies is to sell, not considering consequences of the production such as waste. New capitalism firms on the contrary, work in a closed loop where every waste is optimized and reused via partnerships with other companies that could make use of it, in order to decrease pollution.

	Capitalism 1.0	Capitalism 2.0
Purpose of the Firm	Maximize <i>shareholder</i> value; Short-term	Maximize <i>stakeholder</i> value; Short and long-term
Legitimate capitals	Financial	Financial, Natural, Social, Human
Bottom line	Profit	Profit, Planet, People
Strategic focus	Growth; Consumption	Stakeholder well-being
Source of financial capital	Stock market; Big financial institutions	Smaller financial institutions, Crowd sourcing; Customers Employees; Local communities; Shared ownership
Market focus	Global	More local
Negative impacts	Externalized	Internalized
Boundaries	The firm	The firm's value chain
Transparency	As little as possible	Naked
Business model	Sell products; Take-Make-Waste; Linear	Sell services; Borrow-Use-Return; Circular, Cradle to Cradle; Closed loop

Table 5: Capitalism 1.0 vs. Capitalism 2.0 (from *The Natural Step Canada, 2014*)

A study conducted by Ramudhin, Chaabane and Paquet (2009), follows the same logic of comparing GBMs to conventional business models and found that GBMs have two major advantages over tradition business:

1. Business strategy (from product to service):

Green businesses avoid suffering from the aggressive strategies of low-cost product providers. Those constitute a barrier to enter the market: they have already benefited from economies of scale and attract customers that are price-sensitive. Hence, at the time the new green business wish to enter the market (when operating costs are the highest), it will not be able to compete. Product-Service System is an answer to this issue: because they sell a service instead of a product, costs are lower (no sale of the product therefore less production and fewer material used). In doing so, companies expand their revenue stream by adding services because the product is no longer at the heart of the business model.

Offering Product-Service Systems meet customer demand (provides access to a product which cost would make it non-affordable for certain customers), enables a company to differentiate its offer by adding services and also introduces new technologies to the market (FORA, the Danish Enterprise and Construction Authority's division, 2010).

2. Supply chain management:

The impact of the business model is no longer subject to the product itself but to the entire supply chain - referred to as the "sustainable supply chain management" (SSCM). That enables companies to increase their positive impact on the environment by extending their environmental considerations at every step of the production. SSCM can be linked to green design, inventory management, production planning and control for remanufacturing, product recovery, reverse logistics, waste management, energy use and emissions reduction (Ramudhin, Chaabane and Paquet, 2009).

Another paper by the German Cooperation and GIZ (2015) compares GBMs to conventional business models. The following table elaborates the differences between both types, building on Osterwalder's Business Model Canvas.

BM building blocks	Conventional BM	GBM
<i>Key activities</i>	Focus more on short-term management	Long-term strategic decision making
<i>Key resources</i>	Use of non-renewable and non-recyclable materials and fossil fuels	Use of recycled, renewable and sustainable materials
<i>Customer segments</i>	Focus on traditional and mass consumer markets	Servicing existing customer markets and developing new markets through innovative products and services and thereby increase competitiveness
<i>Costs</i>	Missed cost saving opportunities through resource efficiency measures	Cost saving opportunities through energy and resource efficiency in the production and all stages of the value chain
<i>Value proposition</i>	Focus on maximizing product outputs and economic returns	Focus on value creation through delivery of innovative and green products and services
<i>Revenue streams</i>	Key focus on delivering economic value to business and clients	Deliver economic, environmental, and social value to customers, the companies and society
<i>Key partnerships</i>	Partnership focus on stakeholders directly linked to manufacturing sales of products	Strategic partnerships along the value chain, including private and public sectors and communities
<i>Customer relationship</i>	Relationship with core and traditional customers based on economic values	Long-term customer relationship based on environmental and societal values
<i>Channels</i>	Build on open loop systems (extract, produce, use and discard) with significant waste along the supply chain	Build on circular models facilitating the reuse of resources throughout the value chain

Table 6: : Green Business Model Navigator (from German Cooperation / GIZ, 2015)

According to the findings of the research, many companies' green business model innovation is still at an early stage, and the potential for more mature innovation has yet to unfold. The authors show that many companies are just starting up the process of finding new profitable and greener way to do business. There is therefore some way to go before solid statistics and sound evidence of impacts can be produced. GBMs are vectors for promoting new environmental technologies and products. Therefore, they are bound to expand in volume as new business opportunities arise.

3.2 Assessing Green Business Models

3.2.1 The practitioner's approach: Case Studies

Summary: Innovative green business approaches do not yet belong under a unifying theme of business model innovation (Bocken et al. 2014). In a context where there are no common methods for assessing GBMs, therefore, practitioners test tools to understand the GBMs

dynamic. Currently, the most common tool is the case study approach. This chapter reviews two examples of how case studies are used to examine GBMs: the Nordic Innovation and OECD studies which focus on analysing aspects of green business models and understanding fundamental elements of their business such as their environmental and economic impact, the innovation factor, barriers and drivers.

Nordic Innovation study on GBM in the Nordic region

One such example is Nordic Innovation (2012)'s research on green business model innovation, using qualitative and quantitative analysis of business case studies. The purpose of the assessment was to analyse different types of green business models in order to identify their environmental and economic potential within the Nordic region. One of the researches involved 29 cases where over 70% were established businesses with more than 50 employees. While the business case was the main resource, additional sources in the establishment of this report are a literature review on economic and environmental effects, an impact assessment of a survey, interviews with experts.

The assessment focused on the following questions:

- Sources of funding: 80% of the companies said in-house revenue was one of the five most important sources of funding for their green business model innovation, followed by conventional bank loans, private equity, national government grant and international public programs.
- Other multiple choices questions addressed issues such as knowledge and human resources, policy instruments that affected the business model and type of innovation outcomes (process, service and/or product innovation)
- Self-reported environmental impact that may have been measured after the introduction of the green business model innovation. The most commonly reported environmental results were reduced GHG emissions, reduced energy consumption, reduced amount of waste and increased recycling, reduced amount of chemicals and toxins and reduced water consumption.
- Other barriers and drivers including five of the most important drivers reported by companies: increased consumer and media awareness and demands towards sustainability, market opportunities for sustainable products, increasing costs and decreasing availability of resources, government regulation in favour of sustainability and the potential to create new and closer customer relationships as well as partnership opportunities.

Nordic Innovation assessment of innovation in GBMs

In 2011-2012 Nordic Innovation also made an impact assessment on the financial, environmental and innovation benefits of green business model innovations. The research involved 54 businesses from Europe, North America and Asia. The purpose was to uncover whether companies that apply green business model innovation are also to a large extent those that perform well in financial, environmental and innovative terms.

The independent indicators used in the assessment focused on the degree to which the company:

- Has an environmental focus in the supply chain
- Has an environmental focus through partnerships with their suppliers
- Has take-back mechanisms for used products
- Reduces material use in products/ services
- Designs recyclable products/ services

- Is part of an industrial symbiosis: sharing the use of resources and by-products amongst industrial actors on a commercial basis through inter-firm recycling linkages (Technopolis, 2012).
- Maintains product ownership (by selling the product as a service)
- Is paid by the output of their products/ services.

The analysis consisted of three dependent variables: financial, environmental and innovative impacts.

Financial impact variable measured the companies' financial performance, employment and cost effectiveness. Data analyzed to measure financial performance included revenue, EBIT (earnings before interest and taxes) and total assets for three different years, which made it possible to calculate a number of useful financial ratios as well as their development. The financial ratio of primary interest was EBIT/total assets, which provided a measure of how much operating income the company can generate on each Euro it has invested in assets.

Environmental impacts were measured by asking companies to estimate the environmental impact in their:

- CO2 and other greenhouse gas emission (per produced unit)
- Energy consumption (per produced unit)
- Consumption of non-renewable materials, incl. fossil fuel (per produced unit)
- Waste for recycling (per produced unit)
- Toxic chemicals (per produced unit).

These indicators were obtained for several time periods (t-1, t+3, year 2010, where t=time of introduction of their green business model innovation) in order to show the level of environmental performance before (t-1) and after (t+3 and 2010) the implementation of a company's green business model.

The innovative impact measurement focused on the following indicators. Companies were asked to estimate via open questions the development of innovation in their:

- Materials
- Production and processes
- Products/services
- Management systems (for dealing with environmental issues)
- Marketing
- Infrastructure (the organizational structures for selling/taking back products).

The study concluded that considering the fact that a lot of GBM studied are at an early stage, sound evidence can't be made concerning the potential of innovation on a business model. Nonetheless, all GBM have experienced positive financial or environmental impact.

OECD study on the role of business models in green transformation

A similar analysis has been conducted by the OECD (2012). The goal was to understand how GBMs promote eco-innovation.

The scope of the study included 95 cases among 37 countries falling in the following sectors: oil and gas (21%), buildings and construction (19%), water and waste management (16%), transport (10%), food and agriculture (8%), electronics and ICT (3%) and chemicals (3%).

A first assessment of 32 business cases from 9 countries was analyzed in this report.

The process consisted of interviews with companies' representatives and a questionnaire. Questions contained in the survey were divided into five sections:

- General features of eco-innovation: type of innovation, functions, novelty, targeted customers and business model.
- Impact and benefits: diffusion level, current and future positive and negative environmental, social and economic impacts.

- Innovation process: stages of idea generation, R&D, testing, business development and commercialization.
- Factors that influence the innovation: market conditions, organization and networks, knowledge, resources, policies, value chains, enabling technologies and infrastructure.
- Overall lessons including determinants, future policy support and plans

The GBM market still being under construction, there are numerous case studies that have been conducted regarding green business models by practitioners to define patterns and attributes and enable categorization. The general method of assessment they use was to describe key characteristics of companies with the objective of elaborating business models types those companies could fit in. This approach is rather general and not focused on green business models itself. It is therefore challenging to draw out general assessment methods for GBMs.

3.2.2 The Investor's approach: Assessing Viability

Summary: Investors include both quantitative and qualitative measures in their assessments; the entrepreneur must prove financial and sustainability viability. Investors have a resource and productivity perspective and analyze GBMs according to mainstream assessment methods. Understanding investors considerations and motives provides guidance in elaborating business models and in approaching potential capital providers. Sources reviewed include a 2013 study by Toniic – an impact investor network and platform, a J.P Morgan survey on impact investors and a study conducted by Söderblom and Samuelsson (Stockholm School of Economics) whose objective is to assess the process of financing innovative start-ups.

Considerations related to the GBM

1. Company development stage

The investor will consider the development stage of the company: seed, growth, maturity, decline. The risk is related to business model execution and management according to impact investors surveyed by J.P Morgan in 2014. The risk taken must be in line with its investment strategy. For example, investors that are risk adverse will most likely provide capital to a company which is already operating and has at least a positive EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization) the reason being that it ensures profits for him. Seed investors are the most willing to take on risk and expect a profit corresponding to that risk (ImpactAssets, 2013). Seed investment in GBMs is suitable for investors sharing common values with the company they invest in. They are both seeking innovation and disruption for the greater good. Green investments are being undertaken both by specialist green funds and within non-specialist funds. Green businesses must keep in mind that this in order to know which type of investor to solicit when they will need funds (e.g. Venture Capital at seed stage, debt from bank in the growth stage; etc.). Also, there are specific funding products for each development stage (Berger and Udell, 1998). For example, in the seed stage, a green business does not generating profits, therefore debt would not be suitable, instead, participation in its capital by an investor (e.g. equity) will be appropriate because the investor will not request a part of revenues/profits.

2. Technology/product/service

The market potential and innovative factors are crucial. The goal of an investor is to make profit out of its initial investment. Therefore, it has to believe there is a credible potential for the product/ service/ technology the company it invests in has to offer. The company must offer incremental, disruptive or radical innovation, for example, it can address a need or a problem that hasn't been met/faced yet by other companies or an amelioration of a certain product/technology on the market. Hence, an investor will be more likely to invest in a tangible project targeting a current or future need corresponding to an identified customer

base. Financing may be also refused for start-ups that are expected to compete in a mature industrial sector, or they think that the technology - and the team behind it - will simply not attract enough attention on the market in the short-term. The industry of theme chosen by an investor depends on its own experience of the market.

When it comes to the investor's view of a product oriented business model, the overall thought is "the more tangible the better". For companies creating a product, one that already has created one will be more credible than another having just an idea.

The quality of the team behind the GBM is also essential (Randjelovic et al. 2002). When it comes to investing in innovation, there must be experts of the technology involved in the project to reassure the investor. It wants to be sure it provides fund to a team having solid knowledge and experience in the targeted innovation.

The environmental impact measurement is at the heart of a green investment. The investor decision will highly depend on the ability of the company to provide a clear and precise impact on the environment and society for raising capital and industry development purposes (J.P. Morgan, 2014). There are investors who will consider environmental impact before the finance aspect: they are referred to Impact-first investors by Toniic. Even if the investor doesn't belong to that category, the impact assessment is considered central because it justifies why the investor is willing to take on additional risk by investing in projects that are in line with its own values. Entrepreneurs should emphasize their environmental impact assessment and method when fundraising.

Consideration related to finance

Investors who commit capital in green business models are those who are aware of the environmental and social benefits of such projects and/or understand the potential of double-dividends of sustainability-related investments (Oekom, 2012). These are defined by earning a rate of return, which is at the very least in line with market rates, while at the same time pursuing social, environmental or ethical goals (Porter & van der Linde 1995). It is hard to assess how indulgent an investor will be on the level of returns because it depends on his/her investment profile and considerations.

Investing in green projects is also seen by investors as a potential cost saving and less risky asset (after the GBM has proven its profitability) (Winston, 2009).

Investors in GBM are aware of the fact that the revenue model is likely to differ from traditional investments. The investor's objective here is to identify if the project is able to generate profit and that it is reflected in the business model type (J.P Morgan, 2014). This has an impact on the time frame of the investment: usually, start-up investors intend to exit the company after 1 to 3 years whereas for a green company this time frame can go up to 5 years at least (for product based business models). In addition, the overall performance expectations are lower than usual. A tool used to assess the valuation of a company is the Net Present Value: it is the difference between the net present value of cash inflows and the net present value of cash outflows over a set period of time. The GBM must have a clear and credible estimated future cash flow based on its activity in the investment timeframe.

An investor will also visualize its exit strategy, for example an Initial Public Offering (introduction of the company to financial markets) or when the company is sold to other investors. For start-ups, exit opportunities are rare and situated in the long time frame.

Investors also consider the valuation of the company. There is a preference for low value companies with a strong potential to increase, relative to the risk and the stage of the company (Söderblom & Samuelsson, 2013). The start-up investor's objective is to be the one who identified a project that will raise the attention of investor peers after he/she has invested in it. In doing so, the goal is to benefit from profits generated by the increased valuation of the company and to generate a positive difference between the initial investment and the share price in case the company is sold (exit strategy).

There are also concerns that start-up investors take into account that have to do with other investors in the GBM. First, it will consider how many other investors are there because this

is a vector of investment risk mitigation. In addition, it gives an indication on the relevance of the project.

Second, the investor will ask himself what is the ability of the company to raise capital during the course of its development. A start-up company, if it successfully goes beyond the “idea phase”, will likely be funded several times because of the need for capital in expanding its business. Investors plan for that by setting capital aside called “follow-up on investment assets”. The investor needs to consider if the company would be backed by new investors when he/she won’t be able to provide additional cash. If the project is not commercialized in the course of the investment horizon, then the investor would have made a net loss. This can make the difference between a promising idea that was abandoned too soon and a successful GBM. This strategy is proven to help get out of the “desert gap”. GBMs can help investors assess future needs and the frequency with which capital will be needed.

Support from other investors includes grants that can be provided by public institutions for example to support R&D costs or guarantees provided to mitigate risks for investors (cf. Chapter 5).

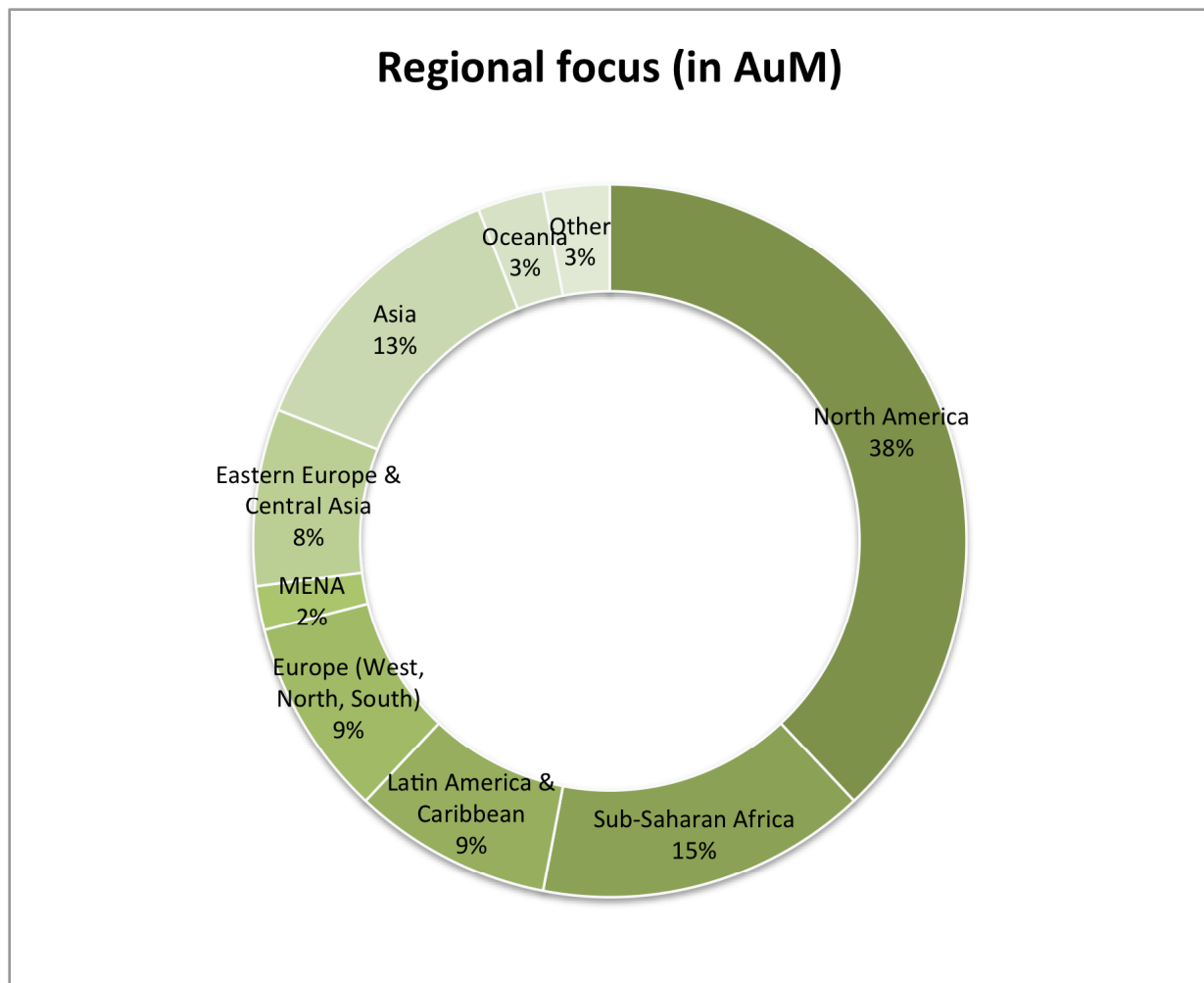
Factors external to the GBM

Big successes draw attention and capital towards earlier stages of financing start-ups. The track record of an industry or technology is a valuable information to the investor (ImpactAssets, 2013).

The components of his/her portfolio is also considered by an investor. The typical objective is to diversify assets by type, development stage, geographical area, etc. Seed investments being risky, an investor can diversify by providing a lesser share of its overall portfolio in order to avoid concentrating the loss potential of similar investments.

Geography is also considered. When it comes to innovative GBMs, emerging markets are very dynamic. The following figure describes the result of the 2016 survey conducted by GIIN on impact investors’ geographic focus:

Figure 2: Annual Impact Investor Survey, *Global Impact Investing Network (GIIN, 2016)*



The investor assesses the following in-country variables in deciding to invest (Toniic, 2013). Legal constraints are external to the project but affect it in a tremendous way. It is one of the major factors influencing investors. For example, a country having favorable policies will reassure investors and encourage them to invest. The political climate impacts investments as well: an unsafe environment with conflicts will have investors afraid. Consequently, this factor can lead to a fluctuating currency valuation representing a high risk for the investor. Also, the possible advancements that have the potential to promote investment (e.g. tax incentives) are considered. Also, different reporting, accounting and auditing standards affect the investor because it affects the ease of assessing financial aspects.

Trade-offs between investing in good and making profit constitute a false widespread common knowledge, according to the Morgan Stanley Institute for Sustainable Investing (2015). According to this study, investors think that sustainable businesses are bound to underperform traditional businesses. The study showed that investing in sustainability is in fact a vector of outperformance for investors' portfolios. Despite this evidence, the trade-off misconception is still hampering growth in the sector.

A paper by Randjelovic et al. (2002) identifies factors that slow seed investment in GBMs to be:

- *Lack of network*: Seeking out trusted in-country partners –investment intermediaries, investor peers and legal assistance – is key for improving outcomes.
- *Lack of a good business plan*: The green industry suffers from incomplete or inconsistent business plans, a lack of essential data (e.g. expected revenues), or too

much irrelevant data (such as an overemphasis on world environmental problems). It is therefore important for GBMs to provide investors with a track record within the industry targeted to show the potential of their business.

- *Lack of expertise and skills:* This is a problem, which affects both sides of the investment process. The investor is an investment specialist who doesn't necessarily know the field of investment. If there is insufficient comprehension of the technology or the industry, the investment decision will be hampered.
- On the other side, the eco-entrepreneur may lack essential business skills, such as marketing, management or financial skills, which are necessary to run the business. Thus, entrepreneurs may need appropriate environments, such as "technological incubators" to be properly developed. In such contexts, eco-entrepreneurs who tend to have a technical orientation learn the managerial competences necessary to make their ideas succeed in market terms.

Socially Responsible investor's strategies (financial markets) according to EuroSIF (2014) and Global Sustainable Alliance (2014):

This section describes strategies of sustainable and responsible investment (SRI). For a definition of SRI, also see chapter 8.2.2 of part 2.

1. Exclusion strategies (negative filter)

Sector exclusion takes out of the portfolio any activity that is considered not socially responsible such as weapons, oil, alcohol, tobacco, pornography, animal testing, etc.

Norms-based exclusion withdraws companies that do not respect certain norms or international conventions in their interaction with stakeholders. Norms that are commonly considered are human rights, labor laws, the environment, racial discrimination, repressive regimes.

Governance criteria are also part of the process (e.g. companies that don't give consideration to small shareholders, power retention, controversial remuneration schemes).

2. Environmental, Social and Governance (ESG) selection

This strategy applies ESG criteria when investing in companies regardless of their industry. In this context, investors use extra-financial rating or NGO advice.

- *Best-in-class approach:* investing in companies that perform the best in certain selected industries
- *Best effort approach:* here companies are selected if they have improved their ESG criteria
- *Best-in-Universe approach:* this strategy privileges companies that have the best ESG rating with no consideration to the industry

3. Thematic selection (positive screening)

This strategy aims at selecting sectors considered ESG compliant. The filter here is positive. Activities linked to the environment come first: renewable energy, clean-tech, energy efficiency companies for example would be targeted.

4. ESG integration

Certain ESG criteria are taken into account, not simultaneously, and integrated to a traditional investment process. Investors using this strategy are those that are not focused on the environment per se but use the screening in order to mitigate risks.

5. Shareholder engagement

This strategy consists of shareholders using their voting power in order to change certain practices of the companies/states that are considered unethical. The overall goal is to install a dialogue between a company and its shareholders and to participate to strategic decisions.

6. Socially Responsible Investment (SRI) Index strategy

Here the investor will follow an SRI index in constituting his/her portfolio and give more weight to assets that are considered more profitable. This is a passive investment approach.

3.3 Measuring results

3.3.1 Measuring environmental impact/sustainability

Summary: This chapter is an overview of different approaches for measuring environmental impact and the sustainability of green business models. Measurement tools identified include Life Cycle Analysis, Environmental Footprint, Ecosystem Service Valuation and Environmental input-output modeling. Other examples of environmental impact measurement and valuation described here include Environmental Assessment and Strategic Environmental Assessment, Organization and Product Environmental Footprint, Sustainable Consumption and Production, Green Public Procurement and Health Impact Assessment.

There are no mandatory standards for the measurement of a company's environmental impact. Most measuring tools come from the initiatives taken by different companies, which are then analyzed to help set rules; therefore, case studies are the main indicator of advancements in the field.

Green Business Models' principal environmental and sustainability impact measurements include:

- Energy and natural resource consumption reduction (per unit). GBM help maintain environmental improvement in the long run (FORA, 2010) (e.g. renting and sharing BM lead to reduction of use of resources and production of product)
- Reduction of GHGE (greenhouse gas emission) and carbon footprint (per unit)(Nordic Innovation, 2012). The reference here is the Greenhouse Gas Protocol, the international standard for reporting GHG emissions.
- Reduced chemical waste and improved disposal (per unit)
- Spread of sustainable practices

In addition to the per unit measurement of environmental impact, having those costs translated into monetary terms has a direct importance for company performance and risk assessment. Trucost (2015) conducted a study on the environmental performance of more than 4,800 companies to bring awareness on the management of supply chains.

After assessing the environmental impact profile of a company, an environmental damage cost (natural capital cost) is applied to each resource and emission to generate an external environmental cost profile. The costs represent the quantities of natural resources used or pollutants emitted multiplied by their environmental damage costs to the economy and society. In doing so, the cost of using a resource or pollution, which is external to the company (because not compensated) is valued. The regulatory framework tends to make polluters pay therefore assessing the external environmental cost of a company is crucial (GreenBiz, State of Green Business, 2015).

Incorporating environmental measures into decision-making enhances impact measurement as it tracks the progress being made, thus additions to the measurement methods or new methods can be made and impact results can be communicated to stakeholders.

There are different valuation and measurement tools and the company's choice will depend on the market it operates in, its type of strategy (product or service), etc. A research by the Network for Business Sustainability (2011) analyzed 180 studies (practitioner and academic material) and presented four of the most common measurement tools:

Life Cycle Analysis (LCA)

It quantifies the impacts of a product or process over its life, from design and manufacturing to transport and disposal. The four basic steps in conducting an LCA are: scope and goal definition, inventory analysis, impact assessment and interpretation of the results. The use of LCA in business is widespread and increasing. The United Nations Environment Program

promotes its use, an ISO LCA standard exists, and many consultants and software packages have been developed to serve executives.

Environmental Footprint

Developed in the early 1990s, the environmental footprint measures demand on ecosystems relative to their ability to regenerate. It is typically expressed very compellingly through a simple number representing an area of biologically productive land or water. It is mostly known to be used for a country scope but it can also be used for companies, products, facilities and even individuals. The Global Footprint Network is a reference in this field.

Ecosystem Service Valuation (ESV)

Ecosystem services are the functions that support life, such as clean drinking water or nutrient cycling. Ecosystem service valuation (ESV) places financial values on those functions. Measuring the value of ecosystem services is challenging as economic markets do not typically reflect the entire cost or benefit of a function and most of the services are public goods.

Environmental input-output modeling

This method's initial purpose is to study changes in demand within an economy by measuring the economic flows between industry sectors. Since one sector's outputs are another's inputs, an I-O model can help decision-makers analyze monetized relationships between different companies or sectors of the economy. Environmental impacts, measured in dollars, can be added into the analysis alongside other revenue and cost streams, allowing managers to see the implications of different products or processes on environmental costs. The European Commission created the Institute for Prospective Technological Studies has developed a tool to measure the environmental impact of companies called the Environmentally extended input-output tables and models for Europe.

It is important to analyze the overall environmental impact of GBMs as some models generate a negative environmental impact. For example, for shared products/services in the case of car sharing, there is an increased use of cars and therefore of pollution; if the logistics part to implement the shared product is highly emitting, it has a similar negative impact (FORA, 2010; Tukker and Tischner, 2004; EPA, 2009).

The Union of Concerned Scientists state alternative fuels' negative environmental impact includes:

- Wind power: land use, wildlife (e.g. birds), public health (sound and visual impact)
- Solar power: land use, water use of thermal electric plants, hazardous materials (e.g. chemicals to clean semiconductor surface), life cycle global warming emissions (manufacturing, material transportation, installation, maintenance, dismantlement)
- Geothermal energy: water quality (presence of sulfur and other minerals in hot water pumped from reservoirs), air emissions (sulfur dioxide released), land use
- Biomass for electricity because of pollution from combustion of feedstock to generate electricity
- Hydroelectric power: land use, impact on aquatic ecosystems, life-cycle global warming emissions

Here are other examples of environmental measurement and valuation:

Environmental Assessment (EA) is a process that ensures that the environmental considerations are taken into account before a project or program is approved. There are two directives under EA: Environmental Impact Assessment Directive (specific to individual project) and Strategic Environmental Assessment Directive (dedicated to public plans and programs). It most specifically concerns projects and programs likely to have an impact on

the environment. Consultation with the public is a key feature of environmental assessment procedures because it strengthens the process.

The overall goal is to provide a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation of projects, plans and programs with a view to reduce their environmental impact. Those that are co-financed by the EU (Cohesion, Agricultural and Fisheries Policies) have to comply with the EIA and SEA Directives to receive approval for financial assistance (source: European Commission website).

The **Organization Environmental Footprint (OEF)** is a multi-criteria measure of the environmental performance of an organization from a life cycle perspective. The final objective of OEF study is to reduce negative impacts on the environment throughout the supply chain activities (from extraction of raw materials, through production and use, to final waste management). Organizations include companies, public administrative entities, non-profit organizations and other bodies. OEFs are complementary to other instruments that focus on specific sites and thresholds.

Similar in goal is the **Product Environmental Footprint (PEF)**, a multi-criteria measure of the environmental performance of a good or service throughout its life cycle.

Both the PEF and the OEF provide a life cycle approach to quantifying environmental performance. Whereas the PEF method is specific to individual goods or services, the OEF method applies to organizational activities as a whole. OEF and PEF can therefore be viewed as complementary activities, each undertaken to support specific applications.

Other tools were developed to focus on a single subject of impact such as for example the Water assessment methods:

- Statistical water accounting on a macroeconomic level and as input-output analysis
- Water Footprint Assessment (WFA): a four-phase process that quantifies and maps green, blue and grey water footprints, assesses the sustainability, efficiency and equitability of water use and identifies which strategic actions should be prioritized in order to make a footprint sustainable (Water Footprint Network, 2011).
- Water-use assessment and impact assessment in the context of Life Cycle Assessment (LCA). The Life Cycle Assessment (LCA) mentioned earlier is here applied to assess impact on water (Jefferies et al., 2012).

3.3.2 Relationship between economic and ecological value

The literature often addresses questions about the way that value creation and economic benefits can be delivered along with sustainability outcomes. A few studies are considered here.

While measuring the environmental benefits of the eco-innovation cases, it was often discovered that the firm reduced internal costs or consumption of materials and that its customers procured products that were more energy and resource-efficient or that had a longer lifetime (Jing, Hao, and Jiang, Bao S., 2014). The challenge faced by GBMs is to create companies that may not be profitable in the short-term (just as any new product/technology because a market takes time to be created) but can generate high long-term productivity due to innovation. In order to expand, GBMs focus on the triple bottom line rather than short-term profits (Jing, Hao, and Jiang, Bao S. 2013).

Studies on Small and Medium-sized Enterprises (SMEs) in Germany, New Zealand and the U.K identified the following economic effects of environmental and social activities:

Direct drivers of economic value through environmental value

- Addressing climate risk can avoid tremendous costs: energy savings, the reduction of material flows (e.g., Jasch, 2008), cleaner production, reduction of technical, political, societal and market risks (e.g., Schaltegger and Wagner, 2006)
- Avoiding new legal constraints can lower adaptation costs when it's already too late

- Reputation and brand value (Marrewijk, 2003)
- Sales and profit margin (Porter and Van der Linder, 1995)

Indirect drivers of economic value through environmental value

- Attractiveness as an employer (Revell et al. 2010)
- Capability to innovate in creating new products and services (Cohen & Winn, 2007)

It should be noted that the cause-and-effect relationship between societal activities effect on a business is indirect. Events and actors that are not part of the market (e.g. political initiatives, NGOs) take part in this process by fostering the development and dissemination of sustainable products and services (Schaltegger and Luedecke, 2008, 2011).

The Triple Bottom Line Objective

Also referred as “3BL”, it implies for a business to make profit within environmental (e.g. addressing pollution risks, resource preservation) and social (e.g. well-being, culture, gender equality) constraints.

The initiator of the triple bottom line approach is John Elkington in 1994. It is an accounting method, which aims at measuring the performance of a business by going beyond traditional financial measures (e.g. profit, return on investment, etc.) by adding environmental and social dimensions. According to the author, the triple bottom line refers to people, planet, profit and is translated into the following metrics:

- Social: it means conducting beneficial and fair business practices to the labor, human capital, and to the community (Elkington, 1997) (e.g., fair wages, labor rights). Metrics include average hours of training per employee, average commute time, female labor force participation, charitable contribution, etc. (Slaper & Hall, 2011)
- Environment: the entity should have activities in line with sustainable development; one that doesn't harm the environment and does not compromise the ability of future generations to meet their needs (Brundtland report, 1987) (e.g. ensuring air quality, water and waste management, etc.) Metrics include electricity consumption, concentration of nitrogen, change in land use, etc. (Slaper & Hall, 2011)
- Economic: this variable refers to inflows and outflows of money. Metrics include amount of waste to landfill, safety incident rate, sale in dollar per kilowatt hours, etc. (Slaper & Hall, 2011)

Slaper and Hall (2011) conducted a review of this concept and conclude that although the Triple Bottom Line does not have a common unit of measure, the advantage it has is that it gives freedom to different types of organizations to apply the triple bottom line according to their entities: whether it is a business or a non-profit, a project or policy (e.g. infrastructure investment or educational programs) being set different types of geographic areas (city, region or country) (Slaper & Hall, 2011).

The challenges of this tool include measuring each of the three categories, finding applicable data and calculating a project or policy's contribution to sustainability (Slaper & Hall, 2011).

This chapter has examined some of the approaches described in the literature concerning the evaluation of business models both from practitioners and from investors perspective. It also looked at some of the more common methods to measure environmental impact. The next chapter focuses on the literature about enabling environments that help green business models flourish.

4. The Enabling Environment

4.1 Drivers and barriers

Summary: This chapter presents the main drivers and barriers that green entrepreneurs encounter in starting and developing a green business model. Here we cover conclusions from different papers concerning drivers and barriers, enabling and challenging factors for specific types of green business models, typologies of drivers for green market opportunities, insights on why some businesses don't invest in climate resilience.

4.1.1 Drivers of green business models

Most of the literature on the drivers that enable the development of new markets and opportunities for green business models and green entrepreneurship identifies three major categories: drivers arising from the policies, drivers arising from the market itself and enabling factors coming from the social and cultural environment.

Political and compliance-based factors.

Walley and Taylor's in their paper from 2002 about *typology of green entrepreneurs* have identified compliance-based factors as one of the main drivers for creating new, green market opportunities, emerging as an outcome of changes to government regulation and legislation requiring environmental improvement. According to the OECD (2013) report on green entrepreneurship, compliance-based drivers include: government regulation and standards for environmental improvement (e.g. disposal of electronic equipment) and the introduction of standards and certification (e.g. eco-labels, eco-logo).

Policies and regulations can be a key driver for green businesses, opening up new market opportunities for entrepreneurs, but they can also become a major barrier if they don't allow for competition or don't reinforce start-ups and innovation. Regulation concerning eco-innovation competition can open up new opportunities for green businesses. "The speed at which new, innovative industries develop can outpace the changes or evolution on regulation. If such rules may not be sufficiently up-to-date, new innovative firms may find that their business model is not compatible with existing regulations" (OECD, 2011).

The policy environment for green business could lead to new markets' development, but also to vulnerabilities, if not carefully designed. Hongtao Yi's paper called *Green businesses in a clean energy economy: Analyzing drivers of green business growth in U.S.*, regarding the business environment for the clean energy in the US, observes that policies that include the adoption and implementation of new standards and incentives result in a demand for renewables and energy efficiency. Green businesses use these opportunities, however, "these businesses often remain dependent on the incentives and there is a high risk to become bankrupt if the policies change."

In fact, as Hongtao Yi's report found out, „many green businesses are start-ups with urgent need for policy and investment support, and are potentially fragile when the political support for the new businesses fades away". For this reason, green businesses are more vulnerable to the influences from the larger political environment.

Market factors enabling green businesses

Market-driven factors, as defined by Walley and Taylor (2002), consist in new market opportunities emerging from the positive impact that more environmentally beneficial behaviour can bring to customers. Market-based drivers consist of opportunities that address the need for environmental or greener goods and services by market players, consumers or businesses. These needs can emerge as a result of changes in values and norms, but can also reflect changes in relative prices (e.g. the taxes on plastic shopping bags brought the opportunity for green bags). Market demand, the increasing awareness of customers about the benefits of eco-innovation concerning material and cost savings, are cited as a main

driver for green entrepreneur's businesses (e.g. green ICT solutions addressing the need to extend the life of ICT equipment and reduce energy consumption when storing documents).

Often, as OECD in its report *Green entrepreneurship, eco-innovation and SMEs* from 2013 also observed, the green entrepreneurs themselves become the creator of new markets and opportunities. The innovation they bring and their vision influences the potential customers in creating a new demand for products and services that don't yet exist. Sometimes, innovations are so radical that users don't expect them. In other cases, businesses involve users in the development of their products and services and identify new need and market niches through this collaboration.

However, as Hongtao Yi concluded, in the research regarding the US conditions for clean energy economy, labour market conditions are a very important factor, due to the fact that green businesses often require qualified human resources, with a very specific know how.

This is why labour market conditions, such as minimum wage laws, unionization activities and average educational attainment highly influence the cost and availability of workforce, being an enabling factor or a barrier.

Market opportunities and innovation can also result from business collaboration and research-industry linkages and interactive processes among different actors, like entrepreneurs, customers and suppliers, universities, researchers, government and financial institutions.

An important market driver for adopting a greener business model is scarcity and difficulty of acquiring resources. According to Nordic Innovation's report from 2012, in some cases, companies consider alternative resources for production due to the increasing costs of resources and supply risk, so they cut costs by reusing waste materials, designing recyclable products or creating take-back mechanisms for reuse.

Social and cultural factors

In the research Nordic Innovation conducted in 2012 with 41 green business cases, one of the main drivers for a company to introduce a green business model innovation is increased consumer awareness towards sustainability. Customers are increasingly expecting companies to provide sustainable goods and services, and decreased environmental impact adds to the value of the products and services. Being greener represents a competitive advantage compared to the traditional business models and it can counter growing competition. In the case of smaller and family-owned green businesses the value of „doing good” is also a driver.

Walley and Taylor (2002) define a specific category they call “*value-driven market opportunities*”. They are opening up in the face of demand due to changes in consumer preferences and tastes for more environmentally friendly products or services. Value-driven market opportunities emerge from social and environmental norms and attitudes, and the civil society and education have a key role in this process, resulting a green niche of consumers with a preference for environmentally superior products.

Social and political perception of clean energy products and services can directly affect the market share of green businesses compared with other sectors of the economy, and maintaining and strengthening related legislation is essential for green business development.

Hongtao Yi's research emphasizes the fact that, for renewable energy businesses to have a long term sustainable growth, the best strategy would be for these to work with each other in coalitions and coordinating collective actions among newly born green businesses.

A fourth factor: the entrepreneur

Identifying drivers behind the emergence of new market opportunities is an easier task than understanding the drivers behind the emergence of green entrepreneurs themselves (Beveridge and Guy, 2005). Green entrepreneurial values are a result of internal and external influences on the individual (Walley and Taylor, 2003), where external factors can

be regulations, economic and social incentives or environmental values of customers. Internal factors can involve family and friends, experiences, networks and education. For a green business to emerge, social values have to be supportive of sustainability, but its success will depend very much on the motivation of the entrepreneur.

4.1.2 Challenges and barriers for green business models

The *Green entrepreneurship, eco-innovation and SMEs report* from OECD (2013) finds a set of potential barriers in the emergence of green business models and green entrepreneurs, the most important being the challenge of market creation, financial barriers (on the demand and supply sides), skill shortage, maintenance patterns and lock-ins and regulatory hurdles.

Market and technological challenges and barriers

The difficulties in market creation and end-user demand stems from the challenge of creating a market for products and services that are entirely new and from lack of awareness of consumers about the benefits of the product/service. „Lack of demand for a product or technology leads to a situation where eco-innovations and prototypes reside in a „valley of death” between the invention and the commercialisation” (OECD, 2011). Generating initial demand for a new product is a key element, even in the form of small but growing niche customer group, so the business can become rapidly more profitable.

Building a green business model often requires large investments and, according to Nordic Innovation (2012), “the large costs of new equipment and machinery, new materials can be also a barrier. Recycling and reusing materials involve costly infrastructure. Nordic Innovation suggest the idea of creating partnerships as a possible solution to these barriers, in the same time observing that “it seems that, for the companies, this is a challenge to initiate on their own.”

Challenges related to financing and risks

Access to finance is one of the main barriers for green businesses to develop. The relative immaturity of the eco-innovation market, problems in accurately pricing the risk of investment, mismatch with the typical investment criteria used by venture capital and institutional investors, can represent obstacles. Financial barriers are a problem especially for start-ups having limited track record and limited funding available.

When the market creation adds to the challenge of attracting capital investment, SMEs are facing barriers in attracting sufficient finance to bring their product on the market (Linnanen, 2002). Green businesses have difficulty in finding investors who share their environmental objectives and values and also have knowledge about the green market. Investors may see green businesses to be subject to additional financial burdens and less likely to grow and provide an adequate financial return on their investment (Cohen, 2006). Investors can have difficulties in finding green businesses ran by entrepreneurs that possess the skills to understand the realities of financial markets.

On the other hand, one of the barriers is the information gap. According to the 2011 report *“Adapting for a Green Economy: Companies, Communities and Climate Change”* by the UN Global Compact, UNEP, Oxfam and WRI, many businesses “are just beginning to understand what climate change means for them, much less what it means for the communities linked to their operations and supply chains”. There is also a lack of information regarding the payoff of investing in climate change adaptation and an increased risk concerning the potential for return on investment.

When it comes to adaptation, risk and uncertainty is involved in departure from business as usual and the process of trying new business models. A related barrier is that the benefits of such investments may not be visible on the short term and it can take up to 20 or 30 years to see the results.

Securing financing for adaptation investment that have a longer return horizon it can be a challenge for companies for the financing environment also needs to change the criteria for

loans and investments over the long term. Another challenge is encouraging private sector adaptation investments for sustainable development (e.g. healthy watershed, storm-resilient coastline) where much of the benefit might go to the community or other actors. “Companies do not yet have the tools to calculate the direct benefit they receive from operating in a more resilient community”.

Knowledge barriers and lock-ins

The Nordic Innovation report from 2012 identifies an important barrier in the employees’ lack of skills and knowledge about green alternatives, in the lack of marketing and sales skills of how to sell a sustainable product, and in the lack of suppliers’ to understand the new green business model.

Limited management and technological skills can reflect in a shortage of skills, of qualified human resources in possession of „green skills” and lack of management skills for running a business. The Confederation of British Industry identifies skills gaps affecting the supply of technical specialists, designers, engineers and electricians, “as well as appropriately trained sales staff in the retail sector and project managers specialising in delivering a range of mitigation and adaptation solutions” (CBI, 2007). Green entrepreneurs may lack themselves the necessary managerial skills to successfully run a green business and the strong commitment to environmental values may impede their ability to make difficult but necessary compromises found in other areas of the business, like hiring and employee retention (Linnanen, 2002; Beveridge and Guy, 2005).

An important challenge for each company trying to adopt a greener business model is the fact that, despite expectations regarding sustainability, many customers still don’t know what sustainability is, according to the Nordic Research paper.

For green businesses overcoming „maintenance patterns” that cause resistance, it can be challenging. These patterns are characterised by an inability to imagine beyond that which is already perceived and lead therefore to a strict adherence to the usual way of doing things (Linnanen, 2002; Beveridge and Guy, 2005). Green entrepreneurs have to overcome the transition failures and „lock-in” effects of existing technologies, must break these patterns and replace them with their new products and services, markets, jobs and solutions.

Regulatory hurdles

According to the report “*Adapting for a Green Economy: Companies, Communities and Climate Change*”, without supportive policy and regulations private sector adaptation is difficult. Private investment in adaptation can be limited by delays in licensing and registration, weak contract enforcement, lacks of dispute resolution services and unclear regulations.

Problems may arise if regulations do not support the implementation of green projects or if the multiplication of successful initiatives is impeded by differing regulations across regions. Regulation can shift the focus of companies towards sustainability and facilitate the greening process of businesses by creating a supportive enabling environment for green businesses to emerge and grow. Policies have a major role in allocating natural resources in a sustainable manner and ensuring access to these resources for end-users. Incentives also have a significant contribution to encouraging companies in becoming considerate of their environmental impact.

4.1.3 Drivers and barriers for different business models

In the study conducted by FORA (2010) regarding green business models in the Nordic Region, different types of drivers and barriers have been identified for specific green business models:

Type of GBM	Drivers	Barriers
Functional Sales	Economic and environmental benefits, regulation and branding value in saving energy	Customer's traditional mindset, lack of market demand for functional sales solutions, lack of knowledge of benefits and life-cycle costs and tax regulation
Energy Saving Companies (ESCOs)	Earnings, increased education and information of consumers and financial institutions, potential market size, regulation and public demand, regulation to save energy and reduce CO2 emissions and rising energy prices	Lack of regulation and government support for energy renovations, lack of knowledge among customers, consultants and financial institutions about economic benefits of ESCO projects, customer's lack of trust to supplier and reluctance to commit to long term contracts, lack of capital for initial investments and for smaller projects and competition for scarce capital with more traditional investments
Chemical Management Systems (CMS)	Regulation, consolidation of the market and enhanced customer loyalty, more value from human resources: expertise and know-how, capture added value from customers, better environmental performance and partnership for innovation between customers and chemical suppliers	General lack of customer knowledge about the business model and life-cycle costs, lack of good reference cases, contracting CMS is more complicated than selling/buying products, dependency from long-term contracts making it difficult for customers to switch to other suppliers, extra supplier investment for equipment, infrastructure and labour
Design, Build, Finance, Operate (DBFO)	Long term earnings and profits and the promising financial asset that is attractive to invest in after project delivery	Lack of insight into environmental impacts, lack of evaluations that document benefits, uncertainties concerning the calculation of risk among customers, loss of flexibility due to long-term contracts, weak regulatory frameworks and lack of political commitment and support
Sharing Businesses	Earnings, regulation, tax exemption, positive environmental effects, branding and reputation	Financing, regulation, unclear taxation for the income generated by sharing of private products, not understanding the economic advantages of sharing, unwillingness to share by customers
Cradle 2 Cradle	Innovation and business development, reduced production costs through resource efficiency and reduced waste management costs, greener image, fewer restrictions on location due to reduced environmental impact and no resource scarcity and safety issues	Increased development and production cost, increased scrutinising from customers and NGOs, lack of competencies in research and development, lack of reference cases and customer insecurity

Industrial Symbiosis	Reduced costs on the input side, access to raw materials, energy and water, reduced waste-management costs and lower environmental taxes and costs, can be used as a marketing platform	Large costs with investment in materials and energy infrastructure systems, it is not a flexible system, puts a great demand on trust among different actors
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Table 7: Drivers and barriers for specific green business models (from FORA, 2010)

4.2 Policy implications and regulation

Summary: A number of recommended policy and regulatory solutions are reviewed in this chapter. Some of the steps for building a foundation for private sector investment and action covered here involve policy long-term commitment, public funds and planning, involving businesses as stakeholders in participatory consultations, financial and risk reduction incentives, clear and coherent regulatory frameworks, eco-labels and certification, sharing good practices and education programs.

Policy and regulation are key to building an enabling environment for green businesses to emerge and develop. A common understanding at international level of government actions that build a favourable ecosystem for green businesses can lead to a significant positive environmental impact on the long term. There are several reports on policy and regulations that efficiently summarize the measures governments can take in order to create an enabling environment for green businesses.

4.2.1 UN GLOBAL COMPACT (2011) - Adapting for a Green Economy: Companies, Communities and Climate Change

In order to catalyse private sector adaptation, policymakers will need to adopt measures to build a foundation for private sector investments and action, align public and private adaptation interests and promote best practices and collaboration.

Building a foundation for private sector investments and action

Demonstrating long-term commitment through climate change legislation, budget allocations for adaptation, creating climate change commissions or bodies and formulating and implementing climate change action plans. Generating and allocating public funding and planning for adaptation at all levels should also be a priority. A key point is to engage businesses as stakeholders in planning and implementation and to become included in participatory consultation processes as key partners.

Tapping into the private sector expertise in plans and projects for building climate resilience is an important consideration. Businesses can significantly contribute with data and information on risks, exposure and adaptation solutions and advice on policy and regulatory frameworks.

Aligning public and private adaptation interests

Stimulating the market for adaptation through financial and risk reduction incentives. This can be achieved by recognizing and addressing market failures in building climate resilience and using appropriate policy tools to fit country contexts and business sector needs (e.g. incentives, tax credits, green bonds, grants and subsidies, seed capital, innovation competitions, pricing guarantees). The criteria for the types of green businesses and projects targeted for public support have to be carefully considered. Regulatory frameworks should be

clear and coherent so companies play all by the same rules and know what is expected of them, thus reducing the risk and uncertainty and business decision-making that promotes the public good can be encouraged through incentives.

Best practices and collaboration

Providing businesses with the information and tools they need to make investments that support climate resilience in vulnerable communities. Climate risk information and awareness raising should be considered a public good. Government can generate, aggregate and disseminate climate change information to the private sector, including financing options available and offer support for analysis on the costs and benefits options of climate change adaptation.

For the process of social learning to occur, it is required to inform businesses about what works and what doesn't and provide real evidence that adaptation can be a viable commercial investment. Building private sector capacity to engage and act can be reached through trainings, extension services, web-based resources, climate risk assessment and adaptation planning tools, and other resources, also successful models can be replicated.

New forms of public-private partnerships should be considered, for enhanced adaptation to climate change requires collaborative action. These partnerships can combine the power, authority and accountability of the public sector, with the finance, managerial efficiency and entrepreneurial abilities of the private sector and the voice, energy, drive and oversight responsibilities of civil society organizations.

4.2.2 OECD (2011) - Green Growth Strategy

Green transitions require a globally agreed framework of policies and regulations, but they should be flexible enough to change across countries, adapting to local environmental and economic conditions, institutional settings and stages of development. In order to create an enabling environment for green businesses action is needed in the following policy areas:

- i. **Supportive framework conditions** for eco-innovation and commercialization so that new business ventures can occur.

A supportive framework for the emergence and development of green entrepreneurs can be ensured by adopting sound macroeconomic policy, competition, openness to international trade and investment, adequate and effective protection and enforcement of intellectual property rights, efficient tax and financial systems. Lowering the barriers to investment for start-ups is needed, but also lowering the barriers to exit for investors and entrepreneurs.

- ii. **Measures that address market or systemic failures** that generate barriers to investment and limit returns from green businesses, by reducing their competitiveness against established alternatives.

New market opportunities for green businesses could be supported by creating property right regimes for public goods, by limiting overuse of natural resources, pricing the negative environmental externalities into the market through taxes, fees, trade schemes, tradable permits etc. Regulations based on outcomes (e.g. energy efficiency) rather than pre-defined technical solutions, introduction of standards and certifications for environmental products and services and ensuring competition in markets through effective anti-trust laws can also contribute to increased market opportunities.

- iii. **Policies to ease access to financial, human and knowledge resources** by green entrepreneurs

Innovative finance instruments should be promoted, which take into account the long-term horizon of eco-investments and the integration of environmental objectives into green businesses. Angel investors can be encouraged through fiscal or tax incentives, enabling tax legislation or loan enhancements. Trainings for investors can help improve understanding of the green opportunities and reduce their doubts with regard to investing in green businesses. Facilitating participation by green entrepreneurs to knowledge

networks, easing and supporting the creation of linkages with research players by funding collaborative projects, mentoring schemes, green clusters and green incubators.

Access to human resources and know-how for green entrepreneurs involves strengthening the technical skills and knowledge base by integrating relevant disciplines into curricula at higher education level as well as in vocational training tracks for traditional trades. Educational programmes should be developed to address the skill gap and strengthen the capacity to gather and manage resources of environmentally oriented entrepreneurs.

- iv. Direct measures to kick-start green markets or generate incentives to experiment market solutions to environmental problems (government as ‘market catalyst’)

A very powerful driver for green entrepreneurs is the creation/strengthening of green markets. Government can act as a “catalyst” for the initial demand and also government demand can work for demonstration to the market and build visibility and reputation for new green products or services. Public procurement is a helpful instrument, but the process should be transparent and competitive and the application procedure should be simplified. Mainstreaming of environmental issues into education is needed, and supporting awareness campaigns on environmental matters. Certification can also contribute to bridging the information gap and giving visibility to new green solutions.

5. Sources of Finance for Green Business Models

Summary: This chapter reviews the literature that describes the different financing schemes suitable for green business models. These include Self Financing, Microfinance Institutions, Peer to Peer Lending, Family Offices and Business Angels, Venture Capital and Private Equity firms, Conventional Banks, Investment Banks, public and private Green banks and national and sub-national initiatives. It covers the different types of assets available to all investors in GBMs: equity, quasi-debt, profit share, debt, loan guarantees, demand dividend and green bonds. Also opportunities offered by non-refundable grants, public charities, private foundations and crowdfunding are presented here.

Various types of financing are suitable to green entrepreneurs. Each financing actor intervenes at a certain stage of the company's development according to their own strategy and constrains. Overall, investors tend to be more comfortable with investing in growth stage companies for all the benefits this brings (efficiency of the business model and therefore of profits, growing company valuation, etc.) The following table illustrates the diversity of types of financing actors per company maturity stages:

Seed	Young	Growing	Mature
			Stock market Institutional Investors
		Private Equity Venture Capital	
		Banks	
	Corporates (e.g. competitions, corporate venturing)		
	Angel investors, Family Offices		
	General public (crowdfunding)		
Government			
Own capital, Family & Friends			

Table 8: The role of venture capital and emerging roles of other actors in growing businesses (Adapted from Marcus et al., 2013)

According to the literature, the sources of finance for a GBM fall under one of the following categories.

5.1 Self-financing

Capital raised (debt or equity) within personal and professional networks is traditionally the first means available to green entrepreneurs. These funds help entrepreneurs elaborate their business model, purchase materials, build their marketing strategy, make capital investments, etc. It also helps them to prepare for future presentations to lenders. During this phase, the entrepreneurs seeks visibility for his/her project and reaches to the broader range of own contacts; social media and Internet websites contribute to spreading the word (Green For All, 2010).

5.2 Microfinance Institutions (MFIs)

They provide financing to borrowers who cannot get a loan from a traditional bank. Micro-lending is targeted toward businesses requiring less than \$35,000 start-up capital and with five or fewer employees (Green For All, 2010). Interest rates can be higher than in traditional banks but the loan is easier to obtain. There are MFIs specialized in environmental and social projects. Microfinance private investment totaled \$10 billion in 2014 (ResponsAbility, 2015).

5.3 Peer-to-peer lending

Peer-to-peer lending is a recently emerging way of financing green business. It connects entrepreneurs with individual lenders who perceive an interest on committed capital. These funding systems can come from social networks who attract people with a common interest and where green projects are promoted. Peer-to-peer loans are more flexible in assessing solvability than bank loans (Glenn Croston, 75 Green Businesses you can start to make money and make a difference, 2008).

5.4 Family offices

Family offices are private wealth management advisory firms that serve ultra-high net worth families. In contrast to traditional wealth management firms, family offices provide a complete suite of financial and investment services for the family. These can include tax planning, budgeting, insurance, charitable giving and philanthropy, property management, family-owned business advisory and wealth transfer services. Moreover, family offices may handle non-financial issues including travel, private schooling and other household arrangements. Family offices are each structured differently from one another due to the particular needs of the families they serve.

There are multiple reasons family offices and other investors choose to practice sustainable, responsible and impact investing: the families' values, financial motivations (performance return and risk mitigation), diversification opportunity, and the positive influence of peers. In addition, the growing availability and variety of Socially Responsible Investment (SRI) investment options across asset classes encourages families to explore investing for impact (USSIF Foundation, 2016). Family offices are more flexible in the way they invest than other investors (such as for example institutional investors) thus they can engage more easily in the expanded investment options available in sustainable investments.

The positive impact of environmental and social considerations on a portfolio translated in better financial return than conventional investments is becoming widely spread among the investment community. A meta-study published in 2014 and originated by Oxford University and Arabesque Partners (an ESG asset management company) showed that "80 percent of the reviewed studies demonstrate that prudent sustainability practices have a positive influence on investment performance." Similar papers were initiated by Deutsche Asset & Wealth Management and Hamburg University (2015), Harvard Business School (2015), Morgan Stanley (2015), etc. These contribute to the promotion of this idea in the finance world.

For more detail on the performance of sustainable and responsible investment and impact investment, see the corresponding sections of chapters 9.4 and 9.5 of part 2.

5.5 Business Angels, Venture Capital and Private Equity firms

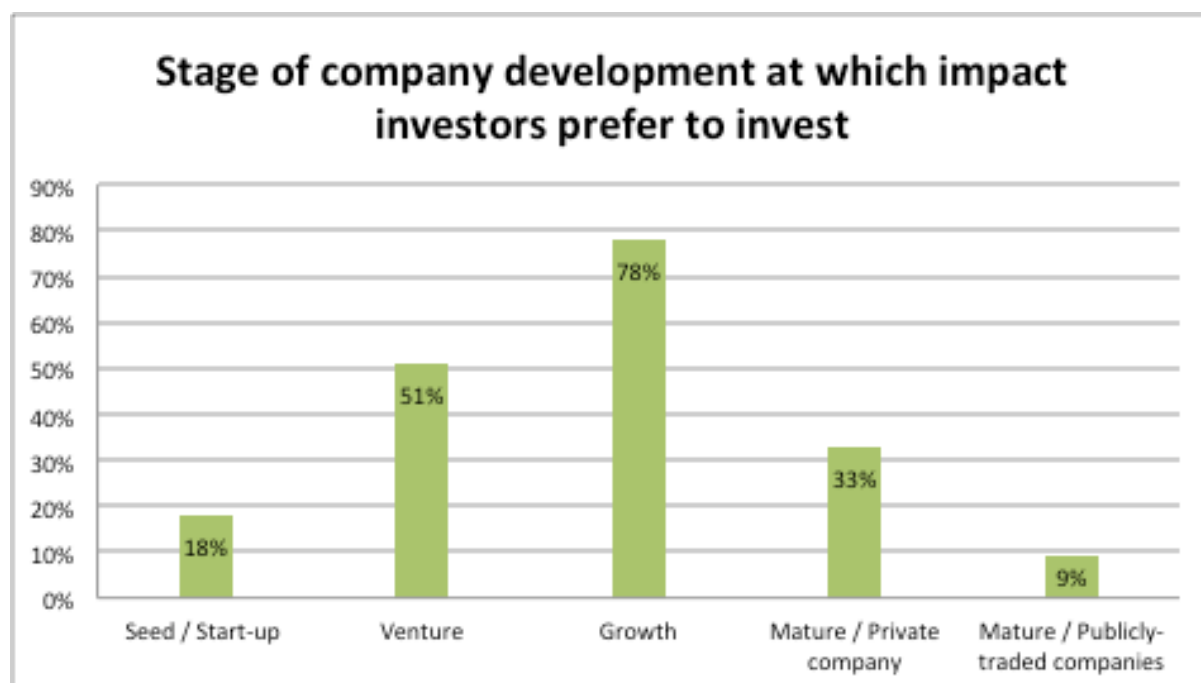
Business angels are private investors who invest in unquoted small and medium sized businesses. They are often businessmen and women who have sold their business. They provide not only finance but experience and business skills. Business Angels invest in the early stage of business development filling, in part, the equity gap (UK Business Angels Association, website). For example, the Green Angel Syndicate, (GAS) is U.K.'s first business angels' syndicate making investments in energy, water and the green economy in the U.K. They manage both individual and joint investments (Green Angel Syndicate website).

Venture Capital (VC) intervenes after the seed phase. VC firms are particularly close to the project they invest in: they have a say about the management team and can take decisions regarding the company. VC plays a role in the development of a start-up company (Hellmann and Puri, 2000). Green businesses are increasingly gaining the interest of VC firms, especially energy-related companies. Many traditional venture capital firms now have dedicated funds and staff that focus on one or more aspects of environmental or social responsibility. In addition, some VC firms (sometimes known as "social venture capital firms") explicitly incorporate additional investment criteria, such as social or environmental benefits, in their mission and investing activities.

The majority of private equity investments are in unquoted companies. Private equity investment is typically a transformational, value-added, active investment strategy. Private equity intervenes once the company has reached the growth stage (Toniic, 2013).

Figure 3: Stage of company development at which impact investors prefer to invest (J.P Morgan & GIIN, 2013)

N.B: This piece of information is the result of a survey conducted on investors that dedicated a total of USD 8 billion in 2012 (refer to "Perspective on Progress, J.P Morgan and GIIN, 2013).



5.6 Banks: conventional banks, investment banks, public & private Green banks

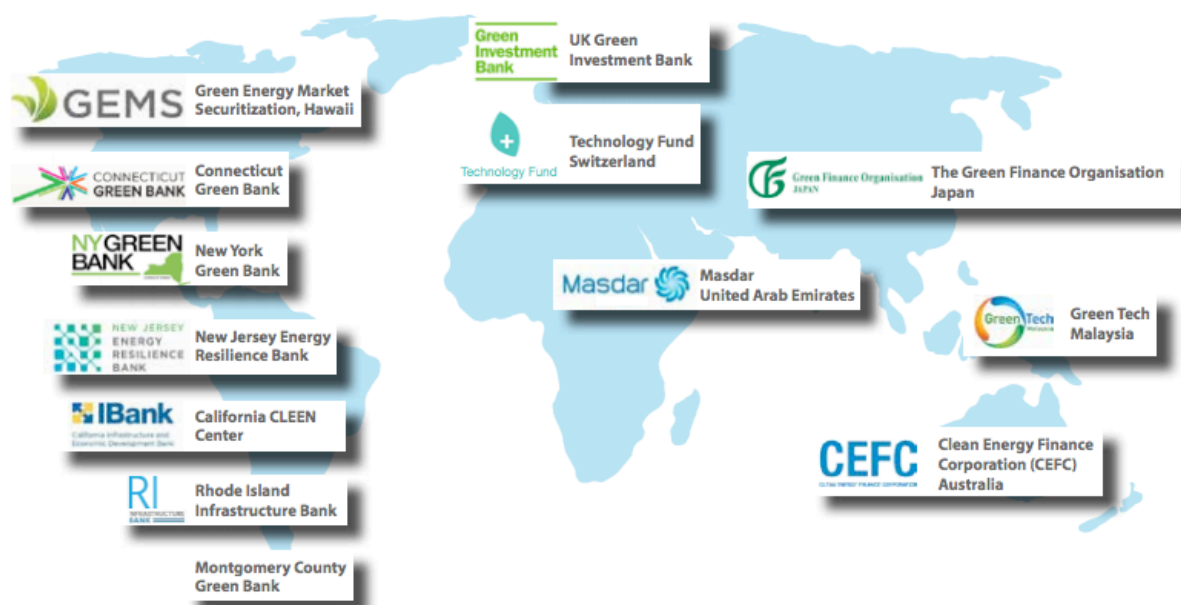
Using debt as a financing instrument depends on the ability of the company to generate strong cash flows. Will the company be able to expand the business by meeting its daily needs while repaying its debt (solvency and liquidity). The interest rate depends on the risk on the business. Debt will be more suitable for a business that has already reached the growth stage.

Only few **commercial banks** currently have the knowledge and experience with green projects, which leaves a large gap in the financing of GBMs. The high risk of failure deters bank from financing green ventures (European Private Equity and Venture Capital Association, 2007). Risk of business model execution and management risk are also a reason why traditional banks avoid funding GBMs (J.P Morgan, 2014). Mechanisms that carefully allocate risks to those best placed to manage them can help attract financing from domestic banks and other financial institutions.

Green Private Banks have emerged in response to the increasing need of green funding, that traditional banks cannot satisfy. They are banks providing banking services (especially credit) to enterprises and individuals of the real economy. Their considerations include sustainability, energy-efficiency and the social impact of companies. Because environmental issues are their core business, they understand the potential of green businesses and their challenges, all while running a profitable bank operation (Global Alliance for Banking on Values, 2015). Triodos, established in the 1980s, solely invests in nature, health, well-being and culture related projects and is a good example of a flourishing Green Private Bank (Triodos Bank website). The Global Alliance for Banking on Values is a network established in gathering 28 Green Private Banks gathering \$100 billion in total AuM, operating across Asia, Africa, Latin America, North America and Europe. Triodos (Europe) is part of it, among other like Alternative Bank Switzerland and Cr dit Coop ratif (France).

Recently, **Green Investment Banks (GIBs)** emerged as a way to finance climate change related businesses. GIBs are “domestically-focused public institutions that use limited public capital to leverage or crowd-in private capital, including from institutional investors” (OECD, 2015). A number of these banks were created to boost investment in low climate resilient infrastructure among cities; governments aware of the future policy shift towards green economies anticipated by setting up these structures. As of end of 2015, 13 national and sub-national governments have created GIBs (OECD, 2015) as reflected in the following table:

Figure 4: Green Investment Banks (OECD, 2015)



GIBs measure and track their performance: emissions saved, job creation, private investment mobilized per unit of GIB public spending, rate of return. GIBs offer loans, bonds and equity financing instruments to their clients. They rarely invest in early-stage / seed projects but some are gaining interest in innovative technologies such as offshore wind energy.

The purpose of GIBs is to attract private investors, and they do so by offering risk mitigation, including for example (OECD, 2015):

- Loan loss reserves: capital set aside to cover potential losses in case of default
- Guarantees on debt
- Insurance against construction, operational or market risks
- Debt subordination by giving the right to certain private investors to have priority to claims on assets and cash flows

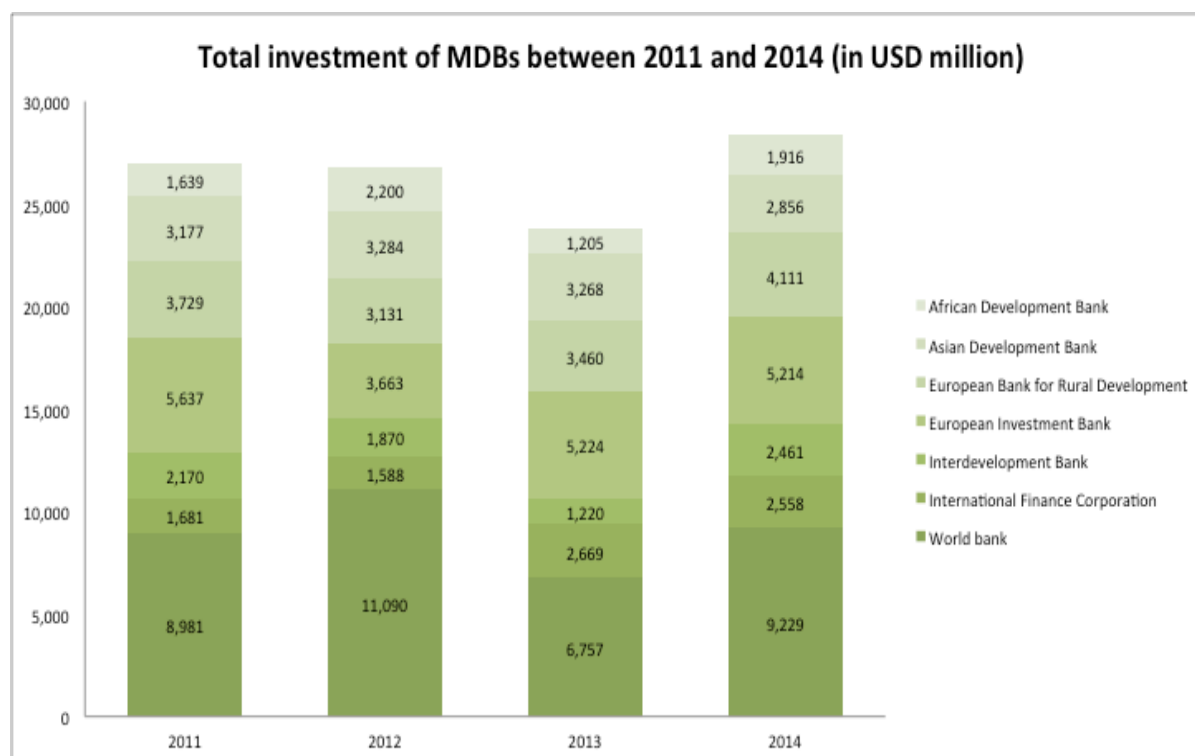
- Investors that lack knowledge in a certain field can co-invest with investors that are experts of the field.

5.7 National and sub-national initiatives

There are flourishing funding initiatives that have emerged from national and sub-national institutions in recent years.

Multilateral Development Banks (MDBs) involved in financing green projects include the European Bank, the World Bank, the European Investment Bank, the European Bank for Rural Development, the African Development Bank, the Asian Development Bank and Inter-American Development Bank. A report released by the World Bank in 2014 explains they target climate risk related projects including renewable energy generation, energy efficiency, agriculture, forestry, land use, waste management and transport (the same source applies for this section dedicated to MDBs). Their terms are more favorable and over a longer term compared with commercial banks which makes them competitive in green finance, in particular in developing countries

Figure 5: Total investment of MDBs between 2011 and 2014 (World Bank, 2014)



MDBs reported that 83% of total climate finance in 2014 was committed through loans, 9% through grants, 5% through guarantees, 2% through equity, and 1% through other instruments (e.g. purchase agreements for carbon finance projects).

Different countries are getting involved in funding projects that are environmentally friendly. In the Horizon 2020, European countries take a stand in promoting climate oriented projects. Examples include kWf Development Bank, the International Climate Initiative and the FMO Entrepreneurial Development Bank.

Founded in 1948 by the German government, KfW supports climate-related projects in developing and emerging countries by providing funds over long periods with a mix of grants, participations and low-interest loans. There is also a variety of special programs and funds available that offer conventional funding and support to innovative or broad approaches to reach SMEs as well as private households. In total, KfW dedicated 4.7 billion EUR (64 %) of the 2014 commitments to climate and environmental protection.

IKI (International Climate Initiative) was created in 2008 by the German government. The Initiative places clear emphasis on climate change mitigation, adaption to the impacts of climate change and the protection of biological diversity. IKI invests in GHG emissions mitigation, climate change impacts adaptation, emission reductions from deforestation and forest degradation, biological diversity preservation.

The FMO Entrepreneurial Development Bank is a Dutch initiative that applies ESG criteria to investments with the ambition to double impact and halve footprint by 2020. In doing so, FMO plans on focusing more on green and inclusive investments in its portfolio.

Development entities can also invest in funds dedicated to environmental issues. These funds provide what is called “concessional financing” (loans that are less constraining than traditional loans: longer grace periods and lower interest rates, OECD definition created in 2003). Examples include the Climate Investment Funds, the Global Environment facility and the Green Climate Fund, which are introduced below.

The Climate Investment Funds (World Bank Group) is a \$8.3 billion group of funds created in 2008 and operating in 72 countries, focused on climate risk related projects with four different funds dedicated to clean-techs, forest investment, climate resilience and energy efficiency. CIF contributes to innovation because it's able to test new business models, build track records and helps green entrepreneurs get financed by multilateral development banks and the private sector.

The Global Environment Facility was created around the 1992 Rio Earth Summit and since then has provided \$14.5 billion in grants and mobilized \$75.4 billion in additional financing for almost 4,000 projects. The GEF has become an international partnership of 183 countries, international institutions, civil society organizations, and private sector to address global environmental issues.

The Green Climate Fund is dedicated to funding climate change projects. The fund's objectives are the following:

- Transforming energy generation and access
- Creating climate-compatible cities
- Encouraging low-emission and climate-resilient agriculture
- Scaling up finance for forests and climate change
- Enhancing resilience in Small Island Developing States

To date, the fund raised \$10.2 billion (equivalent in pledges) from 42 state governments and \$17.1 million (equivalent in pledges) from 3 regional governments.

5.8 Investors

Different types of assets are available to investors in GBMs according to Toniic (2013) and Green For All (2010):

5.8.1 Equity

It's the most appropriate investment tool for seed / early-stage GBMs because at this stage cash flows are uncertain. Equity investment gives more incentive to the investor as owner in the company and it grants access to the company's management (i.e. board or observer seat). An investor that commits equity into a GBM will have identified a high potential of growth and an exit strategy.

5.8.2 Quasi-debt / quasi-equity

Also referred to as convertible debt, mezzanine financing/subordinated debt, they are a mix of debt and equity. It gives the lender rights to convert outstanding debt into equity which is frequently used by SMEs. The lender benefits from gains through capital appreciation and interests on debt repayment.

The particularity of this financial product is that the relationship between the lender and the lendee is more reliable to a partnership as they share risks and rewards of the projects because they both own the business. It's a solution for cases where equity financing is not possible and where the revenue model does not fit debt products requirements. It constitutes a more reliable way of entering the under-served market of mid-sized companies. The Global Climate Partnership Fund is an example of entity providing this type of financing mechanism for climate change mitigation projects.

In practice, quasi-equity is implemented through the sale and purchase of a Revenue Participation Right. This provides the investor with the right to a percentage share in the revenue of the enterprise. The amount payable under the RPA is usually capped (at twice the amount invested and/or limited to a fixed time period). The amount repaid is proportionate to the revenue, so can decrease.

5.8.3 Revenue share

It is usually structured as an investment where financial return is calculated as a percentage of the project's future revenues. It is useful when debt financing is too expensive or doesn't suit the stage of the business, or when equity is not a solution because of the legal structure of the business. Revenue share is dependent on the financial performance of the business.

5.8.4 Profit share

This financing scheme is similar in nature to revenue share but the investment specifies payments to the lender out of bottom line profits instead of top line revenues. The risk lies on the investor in terms of assuring a significant return.

5.8.5 Loan guarantees (given by foundations / charities)

They can help a hesitating investor to finally invest in a business because it mitigates the potential loss they could suffer (Toniic, 2013). Foundations and charities are traditional providers of loan guarantees that help unlock capital. Guarantees can take the form of either a loss tranche in a layered deal, or as a generic letter of credit for the entrepreneur for a certain amount of time, to give them flexibility and reduce their risk as they find other investors, scale a supply chain, etc.

5.8.6 Demand dividend

Demand dividend is a flexible investment vehicle, where terms can be adjusted to fit the enterprise business model and the investor's investment objectives (Toniic, 2013). It matches payments to cash flow, has a grace period to enable capital raised to be fully used in expanding the business, returns a multiple of the investment as a fixed payoff amount, and aligns incentives with term sheet covenants and a financial plan focused on cash. This structure is useful, for example, for investors investing in community-based initiatives for which an equity exit is not appropriate, but the ability to share in the profit is warranted.

5.8.7 Green bonds

A green bond is a fixed-income financial instrument with the aim to raise capital for positive environmental or climate benefits through the debt capital markets. Similarly to traditional bonds, green bonds can be issued by a corporate, bank or government entity.

The issuer raises a fixed amount of capital from investors needed for its green project. There is a set period of time for the bond with a set amount of interest (coupons) paid during the course of the bond and the principal is repaid when the bond matures. The advantage of this type of instrument is the reduction of capital costs of green investments and it helps closing the financing gap. Institutional investors are often seen as natural buyers of green bonds, given their appetite for investment in low-risk, fixed-income products with long-term maturities that match their long-term liabilities (KPMG, 2015).

This instrument is available to companies on the financial markets and therefore only suitable for a small number of SMEs.

Focus on Impact Investment and Institutional investors

Institutional investors are organizations that pool funds from individual investors with the mission to invest those funds on behalf of their clients. Banks, investment funds, insurance companies, pensions funds, mutual funds and hedge funds (OECD, 2009). They invest in currency and deposits, securities, loans, shares and other equities, other financial assets, and non-financial assets. (OECD Statistics, 2016). Institutional investors play a major role in financial markets: according to Grahl and Lysandrou (2006), they account for close to 80% of total trading volumes and their influence is growing (OECD, 2013).

Integrated Environmental, Social and Governance criteria in their asset allocation strategy are now mainstream for Institutional Investors (OECD, 2013). Therefore, their interest regarding Socially Responsible Investment (SRI) has been booming. Impact investment is a part of SRI. It relates to “investments made into companies, organizations, and funds with the intention to generate social and environmental impact alongside a financial return” according to the Global Impact Investing Network GIIN.

It is a growing investment approach that tackles challenges like sustainable agriculture, clean technology, microfinance, affordable and accessible basic services including housing, health-care and education.

The key barriers institutional investors face in converting their investment to climate resilient assets according to a recent study by Columbia University (2014) are:

- Industry awareness and education
- Uncertainties on future policies and the lack of a regulatory framework
- Lack of investment vehicles
- Insufficient quantity and quality of available data and measurements of climate impacts

This type of investors prefers liquid assets (Dvetanovic, 2006) because they are liable to their clients (e.g. a pensions fund must pay its clients their retirement benefits every year). Indeed, SMEs do not match their constraints. In order to change this trend, policy makers must improve visibility on environmental policies for green asset classes. Also, ESG impact measurement tools need to be standardized to help institutional investors engage in impact investment with more visibility.

For these investors to commit capital to SMEs, risk mitigation tools must be developed such as those offered by Green Investment Banks. Another similar initiative was made by the Global Environment Facility, which funded the Climate Aggregation Platform (CAP) in 2016. Its aim is to foster a standardized and low carbon energy assets in the developing world and also to initiate low-costs financing sources for these assets by getting on board diverse investors, including institutional ones (UNDP, 2015).

5.9 Non-refundable grants in Europe

Green growth and green business development is becoming a priority for policy makers and this is also reflected by the financing programmes of different institutions, governments and foundations.

5.9.1 EU funding

Several of the current non-refundable grant programmes of the EU include priorities for supporting green business development and eco-innovation. In the Europe 2020 Strategy the EU sets ambitious objectives for climate action and energy efficiency. The Small Business

Act and Green Action Plan provide SME-oriented actions proposed at European level in order to help SMEs exploit the business opportunities that the transition to a green economy offers and these are also integrated in some of the financing schemes of the EU.

With the goal to promote eco-innovation, including non-technological innovation, the SME instrument under Horizon 2020 aims to help SMEs explore the scientific or technical feasibility and the commercial potential of highly eco-innovative ideas in order to develop new businesses. SMEs can apply for funding for support under specific calls focusing on eco-innovation and supply of raw materials, eco-innovative food production and processing, and innovation in a low carbon and efficient energy system. Actions under the societal challenge “Climate Action, Environment, Resource Efficiency and Raw Materials” are supporting resource efficiency through a systemic approach towards eco-innovation and the setting up of a circular economy addressing activities like research and demonstration, market uptake, coordination and networking.

The **European Regional Development Fund (ERDF)**, the **European Agricultural Fund for Rural Development (EAFRD)** and the **European Maritime and Fisheries Fund (EMFF)** for the period 2014-2020 support SME competitiveness, targeting energy efficiency and use of renewable energy sources as investment priorities to be pursued by Member States and regions through their operational programmes.

The ERDF focuses on the following key priority areas: innovation and research, support for SMEs, low carbon economy and digital agenda. The most relevant priority for green businesses according to the programme regulation is “supporting industrial transition towards a resource-efficient economy, promoting green-growth, eco-innovation and environmental performance management in the public and private sectors”. The programme priorities can reflect differently in each regional operational programmes of the Member States.

The **Environmental Technology Verification (ETV)** is an EU pilot programme under which, claims about innovative environmental technologies can be verified – if the 'owner' of the technology so wishes – by qualified third parties called 'Verification Bodies'. The 'Statement of Verification' delivered at the end of the ETV process can be used as evidence that the claims made about the innovation are both credible and scientifically sound. The EU Environmental Technology Verification pilot programme is trying out ETV on a large scale with volunteer organizations and Member States.

New business models for resource and energy efficiency in SMEs are supported through the LIFE programme. The programme also promotes the take-up of the circular business models and showcases their benefits for SMEs.

In order to better exploit the role of clusters in support of eco-innovative SMEs, the **Cluster Excellence Programme (COSME 2014-2020)** resource efficiency has become a specific topic in the trainings in order to further boost eco-innovation and resource-efficiency within and between SME members of clusters.

Even though there are significant efforts being made by the EU for promoting eco-innovation and green entrepreneurship most of the financing schemes involve only partially or indirectly the development of green businesses. The focus of these is rather on introducing eco-innovation into already existing SMEs and promoting resource-efficiency, however acquiring initial funding for green start-ups is not the goal of these grant programmes.

5.9.2 Philanthropy: public charities and private foundations

(source: Kasper and Marcoux, Stanford Social Innovation Review, 2014)

Grants

Grants are a valuable financing product for venture and seed stage businesses that still have a need for R&D. More detail on the way grants are provided and the actors involved were mentioned earlier.

Public actors use grants, collaborate with partners, diffuse better practices for change, bring capacity building tools, fund research, publish and promote projects. Example of funds that

operate as public charities include Calvert Foundation, Acumen, Beyond Capital Fund, W. K. Kellogg Foundation, Rockefeller Foundation, David and Lucile Packard Foundation, Robert Wood Johnson Foundation, New Profit Inc.

The benefit of foundations is that they are positioned to take on risk as they focus on transformation and experimentation. They invest in projects that may present a high failure risk but the reward in case of success is tremendous.

Similarly foundations can help a project through grants like Grand Challenges, (Bill & Melinda Gates Foundation) and USAID do. Usually the target of those grant programs is vast but remains in the scope of tackling development problems and key global health issues. Benefits are not only pecuniary but also related to the network of partners in financing and research contestant can profit from.

These grants are not only aimed at businesses but can also include students, professors, and from any organization, including colleges and universities, government laboratories, research institutions, non-profit organizations, and for-profit companies. These institutions are aware of the potential high risk of the contestants. The Knight Foundation, the X Prize Foundation, Ashoka Changemakers, and the Case Foundation, all are experimenting with different types of prizes and contests.

Apart from foundations, grants are also offered by other private entities like Walmart (Evergreen Green Grants) and insurance companies (Grimple's Green grants).

Other organizations, such as Ashoka, Echoing Green, the MacArthur Foundation, and the Open Society Foundations, use *fellowship programs* to find breakthroughs. They invest in innovative and entrepreneurial leaders, rather than in specific ideas, and provide those leaders with relatively unrestricted support to pursue their interests.

Unfortunately grants also have their own imperfections. Indeed, they usually exclude some of the out-of-the-box thinking and new perspectives and all the risk is supported by the grant maker.

Challenges and prizes are an alternative to grants that enable to solve those limitations. A Challenge is an open innovation tool whose purpose is to identify solvers of a specific problem/question and offer them an award.

Challenges draw the risk away from the investor and allocate it to the project initiator. There are criteria for winning a challenge and the award is given only after completion of those criteria. In addition, challenges open the way for people outside a given field or people coming from another field with a solution to a problem that has been working in this other field of expertise.

Overall, combining both grants and challenges can have a great effect. The challenge can find the solver of a problem and grants can then support the development of the idea. Of course, in order for challenges to reach their full potential is that awarded solvers are promoted to gain attention of potential partners and investors.

5.9.3 Crowdfunding

(source: Green Entrepreneurship website)

Crowdfunding is a way for businesses to raise money on the Internet in the form of either donations or investments from multiple individuals.

According to the World Bank and InfoDev (2013), crowdfunding is expected to overtake venture capital in the finance markets within 10 years. In fact, a positive regulatory framework is spreading worldwide. It is an alternative to traditional loans because banks invest less and less in companies and are highly risk-adverse. The strong social media market penetration and Internet usage are at the core of the expansion of this tool (Lu et al. 2014).

Green crowdfunding appeared around 2005 and is a niche for online fundraising that is becoming more popular. Online crowdfunding is used by people or organizations to collect

funds from individuals for their business ideas and initiatives. Some of the well-known online crowdfunding platforms are [IndieGoGo](#) (2008) and [Kickstarter](#) (2009). In 2012, there were over 450 crowdfunding platforms (Green Entrepreneurship, 2013).

Green Entrepreneurship (2013) mentions the following six green crowdfunding platforms:

Greencrowd (Netherlands)

[Greencrowd](#) was founded to support sustainable energy projects that have an environmental impact as well as a financial profit. Greencrowd is in charge of making an assessment of the risks involved in the project and assures there are guarantees (e.g. insurances, real estate as collateral) to mitigate the potential losses. Greencrowd's business model is based on a 3% fee over the funds as well as a fixed administration fee.

GreenUnite (USA)

A platform launched by Crowdnetics, [GreenUnite](#) funds US-based eco-friendly projects as well as educational project about global warming, cleantech and organic gardening. GreenUnite charges 9% over all the received contributions including credit card processing and administration fees.

GreenFunder (USA)

[GreenFunder](#) is a global crowdfunding site launched in 2011 and is focused on green and socially responsible projects. Investors are rewarded with perks. GreenFunder charges a 5% fee for fully funded projects and 9% for partially funded projects. On top of this a 3-5% processing and administration fee applies.

Oneplanetcrowd (Netherlands)

[Oneplanetcrowd](#) has financed with almost 1 million Euros 17 successful projects for sustainability. They also offer a new form of financing – the subordinated convertible loan that gets the crowd into a loan to later convert into shares when a professional investor enters the project. Instead of charging the project a fee the site asks every investor to contribute € 0.90 per investment.

The Green Crowd (Australia)

Green Crowd focuses on arts, community and technology within the green niche. They charge a 5% fee on transferring the funds once collected (excluding 3% payment fees). There are no returns for investors other than possible perks offered by the organization or individual collecting the funds.

Greenvolved (USA)

[Greenvolved was launched in 2013](#) and is a crowdfunding platform matching concerned customers to companies willing to fund environmental projects. They do not ask the customers to invest any funds, customers only need to boost, vote and share the environmental projects they want to become reality. These projects are then funded by companies who want to build a meaningful connection to like-minded potential consumers of their products or services.

6. Conclusions and questions for further research

Even though there is a significant amount of literature and research available on green business models many aspects need further research for a thorough understanding of how these business models work, how they contribute to a sustainable future, in what context they can develop and what is required for green businesses to become more attractive for investors.

Some questions for further research include:

1. **How to build the market demand for green products and services?**

The literature notes that the market demand for green products and services mostly comes from an increased consumer awareness, as well as in some cases from government regulation and enabling environments. A new research would help clarify the main factors that drive increased market demand, what may work and what doesn't.

2. **What is the long-term economic, environmental and social impact of GBMs at outcome (community) level on the long-term?**

The literature mostly contains evaluations that are made at the end of various programs that involve the creation or some level of support for green entrepreneurs. At that point, the evaluation only shows immediate results. A new research would set the basis for a thorough long-term sustainability evaluation approach.

3. **What is the relationship between economic and ecological value?**

Most of the literature describes impact assessments from the perspective of one or another environmental impact as added to the enterprise viability. Very little has been written about considering the interplay between economic and environmental value, with the exception of the Triple Bottom Line approach, which is yet to be more widely discussed in the literature.

4. **What are potential green/sustainability trade-offs created by GBMs?**

Impact assessments typically refer to one dimension of environmental concern: GHGs, water, chemical pollution and so on. What the literature does not talk about are the potential trade-offs between environmental issues. What is the impact of a GBM that reduces GHGs on water or biodiversity? What is the impact of a GBM that reduces chemical pollution on energy and GHGs? A new research could set a more compelling integrated assessment of GBMs and the implications on value creation and assessment, in order to create better return on investment appraisals and to better assess potential GBM risks.

5. **How can the practice of green entrepreneurship be improved?**

Often the literature has shown that green entrepreneurship is motivated by factors such as education, family and friends, awareness. What would be the impact on the practice of green entrepreneurship if the entrepreneurial initiative was driven by different values? And what are an entrepreneur's competences and enabling factors required for those values to turn into entrepreneurial plans? How to expand green entrepreneurship leadership? These are just some of the questions that could formulate a new approach to green entrepreneurial leadership.

6. **What is eco-innovation and how does it thrive?**

Eco-innovation was described in the literature as a specific type of green business model. However the literature goes only so far as describing it, along with a few examples. What would be the contribution of eco-innovation to environmental change? What drives and sustains eco-innovation and how can it create a radical positive disruption and departure from an incremental change path?

7. **What makes/can make GBMs attractive to investors?**

Many papers are written from an investor perspective and describe the types of green business models that match various investor or funder strategies and the number of requirements GBMs must address in order to receive funding. Building on existing successful and not so successful GBM cases, a new research is needed that operates from the GBMs perspective, providing entrepreneurs much needed and thorough and more coherent

guidance into what their GBM needs to address and how, in order to become attractive to various types of funding. In addition, a better exchange of knowledge is needed between the investment industry and GBMs at all stages of maturity.

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Part 2 - “The Green Finance Landscape”

7. Introduction – Motivation of the report

The present report gives an overview of the green finance landscape and will allocate it within the overall picture of global financial markets. Thereby the report aims at findings providing a better understanding of those parts of the finance landscape that are related to green finance and as such build a baseline for research within the Green-Win project.

With an increasing need for business models that are in a broader sense ecologically sustainable, the financing needs of companies implementing green business models will grow. This results in a key role for the financial market and its market participants in the transition towards a green economy. The success of this transition will depend significantly on the market interaction between green entrepreneurs and financial institutions.

When it comes to investment needs for the worldwide transition towards a sustainable infrastructure, McKinsey (2016, p. 2) highlights that the global demand for investment sums up to USD 90 trillion, whereas the actual value of existing infrastructure is just USD 50 trillion. The estimated USD 6 trillion of yearly investment needed exceed actual investment in infrastructures by 100 %. They equal 35 % of global capital formation, being USD 17 trillion in 2014 (World Bank 2016b). According to Zhan J. (2015, p. 2) investment needs in developing countries to meet the SDGs by 2030 are huge. Analysing necessary investment in power, transport, telecommunication, water and sanitation just for developing countries there is an investment gap of USD 1.6 – 2.5 trillion per year.

Focusing on climate protection related investment needs aimed at the 2°C pathway, McKinsey and the IEA WEO2010 estimate yearly investment needs of USD 689 billion and USD 720 billion respectively (cited in IFC without year, p. 21).

While these examples do not necessarily cover the green finance landscape in a stricter sense, there are some overlaps; and they give an idea of the magnitude of investment needs for a sustainable transition. The existing gap between actual investments and investment needs for a sustainable transition reflects a problem. Reasons for it could be related to the supply or demand side, or based on coordination challenges within financial markets.

The present report has been developed as part of the **Green-Win** project. The project aims to identify win-win strategies for green business models and enabling environments in the three action fields of coastal zone flood risk management, urban transformations and energy poverty eradication and resilience. One focus of the project is on the question of how green business models can be implemented into the market economy, which specific technical as well as socioeconomic barriers for the development of such business models exist and how they can be overcome.

Most of the **Green-Win** business models are likely to be small endeavours at a very early stage of their business activity lacking track record. Investors are likely to perceive these business models as high-risk investments; and it will be challenging to find investors with the required risk/return profile. This report will focus not only on the green finance landscape itself, but also give an overview of the closely related concepts of sustainable and responsible investment and impact investment in order to gain insight into how investors from these landscapes handle challenges similar to those encountered on the green finance landscape. With a focus on the financial markets following questions derive for the report:

1. Where is green finance to be allocated within the overall financial landscape from a conceptual point of view?
2. Where is green finance to be allocated within the overall financial landscape from a quantitative perspective?
3. What can we learn for green finance from the development of sustainable and responsible investment and impact investment?
4. Who are the relevant stakeholders on the financial markets and which role could they play for green finance?
5. Which further questions emerge from our findings for the **Green-Win** project?

8. Introducing selected key concepts of the green finance landscape

8.1 Sustainable development and green growth: Creating a green economy

Green finance is at the core of creating a green economy by means of financing green growth and sustainable development. Thereby the green finance landscape can only be fathomed within a bigger context. This chapter will briefly introduce the concepts of green economy, green growth and sustainable development.

UNEP (2016) defines a green economy as one that *“results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, a green economy can be thought of as one which is low carbon, resource efficient and socially inclusive”*. *“Practically speaking, a green economy is one whose growth in income and employment is driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services”* UNEP (2016). Therewith green investments are such investments that replace existing technologies and increase resource (physical or energetic) efficiencies. While there is a strong focus on the ecological dimension, evoked by the word green, a green economy furthermore clearly includes a social dimension. Green Growth and sustainable development are oriented towards creating a green economy. While the term green economy focuses on a static description of an economy, green growth takes into account that market economies have an inherent need for growth in incomes, wealth and therewith in production. Conventional economic growth is linked to growth in the use of natural resources and environmental pollutions. Green growth aims to decouple economic growth from the use of natural resources. Therewith green growth seeks to *“harmonize economic growth with environmental sustainability, while improving the eco-efficiency of economic growth and enhancing the synergies between environment and economy”* (United Nations, 2016). According to the GGGI (2016), green growth clearly sets a focus on sustainable development goals 7 (affordable and clean energy) and 13 (climate action), but also includes other sustainable development goals, especially those related to the environment.

Sustainable development is development that *“meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits – not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb effects of human activities. But technology and social organization can be both managed and improved to make way for a new era of economic growth”* (The World Commission on environment and Development 1987, p. 8). Beside the dimension of striving for inter-generational equality, sustainable development also contains the dimension of aiming at inter-regional equality and the eradication of poverty. These definitions clarify that while green finance clearly focuses on having a positive climate and environmental impact, it also, if to a lesser extent, is concerned with reaching all the other sustainable development goals.

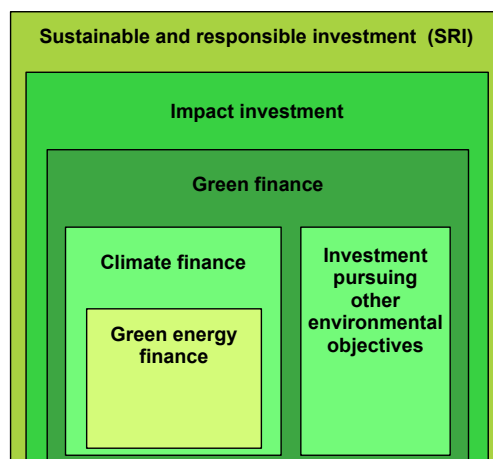
8.2 Sustainable and responsible investment and green finance

8.2.1 Introductory remarks

Sustainable and responsible investment (SRI), ethical investment, socially responsible investment, impact investment, green finance and climate finance – are terms that are used indifferently or with overlapping meanings. Definitions for these different financial activities vary across regions and within these regions over time. A widely complete and in its figures reasonable illustration of the dimensions of the green finance landscape (see chapter 9)

requires a methodological localization of the term green finance and related concepts. The following figure proposes a structural approach wherein green finance is a subset of impact investment which itself is part of sustainable and responsible investment (SRI).

Figure 6: Conceptual approach to the green finance landscape



Source: own rearrangement based on Financeinmotion (2014, p. 10) & International Development Finance Club (2015, p. 1)

8.2.2 Sustainable and responsible investment

The Global Sustainable Investment Alliance works with an inclusive approach to sustainable and responsible investment, defining:

Sustainable and responsible investment (SRI) is an investment approach that considers environmental, social as well as corporate governance (ESG) factors in the portfolio selection and management (GSIA 2015, p. 3).

In its origins, SRI is a values-based investment approach, meaning that the primary goal for a sustainable and responsible investor traditionally has been to align his economic activities and financial investments with his core values and principles. Over the past decades, SRI has evolved and changed as new components have been added to the original SRI approach. When it comes to portfolio selection and management, SRI promises a more detailed risk-management approach, going beyond the analysis of financial and economic risks by also taking into account environmental, social and corporate governance (ESG) factors, traditionally considered extra-financial aspects. As a result, SRI *“isn’t just about personal values anymore. It’s about managing risk to long-term shareholder and stakeholder value. In a world where climate change, water scarcity and global supply chain issues dominate the business pages, that job has become a lot more challenging”* (RiA Canada 2015, p. 6). More recently, the explicit requirement of SRI to become a tool to create an impact on society or the environment is more and more finding its way into definitions of SRI. While both concepts, the values-based (more original) and the impact-seeking (more recent) approach to SRI, have coexisted for some time, nowadays SRI is more and more expected to have an impact and to contribute to marking a change.²

² Italy’s 2014 definition of SRI contains both aspects: *“Sustainable and Responsible Investment is a medium to long-term investment strategy which, in the evaluation of companies and institutions, combines the financial analysis with a robust Environmental, Social and Governance (ESG) analysis, with the aim to create value to the benefit of investors and the society as a whole.”* (Eurosif 2014, p. 49). In France, the definition of SRI has moved away from a process-describing definition in 2010 (*“SRI is a financial investment including simultaneously*

For a description of different SRI strategies also see the sub-section of chapter 3.2.2 of part 1 concerning socially responsible investors' strategies.

8.2.3 Impact investment

Impact investment is a relatively new addition to the SRI universe, the term dating back to 2007 only. In 2007, the Rockefeller Foundation convenes the Bellagio Summit, and this is where the term impact investing is coined (Eurosif 2014, p. 22).

Impact investments are investments that intentionally target specific social objectives along with a financial return and measure the achievement of both (G8 Social Impact Investment Taskforce 2014, p. 1).

Thereby impact investment, social investment and social impact investment are used as synonyms. According to Eurosif (2014, p. 22) impact investing spans a large range of social issues and themes. Eurosif proposes two categories for classification:

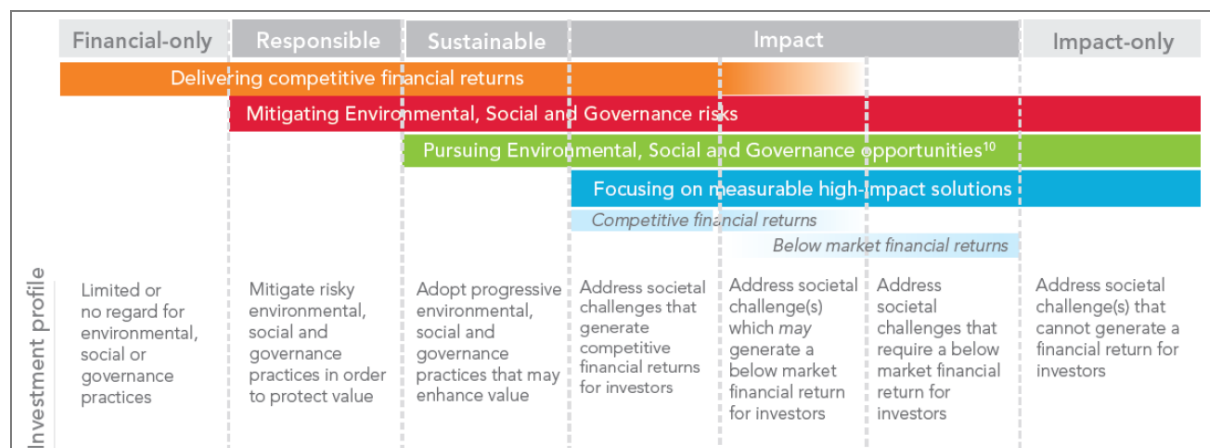
1. **Social integration** including access to affordable housing, health, finance, education, personal care or employability and
2. **Sustainability-related projects** including production and access to renewable energy, food, water and sustainable agriculture.

While impact investment has a strong social component, it is not limited to social impact but also encompasses environmental and climate impact. The global challenges society in the 21st century is facing are growing in complexity and magnitude. Awareness that the government and social sector alone will not be able to tackle global challenges is growing both in the public and private sector. Businesses and the financial sector are required to help building a healthy society, even more so in an environment of governments facing fiscal constraint. Impact investment is a response to this situation. It is conceived to help governments use the funds they dispose of in a more effective way, reaching better results with the same amount of money. Also, impact investment brings a third dimension to evaluating investment outcomes: It adds the dimension of impact to the two existing dimensions of risk and return. The success of impact investment will largely depend on the extent to which capital markets incorporate this third dimension of impact into their thinking (G8 Social Impact Taskforce 2014, pp. 1-3).

The transition from projects with a financial objective only to sustainable and responsible investment to impact investment to philanthropy is fluent. On one extreme of the spectrum of capital are those investments that merely target financial objectives seeking competitive or better than market rate financial returns. On the other end of the spectrum of capital are impact-only investments that explicitly forgo financial return. Figure 7 illustrates the transition between the two extremes. The next step from using funds to generate impact without expecting a financial return while preserving initial capital invested, is to forgo parts or the entire amount of funds used for the sake of financing high-impact solutions. This is no longer an investment, but philanthropy.

Environment, Social and Governance criteria, in addition to the financial ones.”) towards a purpose-describing definition in 2013 (“SRI [...] is an investment approach that aims to reconcile financial performance and social and environmental impacts by financing private companies and public entities that contribute to sustainable development regardless of their industry sector. By influencing the governance and the behavior of these players, SRI fosters a responsible economy.”). (Eurosif 2014, p 44).

Figure 7: A spectrum of capital



Source: OECD, 2015, p.13

8.2.4 Green finance

The OECD (2012, p. 10) points out that “*hundreds of definitions for green investments*” are in use and it is not only the definition of green but also that of investment that differs. Therewith a conclusive assessment and definition for the term seems to be impossible or at least difficult and controversial at the moment. Nevertheless the understanding of this definition problem helps to be aware of methodological challenges when it comes to quantitative and qualitative statements and research findings from different sources. They have to be evaluated accordingly with the hindsight of differences in definitions of and approaches to green finance.

Green finance is concerned with reaching a green economy through green growth and sustainable development by investment into projects generating direct climate or other environmental benefits.

According to Wolff and Phalpher (2014, p.10) “*green finance can be viewed as a core part of a green economy, as it is the link between the financial industry, environmental protection and economic growth*”. The term green finance itself refers to investment activities that are somehow related to climate change, carbon, water, forestry and waste. Green finance is further concerned with environmental protection, resource scarcity and efficiency and other sustainability related issues. “*Green finance thereby recognizes the importance and value of the environment and its natural capital, and seeks to improve human well-being and social equity while reducing environmental risks and improving ecological integrity.*” (Wolff and Phalpher 2014, p.10) From a technical point of view green finance refers to different kinds of financial instruments (e.g. loans, insurance or bonds) that are related to green activities (ibidem). Green finance focuses on investment promoting clean energy, climate action and environmental activities, while also supporting other sustainability goals, and is thus allocated somewhere within the (social) impact investing landscape, being a subset of sustainable and responsible investment.

As there is no unique commonly accepted definition of green finance, there are different approaches to what extent social aspects are to be included within green finance. Also see chapter 2.1 of part 1 for a definition of green business models, and chapter 2.2 of part 1 for a categorization of green business models, illustrating that green business models are facing similar definition and categorization challenges.

Green bonds: An example for a green finance instrument

Green bonds are one specific financial instrument of green finance.

“Green bonds refer to bonds whose use of proceeds is earmarked to finance a specific project generating a direct environmental or climate benefit. Typical projects’ use includes, for instance, renewable energy, energy efficiency, waste management, clean transportation, etc. The green nature of the bond is therefore directly connected to the objective of the project its proceeds will be financing, rather than the overall [environmental, social and corporate governance (ESG)] score of its issuer.” (Eurosif 2014, p.32)

8.2.5 Climate finance

According to Wolff and Phalpher (2014, p.10), overwhelming parts of green finance are concerned with climate change, focusing on mitigation and adaptation strategies. The core of green finance is thus climate finance. And as adaptation strategies are difficult to be defined and measured, most of climate finance is concerned with mitigation strategies. (Wolff and Phalpher 2014, pp. 10-11 & 16)

8.2.6 Green energy finance

Most mitigation activities are concerned with renewable energy and energy efficiency projects, which together can be summarised as green energy finance. Most of green energy finance is related to solar, wind and other renewable energy projects. Thus, renewable energy makes out the bulk of green energy finance, climate finance and green finance (Wolff and Phalpher 2014, pp. 10-11 & 16).

9. Quantitative approach to green finance

9.1 Introductory remarks

Following the conceptual approach to green finance in chapter 8, the present chapter will highlight the quantitative relation between the different conceptual sub-sets of sustainable and responsible investment. Sets of data referring to different ecosystems within the SRI and green finance landscape are obtained from different surveys. As the objectives and methodologies of data collection vary across surveys, data is not necessarily comparable.

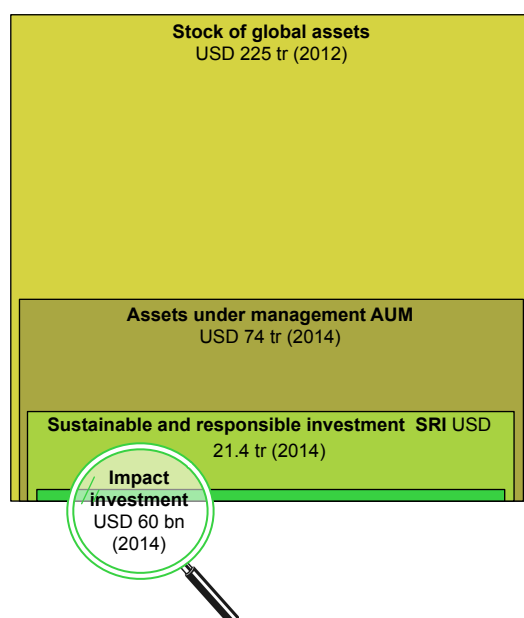
Broadly speaking the most considerable difference in data collection approaches results from different 'domains of discourse'. While for some analysts interactions on financial markets from an investors' perspective are of main interest – this concerns the measurement of AUM, SRI and impact investment – other scientific communities focus on investment flows into measurable capital goods – as it is the case for climate finance.

Surveys may cover only institutional investors, as in the case of SRI and impact investors, or they may cover a much broader group of actors on the financial market, including commercial banks and development banks, as in the case of climate finance. Market surveys may cover only selected countries and regions, as in the case of SRI, or the entire world, as in the case of impact investment and climate finance.

Another important difference is that they may cover stocks invested into the financial ecosystem in question at a certain date, as in the case of SRI and impact investment, or they may cover investment flows into the financial ecosystem throughout the year surveyed, as in the case of climate finance.

The following sub-chapters will first present data available on SRI and impact investment, allocating them within the overall financial markets as a part of assets under management. Figure 8 shows a summary of this approach. Subsequently, available data on green finance and its sub-categories will be presented.

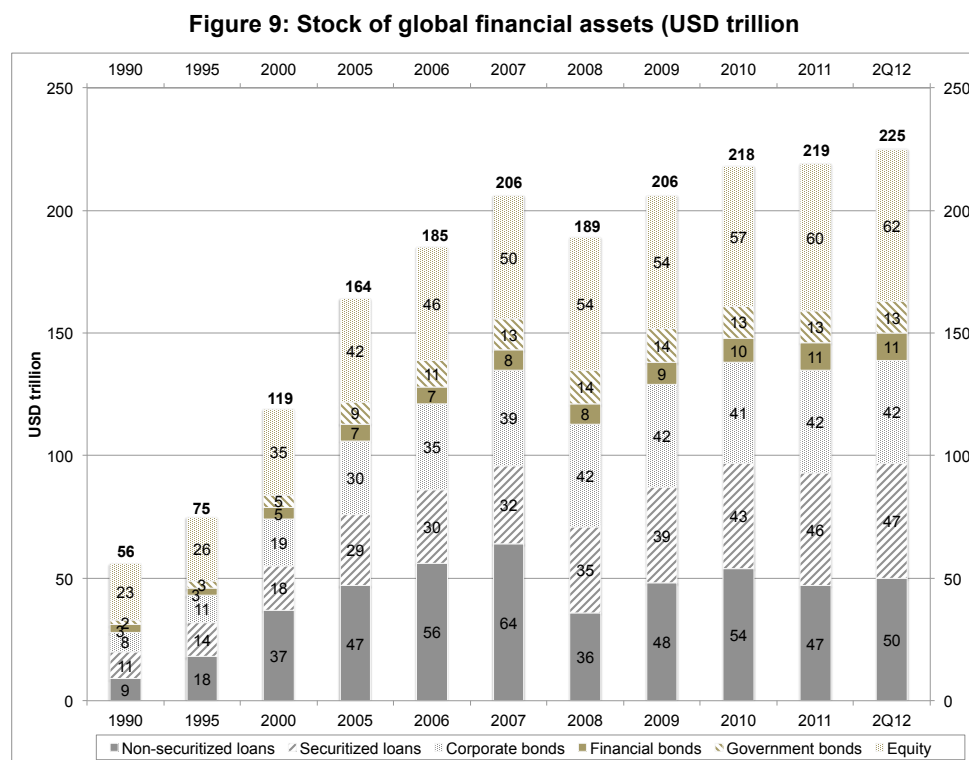
Figure 8: Sustainable and responsible investment and impact investment in numbers



Source: own rearrangement based on McKinsey & Company (2013 p. 2), BCG (2015, p. 7), UN PRI (2016) & J.P. Morgan and GIIN 2013, pp. 4-6)

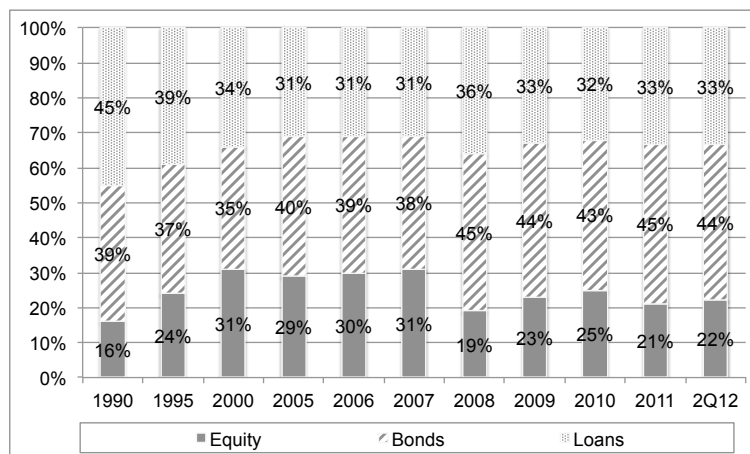
9.2 Stock of global financial assets

According to McKinsey & Company (2013 p. 2) the value of world's financial assets – the value of equity market capitalization, corporate and government bonds, and loans – sum up to USD 225 trillion in 2012. It's value grew from around USD 12 trillion in 1980 to USD 206 trillion in 2007, declining to USD 189 trillion in 2008 as a result of the financial crisis and recovering to USD 225 trillion subsequently. Figure 9 shows the development over the past two decades.



Source: McKinsey (2013, p. 2)

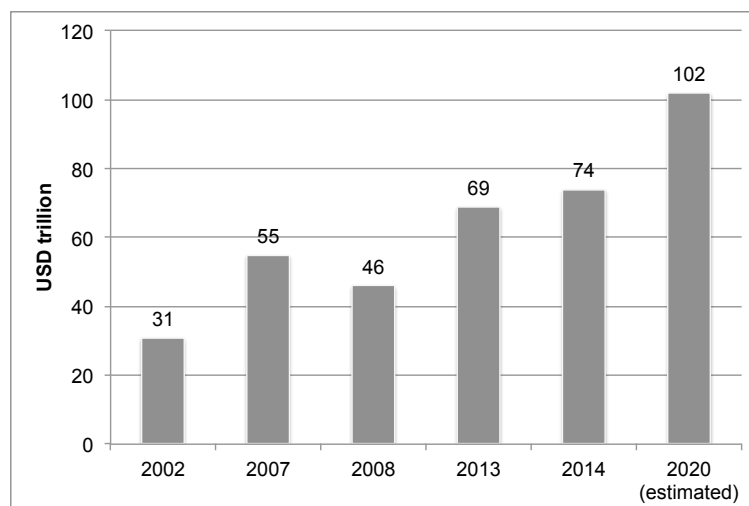
Not only did the total amount of financial assets grow over the past two decades. Presenting data from Figure 9 in a different way, it shows that, the composition of financial assets also changed over time. Figure 10 shows how different asset classes gained and lost weight in global financial assets over time. While in 1990 loans made out 45 % of financial assets, since 2008 it has been bonds making out the biggest share of financial assets with roughly 45 %. While in the early 2000s equity made out close to 1/3 of financial assets, its contribution to financial assets declined with the financial crisis in 2008.

Figure 10: Composition of asset classes within global financial assets per year (in %)

Source: own rearrangement of data from McKinsey (2013, p. 2)

9.3 Assets under management

Assets under management (AUM) refer to professionally managed funds by an institution on behalf of itself and on behalf of clients and are thus a subtotal of the stock of global financial assets. Worldwide, AUM are growing. Despite taking a setback in the wake of the financial crisis in 2008, global AUM have grown from USD 31 trillion in 2002 to USD 74 trillion by 2014, and are expected to pass the USD 100 trillion mark by 2020. Assets under management are common reference for calculating the market share of sustainable and responsible investment.

Figure 11: Evolution of global assets under management (USD trillion)

Source: BCG (2015, p. 7) and pwc (2014, p. 8) for estimate

9.4 Sustainable and responsible investment

Sustainable and responsible investment (SRI) is measured based on questionnaires sent out to institutional investors claiming to be sustainable and responsible investors. They fill out the questionnaires as they judge best. Thus, the SRI universe depends on self-declaration by investors. Changes in the number of questionnaires sent out and changes in the number of responses feeding back into the SRI database can have a considerable impact on the total amount of SRI AUM in a given country or for a given SRI strategy when comparing one year to another. Also, as long as associations collecting data on SRI markets are not aware of a new investment trend or strategy within the SRI universe and thus do not feature it in their

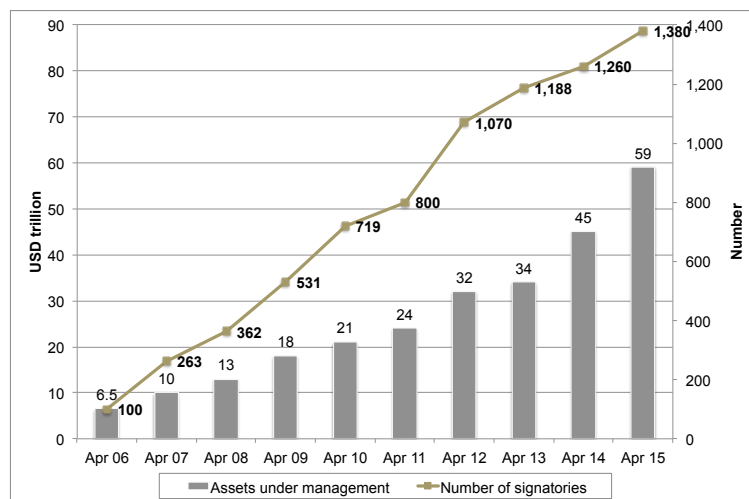
questionnaires and reports, assets under management (AUM) assigned to these SRI trends or strategies are not included in the SRI market surveys.³ Countries where SRI is only emerging tend not to be covered by an SRI survey neither; only once the nascent SRI market develops to a point that main actors regroup in an association concerned with SRI, market surveys are being conducted.⁴ Further, very secretive investors, including religious institutions that would be natural SRI advocates, tend not to respond to questionnaires circulated for SRI surveys. At the same time, associations surveying SRI control for double-counting. As a result, it is very probable that there is a tendency of under-accounting of SRI AUM.

Surveys on SRI collect data on institutional investors' assets under management (AUM) dedicated to SRI. These surveys also take into account retail investment to some extent. They do not, however, account for investments by financial institutions held by a national government or governments, like central banks. SRI surveys do, however, tend to consult national pension funds and sovereign wealth funds as part of institutional investors. When calculating SRI market penetration, the reference of total AUM is institutional investors' AUM. SRI AUM is a sub-universe of institutional investors' AUM.

The Global Sustainable Investment Alliance (GSIA) estimates global SRI to have increased from USD 13.3 trillion closing 2011 to USD 21.4 trillion closing 2013. The survey includes data collected in Europe (with USD 13.6 trillion accounting for 64 % of worldwide SRI), the United States (with USD 6.6 trillion accounting for 31 % of worldwide SRI), Canada, Australia, New Zealand and Asia (GSIA 2015, pp. 7-8). SRI is likely to continue growing as a share of overall investment. One important indicator is the growing number of signatories of the United Nations Principles for Responsible Investment (UN PRI). With signing the UN PRI, an investor recognises the materiality of environmental, social and corporate governance (ESG) issues and commits to design and implement investment policies in alignment with the UN PRI. This means that not all the signatories have yet done so, but they are surveyed on their handling of ESG considerations, and they are committed to improve their ESG exposure. The continuously growing number of signatories of the United Nations Principles for Responsible Investment shows that the consideration of environmental, social and corporate governance (ESG) aspects into portfolio selection and management is gaining popularity among investors.

³ The concept of impact investment was coined in 2007. But it is only some years later that surveys on SRI start to collect data on impact investment.

⁴ SRI markets are asset management markets, meaning, surveys collect data on assets managed within the country they survey, no matter the origin or destination of funds. SRI surveys do not cover every country or region. European surveys cover Austria, Belgium, Finland, France, Germany, Italy, the Netherlands, Norway, Poland, Spain, Sweden, Switzerland and the United Kingdom. Asian surveys cover Bangladesh, China, Hong Kong, India, Indonesia, Japan, Malaysia, Pakistan, Singapore, South Korea, Taiwan, Thailand and Vietnam. African, South American and Eastern European markets are not being surveyed. SRI surveys only cover countries where the SRI landscape has grown to a point that it is becoming visible.

Figure 12: Development of UN PRI signatories (USD trillion) and number of signatories

Source: UN PRI (2016)

When analysing the average amount of assets under management (AUM) per signatory, the first year, in 2006, it was at USD 65 billion, only to drop to USD 38 billion in the second year, 2007, and to continue dropping for another 3 consecutive years. Between 2010 and 2013, the average amount of AUM per signatory remains at USD 29 to 30 billion. This previous trend of declining average amount of AUM per signatory reverses in 2014, only to reach USD 43 billion by 2015. A possible explanation is the following: Among the UN PRI founding signatories in 2006 were several big mainstream investors, ABN AMRO Asset Management, BNP Paribas Asset Management, CalPERS, Munich Reinsurance AG, New Zealand Superannuation Fund, Norwegian Government Pension Fund and PFZW (former PGM) Investments among them. In the first years after their creation, the UN PRI possibly attracted mostly smaller investors than the average founding signatories, many of them specialised SRI boutiques. The turn on average AUM per signatory in 2014 can be explained with either growing AUM of existing signatories (after the financial crises) or with new signatories being on average bigger than existing signatories in terms of AUM. Probably it is a combination of both, and in any case this development indicates that the UN PRI are reaching ever bigger investors over the past two years than in the preceding years, and that thus they have been moving more towards mainstream investors in the past two years. The UN PRI reaching mainstream investors is a positive sign for SRI, which is also moving more mainstream as new more mainstream UN PRI signatories design and implement their ESG policies and strategies.

The financial performance of sustainable and responsible investment has been investigated from different angles over the past decades, resulting in thousands of publications on the matter since the early 1970s. Results of recent reviews of selected academic studies suggest that the consideration of environmental, social and corporate governance (ESG) aspects in portfolio selection and management processes can result in comparable or better financial performance.

Clark et al. (2015) review over 200 academic studies and sources on sustainability issues and sum up following findings:

1. *"Companies with strong sustainability scores show better operational performance and are less risky"*
2. *Investment strategies that incorporate ESG issues outperform comparable non-ESG strategies*
3. *Active ownership creates value for companies and investors"* Clark, G. L., A. Feiner and M. Viehs 2015, p. 10):

Friede et al. (2015, p. 226) analyse the relationship between environmental, social and corporate governance (ESG) level of a company and its corporate financial performance (CFP). They conduct “a second level review of 60 review studies [combining] more than 3.700 study results from more than 2.200 unique primary studies [and] clearly find evidence for the business case for ESG investing” (ibidem). They point out that portfolio studies tend to come up with a neutral or mixed ESG-CFP link, while “other – in particular company-focussed – empirical studies suggest a positive [ESG-CFP relation]” (ibidem).

9.5 Impact Investment

The Global Impact Investing Network (GIIN) and J.P. Morgan closely survey the development of the impact investment market and on a yearly basis publish their findings. This publication that tracks the global market of impact investment from a financial industry perspective, is considered to be the most influential and comprehensive survey of the impact investment landscape.

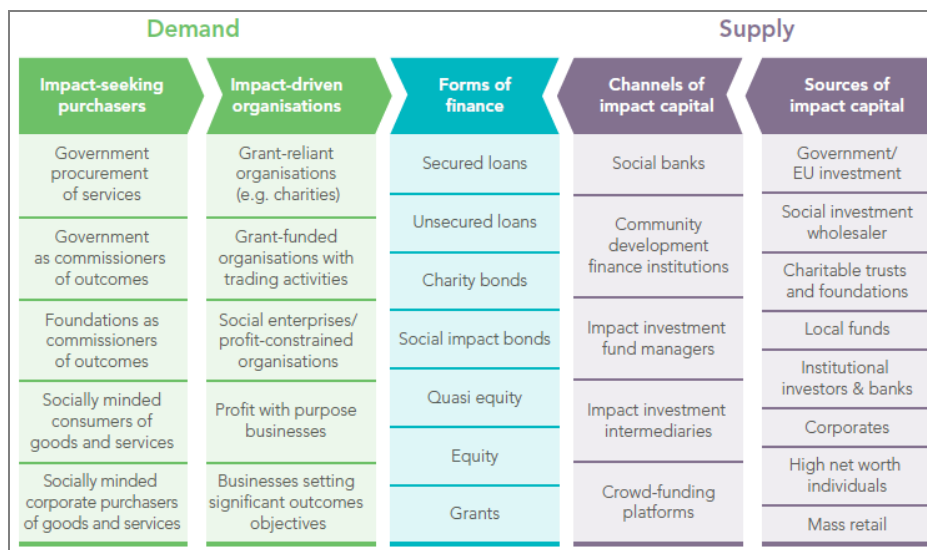
Similar to the determination of the SRI market, the market of impact investment is identified based on a questionnaire sent out to impact investors (basically being institutional investors) and completed by additional research. For the survey on closing 2014, 146 respondents qualified as impact investors for GIIN and J.P. Morgan, compared to 125 respondents for the previous survey.

The impact investment market has reached USD 36 billion of assets under management (AUM) in 2012, USD 46 billion in 2013 and USD 60 billion by 2014 (J.P. Morgan and GIIN 2013, pp. 4-6). However, the World Economic Forum (2014, p. 27) points out that these estimates understate volumes of impact investment, as the number of impact investing funds alone is estimated to amount to 380 according to ImpactBase (2016).

Impact investment thus is a fast-growing market segment within the SRI universe. In 2014, 63 % of impact investment is being held by asset managers, 18 % by development finance institutions, 9 % by diversified financial institutions and banks, 6 % by foundations, only 2 % by pension funds and insurance companies and the remaining 2 % by others (J.P. Morgan and GIIN 2015, p. 23). 65 % of impact investment is being managed on behalf of clients while the remaining 35 % are proprietary capital (ibidem pp. 27-28). Then, however, asset manager invest 74 % directly into companies, while 20 % are invested indirectly through intermediaries (including fund managers) and 6 % otherwise (ibidem p. 28).

Figure 13 illustrates how supply (right hand side of the figure) and demand (left hand side of the figure) side of capital interact on the impact investment market. Asset owners, fund managers, intermediaries, specialised product and service providers intervene, developing an impact investment infrastructure. For **Green-Win** this means that it is rather unlikely that asset owners invest directly into green business models, but that it is mostly fund managers who invest directly into green business models.

Figure 13: Social impact investment ecosystem



Source: G8 Social Impact Investment Taskforce (2014, p. 3)

Concerning future development of the impact investment market, impact investors indicate that improvements have been made on different grounds, *“including: collaboration among investors, availability of investment opportunities, usage of impact measurement standards, and number of intermediaries with significant track record”*. (J.P. Morgan and GIIN 2015, p. 8). According to J.P. Morgan and GIIN (2015, pp. 9 & 20), Eurosif (2014, p. 27) and RiA Canada (2015, pp. 33 & 36-37) the following challenges to the growth of the impact investing industry have to be highlighted:

1. **Lack of appropriate capital across the risk/return spectrum** resulting from risk and performance concerns. The largest contributors to risk according to sustainable and responsible investors and impact investors are business model execution and management risk, liquidity risk and difficulties to exit the investment, market demand and competition risk, financing risk, as well as country and currency risk.
2. **Lack of viable products/options** resulting from a shortage of high quality investment opportunities with track record and a lack of innovative deal/fund structures to accommodate investors’ or portfolio companies’ needs. Institutional investors are particularly concerned with finding products exhibiting the following requirements: *“scale and scalability to match institutional minimum investment sizes, track record (notably in terms of financial performance) [and] investment characteristics matching their asset allocation constraints (liquidity, volatility, investment style, etc.)”* (Eurosif 2014: p. 27).
3. **Mistrust concerning the social and environmental impact**, given there is no common way to talk about impact investing, and impact measurement practices being inadequate. This leads to a concern about greenwashing. For different approaches to measuring impact, also see chapter 3.3 of Part 1 on measuring results.
4. **Lack of advice and expertise** within the financial industry when it comes to impact investment due to a lack of investment professionals with relevant experience and skill set.

According to the G8 Social Impact Investment Taskforce, *“the most common obstacle faced by impact entrepreneurs is securing early stage risk capital. Many impact investors are willing to invest at later stage, when business models have already been proven and risks are lower; far fewer are willing to walk side by side with entrepreneurs through the critical early stages of a high-risk, high-growth impact business”* (G8 Social Impact Investment Taskforce 2014, p. 12). *“Most [impact investment] capital managed [as of end 2014] – 91 % – is invested in companies post-venture stage, with 28 % allocated towards companies at the*

Growth Stage, 52 % in Mature, Private and 11 % in Mature, Publicly-traded companies. Nine percent is committed to Seed/Start-up companies [(three percent)] or Venture Stage businesses [(six percent)].” (J.P. Morgan and GIIN 2015, p. 7)

Most of the **Green-Win** business models are likely to be small endeavours at a very early stage of their business activity lacking track record. Investors are likely to perceive these business models as high-risk investments; and it will be challenging to find investors with the required risk/return profile. An analysis of how selected impact investors holding investments similar to those we expect to find with **Green-Win** deal with the risks identified by impact investors and sustainable and responsible institutional investors could provide more insight into how to match up investors and investees. Some aspects for further analysis could be impact investors’ experience with technical and management assistance, possibilities of decoupling of risks, pooling of projects and examples of governmental or other support for early stage impact investment.

For more information on different potential sources of finance for green business models at different stages of their life-cycle, also see chapter 5 of part 1 on sources of finance for green business models.

Concerning the **performance of impact investment**, most impact investors report that their performance expectations have been met or outperformed, both on an impact and financial level. For impact expectations, 71 % were in line with expectations, 27 % outperformed and only 2 % underperformed. For financial expectations, 78 % were in line, 14 % outperformed and 9 % underperformed (J.P. Morgan and GIIN 2015, p. 33). Concerning financial expectations, it is important to acknowledge that 55 % of impact investors do expect competitive market returns, while the other 45 % expect below market returns close to market returns (27 % of impact investors) or even just above capital preservation (18 % of impact investors) (ibidem p. 15). Also see Figure 7 for a classification of investment profiles concerning financial returns within the impact investment landscape and the overall finance landscape.

9.6 Green finance

A complete survey covering total global green investment is not available to date. Green finance aiming at climate issues is surveyed globally on a yearly basis and will be presented in the following chapter. Information on green finance dedicated to other environmental aspects is difficult to find. However the largest portion of green finance goes into climate finance and within that into green energy finance.

The International Development Finance Club (2015) mapped the investment flows of its 23 member banks worldwide for 2014 and finds that they dedicate USD 98 billion to green finance, of which USD 85 billion go into climate finance and USD 13 billion are dedicated to other environmental objectives. In 2014, 87 % of green finance flow into climate finance and only 13 % towards other environmental objectives. While their survey only covers 22 % of the whole global climate finance market of USD 391 billion (see chapter 9.7), it gives a general idea about proportions.

The following chapter will present climate finance in more detail and in numbers. Also see box on green bonds (page 81-82), being one specific financial instrument concerned with green finance.

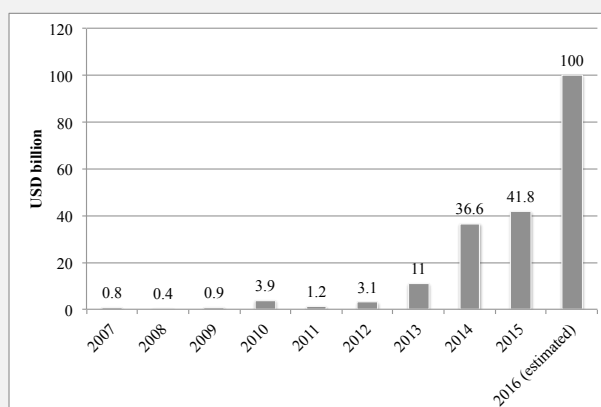
As green finance is to be allocated somewhere within the (social) impact investment ecosystem, it encounters the same complexity of matching up an entrepreneur having a green business model in mind with the adequate source of capital. A whole infrastructure needs to be established in-between, like it exists for traditional for-profit businesses and has over the past decades been evolving and thriving around SRI. This ecosystem encompasses a legal framework and education for green finance and sustainable development, as well as a body of professionals in different occupations gaining experience with the matter and sharing their insight, as well as voluntary industry standards. Impact investment and green

finance can to some extent build on and profit from advances in the SRI landscape. For more details see the chapter 10.4 on intermediaries.

Access to long-term finance is likely to be a fundamental obstacle for many individuals and households to overcome when they seek entering the green finance landscape. Besides the lack of availability of long-term finance options altogether, financial illiteracy is possibly also closely connected to the inability to access long-term finance. This is likely to be a key aspect for individuals and households from developing countries and among the poorer and less educated. *“Use of long-term finance – frequently defined as all financing for a time frame exceeding one year – is more limited in developing countries, particularly among small firms and poorer individuals”* (World Bank Group 2015, p. 3). At least some of the **Green-Win** business cases will be attributed to individuals or to households and the realisation of these green business cases will depend on the access to long-term finance and they will rely on assistance in finding it.

Green bonds: An example for a green finance instrument

Figure 14: Development of green bond issuance per year (USD billion)



Source: Climate Bonds Initiative (2016a and 2016b)

Green bonds premiered in 2007, and have since enjoyed growing popularity among issuers and investors. The Climate Bonds Initiative summarizes the most important developments of the green bond market since its emergence as follows:

“In 2007 the green bond market kicked off with AAA investment grade issuance from multilateral institutions European Investment Bank (EIB) and World Bank. The wider bond market started to react after the first \$1bn green bond sold within an hour of issue by IFC in March 2013. The following November there was a turning point in the market as the first corporate green bonds were issued by EDF, Bank of America and Vasakronan. Corporate issuance continued to flow [in 2014] with the largest to date from GDF Suez at EUR2.5bn (\$3.44bn) in March 2014. High yield green bonds are starting to develop. Abengoa Greenfield, a Spanish renewable energy services company, successfully issued the first high yield green bonds in September 2014. [The Climate Bonds Initiative expects] to see more issuances from companies with diverse credit stories as the market develops. Municipal and local government green bonds are a growing trend. The first green muni bond was issued by Massachusetts in June 2013. Gothenburg in October 2013 issued the first Green City bond. In Q3 2014 the state of California issued its first green bond. Province of Ontario, New York State, City of Johannesburg and others have also issued green bonds.” (Climate Bonds Initiative 2016b)

For 2016, the Climate Bonds Initiative targets USD 100 billion in green bond issuance. This target has to be taken with caution, as they had already aimed at this very same amount for 2015 without getting close. By end of February 2016, green bonds issuance of the current year sums up to USD 12.83 billions (Climate Bonds Initiative 2016b). Assuming this to be the average 2-month issuance amount, a total of USD 76.98 billions could be reached in

2016, which still would be an important growth in yearly green bond issuance compared to the USD 41.8 billion for 2015.

Taking into account, that bonds are the single largest single pool of capital totalling a value of approximately USD 80 trillion in 2013, Eurosif (2014, p. 32) points out that a further mobilisation of this market could be key to meeting climate change related targets; and, according to Eurosif the year 2013 seems to have been a *“turning point for the market and could set the stage for further rapid growth of the market”*. (ibidem, p. 32).

With increasing amounts of green bonds issued, there is a growing concern about green bonds' transparency in relation to their non-financial objectives and the actual non-financial impact they are having. Initiatives for green bonds' practices, standards and principles are working on solutions to making the green bond market more transparent (ibidem, p. 32).

Surveys by the climate bonds initiative inform of total amounts of green bonds issued per year. They do not inform about the total stock of climate bonds on the market at a certain point of time. Green bonds issued in previous years and still on the market will not show up in the survey of green bonds issuance, but may very well form part of portfolios held by sustainable and responsible investors or impact investors and be reported in the respective market surveys.

Green bonds with investment grade ratings are attractive for institutional investors and official institutions. They are a suitable financial instrument for financing large projects, like infrastructure projects and real estate projects. Thus the green bond market is very likely to continue growing and developing. Green bonds are an important contribution to the green finance landscape, making it more visible and attractive for mainstream investors. However, green bonds are not appropriate financial instruments for financing small endeavours.⁵ For most of the **Green-Win** business models are expected to be rather small projects, green bonds are not likely to be the source for financing to be sought out.

9.7 Climate finance

Climate finance, and more particularly climate mitigation oriented finance with a focus on renewable energy, is a substantial subset of green finance.

Figures concerning climate finance reported under this chapter are obtained based on a completely different methodology than the ones applied for quantifying sustainable and responsible investment (chapter 9.4) and impact investment (chapter 9.5). Surveys on sustainable and responsible investment (SRI) and impact investment basically focus on institutional investors; they only include investors explicitly committed to these kinds of investment, their commitment being superior to that of other market participants. This approach leaves out investments contributing to sustainable development and green growth if the main motivation of the investor was financial and economic.

For climate finance, institutional investors play a minor role only; and a much larger universe of investors is surveyed, including private market participants being individuals, households,

⁵ In the aftermath of the financial meltdown of 2008, small and medium sized companies suddenly faced difficulties in obtaining bank loans and credit lines to secure financing. Since 2010 the German corporate bond market offers the new option to issue bonds for mid-caps. By mid-2012, more than 44 medium sized companies made use of bond IPOs, the smallest summing up to EUR 10 million, the largest one EUR 200 million, and the average issuance amount being EUR 54 million. Companies that used corporate bond issuance were existing businesses mostly in a sound financial situation. The following two KPIs illustrate the size of these companies: On average, corporate revenue in the year before the bond IPO was EUR 144 million and, again on average, total assets were of EUR 125 million. Maturity ranges of bond issuances were of three to seven years, generally five years; and ratings mostly were somewhere between BB to BBB+. Well-known brand names were of an advantage when it came to successfully placing a bond IPO. (Oppermann 2012, pp. 42-44). This gives an idea of the smallest possible corporate bond issuances and characteristics of medium sized companies that are likely to succeed in securing capital via bond issuance.

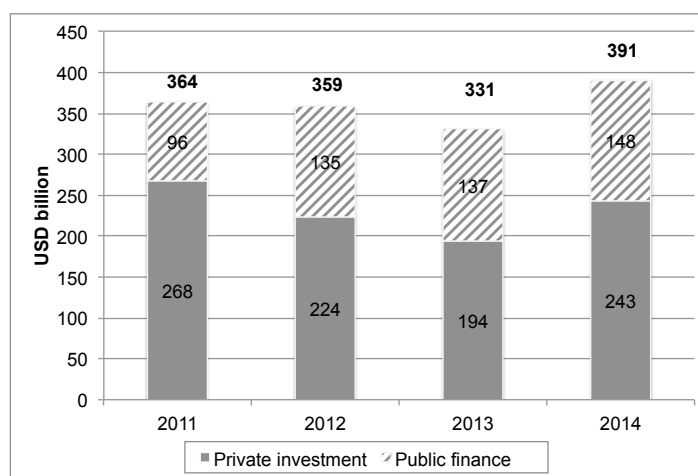
corporate actors, project developers and commercial financial institutions as well as public market participants being development agency institutions, governments and agencies. Also, what really counts is that investment ultimately reaches climate adaptation and mitigation related projects, independently of the intention of the investor. Even more important, SRI and impact investment is tracked as investment held by surveyed investors as of a certain date, thus taking a stock. Climate finance on the other hand captures the total amount of investment dedicated to climate adaptation and mitigation throughout a whole year, thus determining climate investment flows. These are two differences in methodology crucial to making numbers on climate finance incomparable to quantifications of SRI and impact investment.

The Climate Policy Initiative keeps track of climate finance in its yearly surveys. These surveys represent and analyse global financial flows targeting climate change.

Figure 15 shows that yearly investment flows dedicated to climate finance have been growing from USD 364 billion in 2011 to USD 391 billion in 2014. The Climate Policy Initiative further points out that it is difficult to capture all climate finance related investments; this holds especially for private investments (Climate Policy Initiative 2016).

Wolff and Phalpher (2014, p. 17) blame the absence of commonly accepted standards for labelling energy efficiency investments and difficulties in tracking private sector investments to be the main difficulties in tracking energy efficiency flows. They point out that energy efficiency lending can be subsumed under various other loan categories (housing, small business, equipment, or corporate loans) and as a result would not show up in energy efficiency directed investment flows, leading to an under-accounting in this category within climate finance. To some extent this observation is likely to apply to any real estate investment that includes climate relevant considerations other than energy efficiency too. Probably it also applies to some extent to any other private climate relevant project that is not real estate bound. Thus, when it comes to private climate investments, be it by households or businesses, especially one-person or family endeavours, these investments are not necessarily classified as such and thus never appear in a climate finance survey. This again implies that all these small private endeavours have to compete with non-green finance projects when it comes to detecting sources of finance. They have to promise competitive financial performance in order to receive external financing (most likely bank loans), or else they have to be financed with money previously put aside, which, again, will not make them be traceable for a climate finance survey.

While investment volumes surveyed for 2014 sum up to USD 391 billion, the Climate Policy Initiative indicates that the total climate finance they “*know about*” amounts to more than USD 485 billion in 2014. This is a gap of USD 94 billion that is not further explained. Nevertheless this number gives an idea of the magnitude of under-accounting for yearly climate investment. The following will refer to the USD 391 reported in the survey. Figure 16 shows the global climate finance landscape as of financial flows throughout 2014. It is a detailed graphic account of sources and intermediaries, instruments, recipients and uses of climate finance.

Figure 15: Development of climate finance (USD billion)

Source: Buchner et al. (2012, 2013, 2014, 2015)

As of end 2014, when analysing sources and intermediaries of climate finance, the most important actors on the global climate finance landscape according to Buchner et al. (2015, pp. 3-5) are:

Project developers (private investments)	USD 92 billion
National DFIs (public finance)	USD 66 billion
Corporate actors (private investments)	USD 58 billion
Multilateral DFIs (public finance)	USD 47 billion
Commercial financial institutions (private investments)	USD 46 billion
Households (private investment)	USD 43 billion
Bilateral DFIs (public finance)	USD 17 billion
Governments and agencies (public finance)	USD 15 billion

Among other contributors to climate finance are (ibidem):

Climate funds (public finance)	USD 2 billion
Private equity, venture capital and infrastructure funds (private investments)	USD 1.7 billion
Institutional investors (private finance)	USD 0.9 billion

The above-presented data is a more detailed presentation of the global climate finance flows illustrated in Figure 16. Minor divergences result from differences in the data arrangement.

It is mainly institutional investors whose investment portfolios are captured in SRI surveys, many of the most important contributors to climate finance in terms of financial flows not being included into the scope of SRI surveys. Further, surveys on SRI and impact investment capture investment stocks at a certain moment in time. Surveys on climate finance on the other hand summarize investment flows throughout the whole year. Thus, while conceptually climate finance is a subcategory of green finance, which again is comprised in impact

investment, being itself a part of sustainable and responsible investment, numbers of climate finance are not directly comparable with those of SRI and impact investment due to different methodologies of surveying the landscape.

Institutional investors, who have in the past been pushing the development of sustainable and responsible investment (SRI), make out only a tiny contribution to climate finance. Considering that institutional investors see climate change as one of the most important drivers of SRI growth, if not the one most important one, their relatively small contribution to climate finance is surprising.

For business cases detected throughout the lifespan of **Green-Win**, this indicates that institutional investors are not likely to finance these projects. Other financing options will have to be sought out. For 2014, when analysing financial instruments employed for climate finance, the most striking observations are:

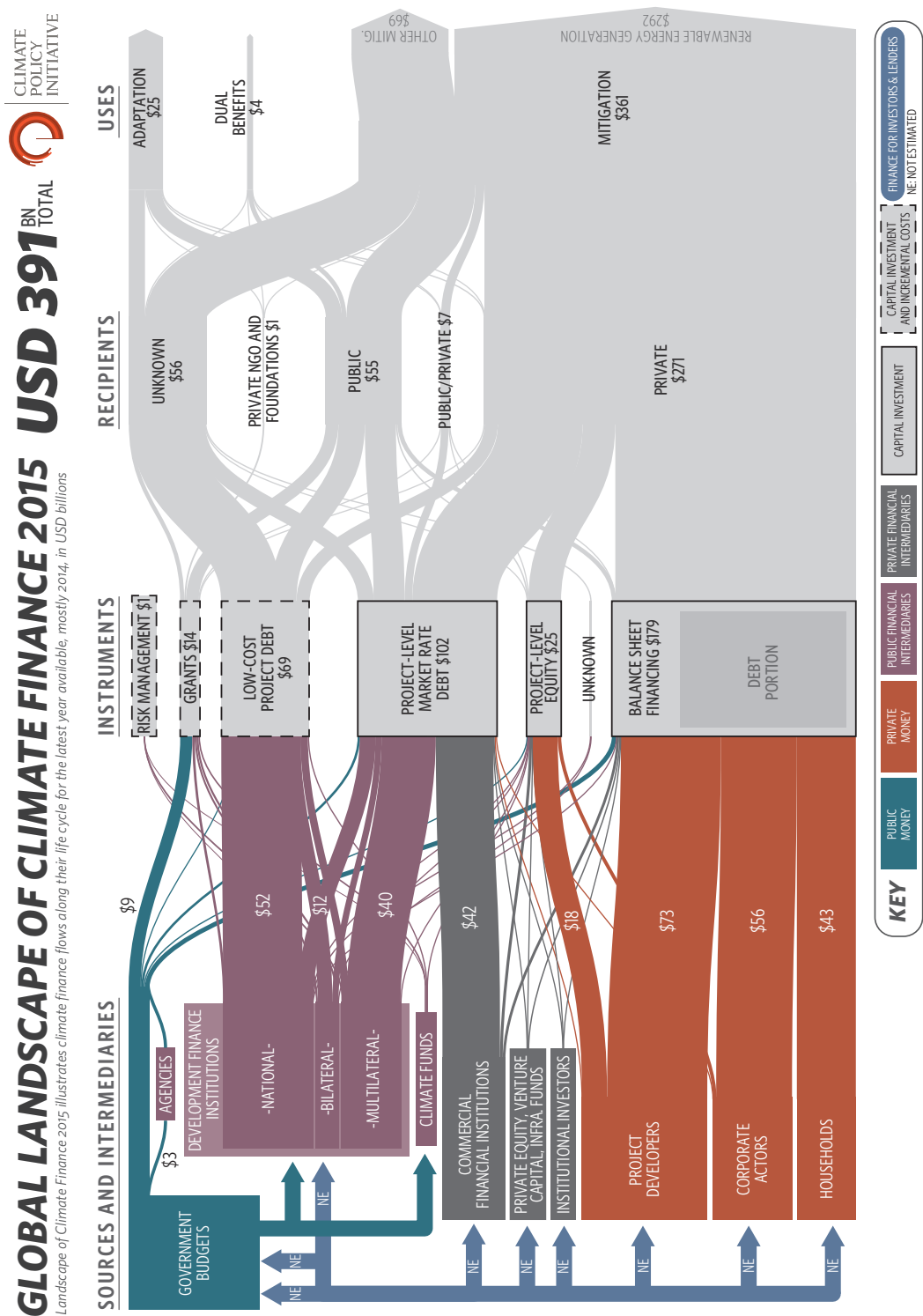
1. *“Private actors rely primarily on their own balance sheets to finance renewable energy projects. [...] The reasons for investors’ reliance on balance sheets can vary, including the size of the project (it can make more sense to finance small projects internally), difficulties in securing debt, high costs of capital, and other factors.”* (Buchner et al. 2015, p. 7). Balance sheet financing makes out 46 % of total climate finance, and is the one most important financial instrument of climate finance.
2. Making out 26 % of climate finance, project-level market rate debt is the second most important financial instrument of climate finance.
3. *“Public actors delivered more than half of their financing in form of grants and low-cost loans.”* (Buchner et al. 2015, p. 10) Together, grants and low-cost loans make out 21 % of total climate finance.

Concerning **Green-Win**, this indicates that for small endeavours it could result difficult to find other than balance sheet financing instruments.

According to Buchner et al. (2015, p. 7) the majority of finance flows remained in the country of origin (74 % of total climate finance flows, and up to 92 % of private investments). The first destination of climate finance flows being East Asia and the Pacific with 31 % of total climate finance flows, followed by Western Europe accounting for 24 %. China alone accounts for 22 % of total climate finance flows (ibidem, p. 10).

While climate finance reached its highest level with USD 391 billion in 2014 since surveys on the climate finance landscape started in 2011, and the contribution of public finance has been increasing steadily every year from USD 96 billion in 2011 to USD 148 billion in 2014, these numbers are small compared to fossil fuels expenditures. According to Climate Policy Initiative (2016) the public support of climate finance in 2014 sum up to less than a third of government subsidies for fossil fuel consumption of ca. USD 490 billion. These figures reflect an on-going trend. Even if the investments in renewable energy generation, distribution and storage have been increasing constantly, the investments into energy supply from fossil fuels show a similar development. In 2013, the share of fossil fuels supply related investments were around 70 % of the overall energy supply related investments (IEA 2016), reaching USD 950 billion and having more than doubled in real terms since 2000 (Buchner et al 2014, p. 5).

Figure 16: Climate finance landscape 2015



Source: Buchner et al. (2015, p. 2)

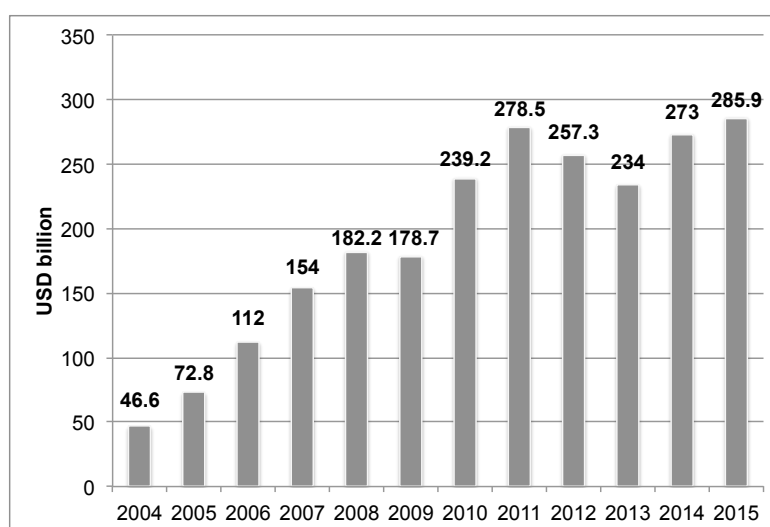
9.8 Green energy finance

Within climate finance the green energy finance is the most important investment destination. Thereby it is a proper subset of climate finance and therewith of green finance too, as depicted in Figure 6. Green energy finance captures investments funding renewable energy and energy efficiency.

IEA (2015, p. 16) estimates that global energy efficiency investment in buildings amounted to USD 90 billion (+/- 10 %) in 2014. Energy efficiency investment into buildings refers to one specific kind of energy efficiency investments only, leaving out for instances machinery and process energy in production processes. As already explained in chapter 9.7, it is difficult to track energy efficiency flows and they are likely to be underestimated.

Compared to energy efficiency finance, yearly investment flows into renewable energy are significantly higher. Figure 17 shows the development of renewable energy finance from 2004 to 2015.

Figure 17: Global new investments in renewable energy by asset class (USD billion)



Source: Frankfurt School-UNEP Centre/BNEF (2016, p.12)

Renewable energy finance has been growing continuously from USD 47 billion in 2004 to USD 286 billion in 2015. Green energy finance makes out just over 70 % of climate finance. The development of yearly investment flows into green finance can largely be explained by the development of yearly investment flows into green energy finance. As already seen for climate finance in Figure 15, for green energy finance too, yearly investment flows decrease between 2011 and 2013, before reaching a new maximum in 2014.

10. Green finance and selected financial market actors

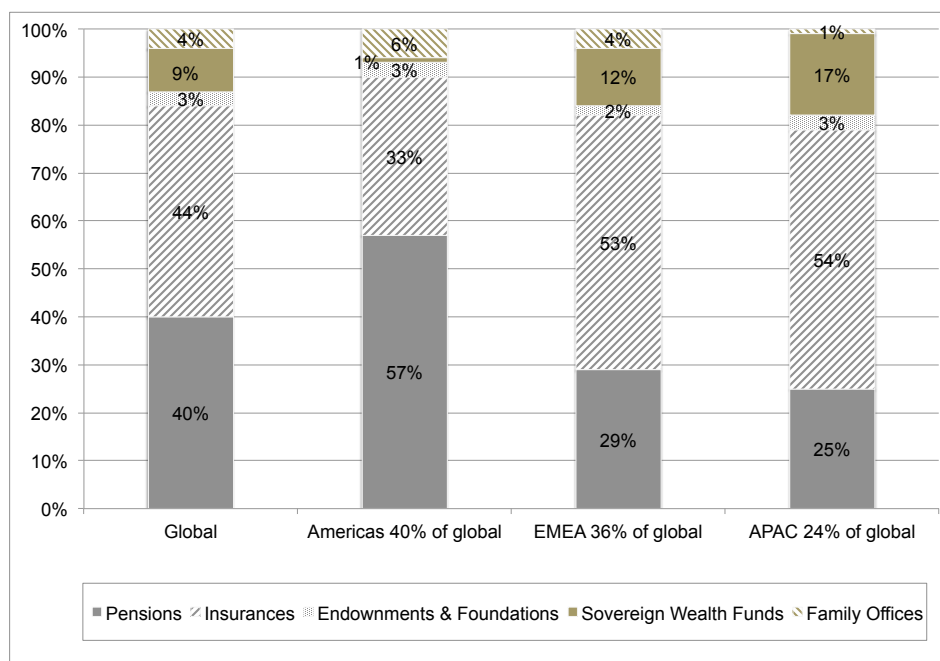
10.1 Introductory remarks

The following chapter will focus on selected actors on the financial market that either play a relevant role on the green finance landscape today or have the potential to do so in the nearer future. There are many key actors and influential forces when it comes to sustainable and responsible investment (SRI), impact investing and green finance. Therefore not all of them can be discussed in this framework. This chapter will focus on those from the financial ambit, being **asset owners**, **asset managers** and **intermediaries** others than asset managers. There are financial entities that intervene in more than one of these categories; and boundaries are therefore not always very clear in practice. This chapter will focus on the specific activities and responsibilities, as well as the different functions these categories of actors have within the financial landscape and on how they do or could contribute to developing the green finance landscape. Other influences on the development of the green finance landscape, like governments, media and NGOs, will not be analysed here.

10.2 Asset Owners

Asset owners are those holding the legal ownership of assets, while they may manage these themselves or outsource asset management functions to asset managers. Examples for asset owners are pension funds, insurance companies, banks, sovereign wealth funds, foundations and endowments, family offices and individuals. Each of these groups of asset owners faces different investment objectives and constraints. For some of them the main investment objective is to generate the income necessary to meet future liabilities (e.g. pension funds, insurance companies and banks), while others primarily seek to preserve their principal and to maximize long-term returns (e.g. foundations and endowments). Further, investment allocation decisions differ in accordance with capital markets outlook and with constraints imposed by charters and regulatory and accounting rules. These vary across groups of asset owners and even within groups of asset owners. Individual investors face very different investment objectives, not only compared with each other, but also over the course of their life. Some examples are retirement planning, saving to purchase a home or saving for a child's education. (BlackRock 2014, pp1&2)

Figure 18 shows the most important institutional investors as of assets under management, being insurance companies, pension funds and sovereign wealth funds. These three categories will be analysed in more detail for their inclination towards green finance. Another category of investors this report analyses are individual investors.

Figure 18: Global AUM as of different geographic regions and institutional investor groups (estimated as of 2013, in %)

Source: World Economic Forum (2014), (For the Americas, the percentage of Pensions has been modified from 58 % to 57 % in order to match a total of 100 % of assets under management for the Americas.)

10.2.1 Insurance companies

As of Figure 18, insurance companies make out an important portion of institutional investors in terms of assets under management (AUM). The World Economic Forum (2014) estimates their share of worldwide AUM to reach 44 % as of 2013, making insurance companies the largest group of asset owners on a global level. As of Figure 11, global assets under management amount to USD 69 trillion in 2013. This makes USD 30 trillion held by insurance companies in 2013. *“Insurance companies include property and casualty (P&C), health, life, monoline, and reinsurers. Each type of insurance company has a different business model with specific products from which they project their liabilities. While individual company portfolios differ significantly, the asset allocation of a typical insurance company is heavily weighted towards high quality fixed income securities. These companies try to earn a spread while matching their liabilities and meeting various regulatory and rating agency constraints.”* (BlackRock 2014, p. 4)

Insurance companies role for the green finance landscape

Concerning the SRI landscape, insurance companies are active players on many national and regional markets, sometimes even pioneers in their respective markets. Insurance companies, and especially reinsurers, are well-informed about climate change and many other sustainable development related issues. What are externalities and extra-financial risks and opportunities to most businesses, are the core business of insurance companies. They have high-level in-house research teams dedicated to matters like climate change and its implications. They should be keen on investing in a way to separate potential financial losses from potential operational losses, and thus, they should be the ideal green finance adherents.

However, most impact investing and green finance products available today are unlikely to match investment constraints insurance companies are facing. Their investment portfolios are already heavily inclined towards fixed income securities with investment grade ratings. Impact investment and green finance options dedicated to establishing innovative new business models are perceived as high-risk investments; and insurance companies have to

shun them. According to Nataxis (2015), with the implementation of Solvency II in Europe and Dodd-Frank regulations in the U.S. insurance companies are now facing new and even stricter liquidity and risk standards, limiting them further in their investment options. As a result, in the future, insurance companies worldwide are likely to increase their share of alternatives, investing into real estate and infrastructure projects.(NATIXIS 2015).

While investment grade green bonds match the risk/return profile of insurers, most business models expected to form part of the **Green-Win** project are not very likely to be financed by insurance companies, the **Green-Win** business models very likely being too small, too illiquid and too risky. While insurance companies actively engage in sustainable and responsible investment (SRI), they are unlikely to do so in green finance unless product options matching legal constraints on their investment policies are to be available. However, as their exposure to alternatives is expected to increase, their potential engagement into large real estate and infrastructure projects with a sustainable development aspect is a topic open for further investigation.

10.2.2 Pension Funds

As of Figure 18, pension funds make out an important portion of institutional investors in terms of assets under management (AUM). The World Economic Forum (2014) estimates their share of worldwide AUM to reach 40 % as of 2013, making pension funds the second largest group of asset owners on a global level. As of Figure 11, global assets under management amount to USD 69 trillion in 2013. This makes USD 28 trillion held by pension funds in 2013. Pension funds are asset pools established by companies, governmental institutions and labour unions. They are bound to meet future liabilities to pensioners. In order to do so, they manage their funds by balancing two objectives: increasing returns while reducing volatilities of their portfolios. Their investment options are limited as they have to meet regulatory and accounting rules. BlackRock (2014) finds that in *“reviewing pension asset allocation trends over the past twenty years, there is a significant shift into so-called ‘alternative’ investments such as real estate, private equity, and hedge funds as well as a liability-driven shift into (longer duration) fixed income”*(BlackRock 2014, p. 3).

Pension funds role for the green finance landscape

Pension funds have taken on an influential role in shaping the SRI landscape in the past, pioneering in their respective national markets as first movers, actively participating in setting voluntary standards and pushing initiatives. There are different reasons behind their engagement on the SRI market:

1. Sovereign and public pension funds make out 141 of the top 300 pension funds, managing 67 % of total pension funds' assets within this group (Towers Watson 2015 p. 5). Especially these sovereign and public pension funds, as well as any other pension funds managing large amounts of retirement savings on the behalf of future pensioners, are vulnerable to having their investment policies scrutinized and publicly criticised. NGOs and the media are keen on investigating companies that are of public interest when stating an example.
2. In their investment policies pension funds are bound by fiduciary duties. Whether, and if so to what extent, ecological, social and corporate governance (ESG) aspects can or must be taken into account in the portfolio selection and management process and are part of fiduciary duties is a contested subject with fervent opponents and proponents. With the change of the century, national governments started to issue binding regulations concerning the treatment of ESG characteristics in pension fund portfolios. In some countries, pension funds have to report on their ESG integration practices (e.g.: Austria, France, Germany, United Kingdom). In some countries pension funds are bound by law to make SRI an integral part of their investment policies (e.g.: New Zealand, Norway, Sweden). Notwithstanding, the maximisation of returns at a given risk remains the first order objective to which pension funds are bound by fiduciary duty, ESG considerations

being secondary to this objective. However, these regulations back pension funds' engagement within the SRI landscape.

While pension funds are very proactive members of the SRI landscape, they are not so on the green finance landscape. As it is the case for insurance companies, pension funds are also bound to design their investment policy within a framework of regulatory and accounting standards they have to meet. Therefore, again, investment grade green bonds are probably close to the only investment option available on the green finance landscape for pension funds. Unless appropriate investment options become available on the market, pension funds are not likely to take on a key role on the green finance landscape as they did and do on the SRI landscape. They have however started to take on larger shares of alternatives over the past years. Investigating their experience to date and their potential engagement into large real estate and infrastructure projects with a sustainable development aspect is a topic open for further investigation.

10.2.3 Sovereign Wealth Funds

Sovereign wealth funds (SWFs) are a small but growing segment of institutional investors. As of Figure 18, the World Economic Forum (2014) estimate their share of worldwide AUM to reach 9 % as of 2013, making them the third largest group of asset owners on a global level. As of Figure 11, global assets under management amount to USD 69 trillion in 2013. This makes USD 6 trillion held by sovereign wealth funds in 2013. *"A Sovereign Wealth Fund (SWF) is a state-owned investment fund or entity that is commonly established from balance of payment surpluses, official foreign currency operations, the proceeds of privatizations, government transfer payments, fiscal surpluses, and/or receipts resulting from resource exports. The definition of sovereign wealth funds excludes, among other things, foreign currency reserve assets held by monetary authorities for the traditional balance of payments or monetary policy purposes, state-owned enterprises (SOEs) in the traditional sense, government-employee pension funds (funded by employee/employer contributions), or assets managed for the benefit of individuals."* (SWFI 2016b). According to Prequin (2015, p. 2), SWFs *"invest to aid national policies and to stimulate financial markets"*.

As of 2015, 70 % of sovereign wealth funds are invested at least into one alternative asset class⁶, with infrastructure (60 % of SWFs) and real estate (59 % of SWFs) being the most favoured alternative asset classes. 58 % of sovereign wealth funds are invested in economic infrastructure and 44 % in social infrastructure; 86 % of SWFs are invested in fixed income and 81 % in public equities. A breakdown of SWFs by regions puts Asia (44 %) first, followed by MENA (34 %) and Europe (16 %). (Prequin 2015, pp. 2, 6 & 9).

The World Bank sees SWFs as *"a promising source of long-term finance, given their long investment horizon and mandate to diversify economic risks and manage intergenerational savings"* (World Bank Group 2015, p. 4)

SWFs role for the green finance landscape

Some characteristics unique to SWFs make them potential actors on the green finance landscape. Given their vast amounts of funding – assets under management can reach amounts that cannot be invested locally because they exceed the possibilities of the national economy – they can pursue long-term strategies and political agendas. Besides pure economic and financial objectives, social and ecological objectives can be at stake when it comes to the conception of an SWF. The very reason for the creation of a SWF could be the objective to enhance green growth and sustainable development, if not the whole SWF, so at least a separate sub-fund⁷.

⁶ Alternatives include hedge funds, private equity, real estate, infrastructure, and commodity funds. (BCG 2015, p. 13).

⁷ Among common objectives to launch an SWF are the funding of social and economic development and the increase in savings for future generations (SWFI 2016a). These objectives are clearly aligned with sustainable development.

Lack in transparency and accountability is an issue for many of the largest sovereign wealth funds. This in itself is an obstacle to making SWFs suitable candidates for a sustainable and responsible investment strategy, as transparency and accountability are core elements of it. Nevertheless, SWFs can pursue objectives aligned with green growth and sustainable development to some extent. Also, once their most criticised flaw, SWFs are becoming increasingly transparent, and they are “*playing an active and stabilizing role in the economic and social development of nations*”. (Prequin 2015, p. 9).

As SWFs increase their exposure to alternative investment strategies, they could play an important role when it comes to financing infrastructure and real estate projects with a sustainable development and green finance component. Concerning **Green-Win**, when it comes to the coastal protection business cases with their important investment volumes and long-term investment time frames, this could be of interest.

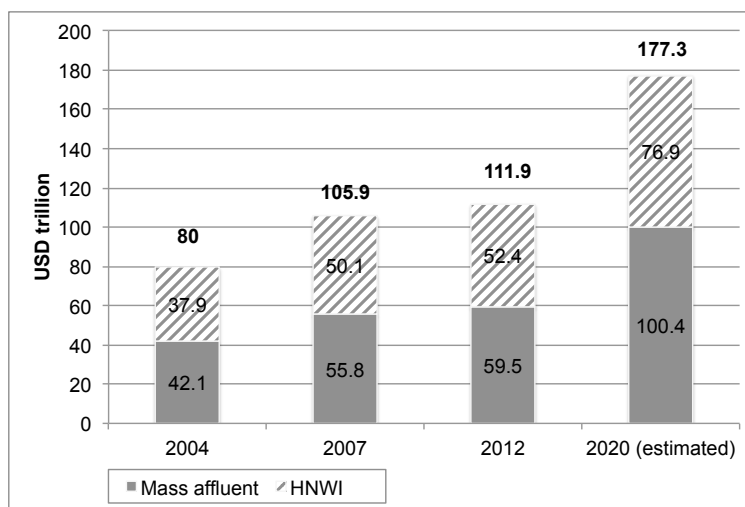
According to SWFI (2016b) another interesting feature of SWFs is that “*they tend to prefer returns over liquidity, thus they have a higher risk tolerance than traditional foreign exchange reserves*”. When this higher risk tolerance, coupled with long-term investment horizons, meets a political interest in green growth, this could make an SWF a candidate for investment into **Green-Win** business cases that are considered too high-risk for other institutional investors.

The ideal conditions for SWFs to actively become involved in the green finance landscape call for a more detailed analysis concerning the political environment and the availability and development of adequate financial products and services.

10.2.4 Individuals and households

“[Individual] investors encompass a broad range of investor types. Likewise, the investment objectives of individual investors vary widely and include saving for retirement or a child’s education, generating investment income, wealth preservation and many more. Further, investment objectives and ability to take on investment risk often change dramatically over an individual’s life course. Given the wide array of investment objectives that individual investors can have, it is difficult to generalize; however certain behaviors can be observed. [...] [According to BlackRock,] approximately 60 % of individual investors’ investable assets are in cash or cash equivalents, with a relatively small proportion dedicated to other types of investments [bonds, alternatives and others]. Indeed, the psychological impacts of the financial crisis are still impacting individual investors – with many individuals’ asset allocations reflecting continued risk aversion despite steady gains, particularly in equity markets, in recent years. [Many] (but not all) individual investors rely on advice from financial advisors [(intermediaries)] to help them build their portfolio.” (BlackRock 2014, pp. 6-7)

Figure 19 shows that assets held by individuals have constantly been growing since 2004. In 2012, between high net worth individuals (HNWI) and mass affluent, individuals hold USD 111.9 trillion in assets under management. By 2020, they are estimated to hold USD 177.3 USD trillion.

Figure 19: Development of AUM for HNWI and mass affluent (USD billion)

Source: pwc (2014, p.9)

Individuals and households role for the green finance landscape

Two different groups of individual asset owners can potentially have an impact on the development of the green finance landscape. They are high net worth individuals (HNWI) and the mass affluent. As the total AUM of HNWI and mass affluent continue to grow, they have an increasing potential of becoming actively involved with and visible within the green finance landscape. Depending on their personal values and priorities, it is possible that they will seek to have a positive social and environmental impact beyond their financial objectives when selecting investment options. However, individuals and households first have to be aware of the existence of the green finance landscape before they will be able to consider it in their consumption and investment choices. Thus when it comes to improving financial literacy of individuals and households, not only the component of long-term finance is fundamental, but also the green finance component. If individuals become more knowledgeable about and collectively ask for greener and more sustainable and responsible investment options, this would lead to a greening of the financial landscape.

Individual investors already play an important role in climate finance. In 2014 households contributed USD 43 billion, or 18 % of private investment (USD 243 billion) and 11 % of total climate finance (USD 391 billion) (Buchner et al. 2015, pp. 2, 4 & 5). Households' yearly contribution to climate investment might be even higher. (Also see chapter 9.7 for difficulties in tracking climate finance and reasons for under-accounting.)

In summary, individuals and households already play a key role on the green finance landscape and most probably they are more actively involved than traced by surveys. While there is leeway to improve the engagement of individuals and households within the green finance landscape, some questions remain unanswered:

- To what extent are individuals aware of the existence of the green finance landscape?
- How much of their assets are individuals willing to invest green?
- Is there a demand that is not met by the offer of green finance products?
- How can the demand of individual investors for green finance be activated?

10.3 Asset Managers

Instead of managing their assets themselves, asset owners might prefer to outsource the management of some or all of their assets and hire external asset managers to manage their assets via funds or separate accounts. Asset managers are not the legal owners of the

assets under management, nor are they the counterparty of transactions or derivatives. But they are responsible to select and manage portfolios on behalf of their clients, the asset owners, in accordance with their mandate. Asset managers have a duty to act as a fiduciary on behalf of their clients and they are bound to make investment decisions that are in line with the investment management agreement or the fund constituent documents. (BlackRock 2014, pp. 1 & 7)

The total AUM of the largest 400 asset management companies worldwide has increased from USD 46.9 trillion as of end 2011 to USD 60.9 trillion as of end 2014. With USD 4.7 trillion of AUM, BlackRock is the largest asset manager worldwide and accounts for almost 8 % of overall asset managers' AUM. The largest 10 asset management companies account for a third of all asset managers' (Investment & Pensions Europe 2015). According to BlackRock (2014, p. 5) a fundamental reason for the increase of AUMs managed by professional asset management companies is that many asset owners are deciding to outsource the management of larger portions of their assets.

The asset management industry is changing. Growing pressure on fees contributes to an increased offering of passively managed portfolios. Besides this continuous shift away from actively managed portfolios towards passively managed portfolio, another development observed is a growing share of solutions, specialties and alternatives (BCG 2015, pp. 11-12 and pwc 2014, pp. 28-30).

Passively managed portfolios, mostly indices, are not very likely to contain green finance solutions at this point of time. Green finance indices are likely to emerge as the ecosystem and infrastructure around the green finance landscape develops. While a development towards more passively managed portfolios does not favour green finance at this point of time, the development towards more solutions, specialties and alternatives may at least include some green finance. These financial products could be inclined towards green finance, at least in parts, if asset owners should wish so.

The amount of assets under management outsourced to asset managers can only take into consideration climate change and sustainable development aspects if there are asset managers that offer products that, in addition to financial considerations, also embrace extra-financial aspects. Thus, only if asset managers pay more attention to extra-financial aspects in their portfolio selection and management processes, then asset owners will be able to assign their outsourced funds to greener and more sustainable and responsible investments. However, "[according to BlackRock's experience,] *in practice, the majority of investment products that capture the bulk of asset flows are developed based on the needs of asset owners and their allocation of assets to these strategies*" (BlackRock (2014, p. 8).

Referring to green finance, this implies that the impulse for greening the financial landscape has to come from the asset owners themselves, rather than from the asset managers. The responsibility of asset managers is to capture the interest of asset owners in green finance and offer products tailored to their clients' needs, objectives and constraints. There are some positive signs that this is happening as the needs and interests of asset owners are changing.

Institutional investors, and particularly so pension schemes and endowments, are becoming more and more interested in investment strategies conceived to avoid reputational risks. Today, reputational risk avoiding products are fringe strategies, but they might soon become material components of many institutional investors' portfolios. Increasing consciousness among institutional investors about the scarcity of natural resources in particular and natural resource risks more generally will lead to continuous changes in product demand and investment policies. Consequently, as these risks become more important for the clients of assets management firms, the latter will shift their focus towards these risks too and they will begin to treat natural resource risks in the same way as they treat other risks they are facing (pwc 2014, p. 35). Asset management firms have to recognize this constantly changing landscape and make change, policy and societal challenges a key component of their strategies. Their communication will have to go beyond investors and address policy makers

and the community at large alike. If asset management firms want to thrive in the future, they have to position themselves as “*part of the solution rather than part of the problem*” by “[*creating*] *positive social impact*” and by clearly communicating and convincing all stakeholders that “*they are a force for good*”. (ibidem, pp. 22 & 36). Asset managers will have to increase their understanding of regional characteristics, specific investor needs and geopolitical issues. Improvements in transparency, alignment of interests, efforts to educate their clients and the building of trust will be crucial for asset managers to survive. Perceived secondary to banks and insurers, they will improve their visibility in the financial landscape and gain importance and impact. They are likely to become more involved with the financing of infrastructure solutions, tailoring solution-based products specifically for the retirement and healthcare market, raising and deploying capital required to meet the demands of growing urbanisation and cross-border trade (ibidem).

Concerning impact investment landscape, already today, asset managers play an important role. As described in chapter 9.5, rather than the asset owners themselves, it is the asset managers that make direct investments when it comes to impact investment. As they gain experience with impact investment, they will probably play an even more active role in the future, also in the green finance landscape.

For **Green-Win** this development implies that asset managers are becoming ever more likely to invest in large infrastructure projects oriented towards sustainable development and a green economy. Also they are likely to develop products somehow related to selected sustainable development goals. Thus some years from now, there may very well be products regrouping small projects as those we expect to find within **Green-Win**. However, while this outlook is promising, the changes expected will probably become visible too late for smaller **Green-Win** projects to profit from them.

10.4 Intermediaries (other than asset managers)

Intermediaries (e.g. institutional investment consultants, registered investment advisors, financial advisors) are actors on financial markets that provide investment advice to asset owners. They also select and manage portfolios. Intermediaries further “*conduct due diligence of managers and products*” (BlackRock 2014, p.1).

According to BlackRock (2014, pp. 9-10) institutional as well as individual asset owners consult intermediaries and seek out their assistance with asset allocation and re-allocation. Large institutional investors have their own in-house investment consultants and financial analysts and other specialised professionals. For additional insight, they contact external intermediaries. The same is valid for large asset managers, counting with in-house expertise and consulting external intermediaries when needed. This chapter will deal with intermediaries other than asset managers (see previous chapter for asset managers) and their role in shaping the green finance landscape.

The development of the sustainable and responsible investment (SRI) landscape is an example of how the market of SRI grew both in width and depth as the number of intermediaries involved with SRI started to evolve. Modern sustainable and responsible investment as we know it today developed over the second half of the 20th century. At first, specialized boutique product and service providers offered customised solutions to their clients on demand. As interest in and demand for SRI products and services continued to grow, so did the range of products and services offered. In the 1990s, the first SRI indices were created, making SRI options available and affordable for a wider public. The offer of SRI products became ever more standardized and less tailor made as the SRI market started to consolidate and concentrate in the 2000s. Existing specialized boutiques started to merge and big international mainstream players entered the SRI landscape, buying up existing specialists or fostering in-house expertise. By now the SRI landscape is, in addition to asset owners and asset managers, populated with financial consultants, index providers, rating agencies, business consultants, lawyers, NGOs, reporters, academics and professionals from any other imaginable ambit somehow related to the financial sector and

business activity that have specialised in SRI. They all contribute to stressing the relevance of environmental, social and corporate governance (ESG) considerations to financial performance. Among them, climate change is widely being recognised as a key driver of the SRI market development with the potential of mainstreaming SRI.

The more intermediaries know about sustainable development and climate change and the more emphasis they put on related aspects in their analysis and recommendations, the more extra-financial aspects will transcend to both asset owners and asset managers. As intermediaries investigate deeper into the matter and develop expertise in it, the quality of their assessments of traditionally non-financial aspects of investment rises, as well as their understanding of the interrelations of finance with climate change and sustainable development.

While intermediaries emerge on a financial landscape as demand for them arises, and their areas of activities grow ever more sophisticated as demand for more detailed and more profound analyses prevails, their activities are likely to also have an awareness raising, educational and sensitisation impact on asset owners, asset managers and other market participants.

By scrutinizing asset managers and financial products not only for their financial performance, but also for their social, ecological and ethical (SEE) performance, or, in other words, non-financial impact, asset managers and other providers of financial products and services become more conscious about extra-financial information the market is looking for and they start to better understand the impact their investment decisions have on sustainable development and climate change.

Most asset owners receiving SRI relevant information explicitly ask for it. By informing asset owners about the implications of their investment options on climate change and sustainable development, asset owners become more and more aware of these aspects of potential investment choices and their understanding of extra-financial information improves as they receive more precise and more elaborate information.

The SRI landscape has grown a whole ecosystem and infrastructure of financial intermediaries. Concerning impact investing and green finance, a comparable ecosystem and infrastructure still has to develop, as already mentioned in chapter 9.6. When it comes to intermediaries, the need for professionals concerned and experienced with impact investment and green finance goes far beyond asset managers and financial consultants. There is a need for specialists and experts in all related areas: “*bankers, management consultants, lawyers, accountants, public relations firms, [...] business schools*” (G8 Social Impact Investment Taskforce 2014, p. 10), rating and certification agencies, specialised stock exchanges, policy makers, government and voluntary industry initiatives issuing guidelines, technical assistance and general operating support entities, researchers, specialists and experts. The handling of risks and opportunities related to impact investment and green finance call for innovative approaches and solutions for matters like technical and management assistance, possibilities of decoupling of risks, pooling of projects and examples of governmental or other support for early stage impact investment.

11. Conclusion and outlook for Green-Win

Most of Green-Win business models are expected to be small endeavors at an early stage of their business activity. For a business model to be transformed into a successful business, it needs to be financially and economically viable on the market, independent of the business model being green or non-green. For green business models this implies that, if in the medium and long term they want to succeed without relying on public support schemes, they have to be financially and economically competitive with non-green business models.

Currently, green finance still represents a relatively small share of financial markets, irrespective of differences in definitions, data collection methodologies, and whether one focuses on stocks or flows. Transitions between impact investment, including both environmental and social impact, to green impact investment are fluent, as definitions of green finance to some extent tend to include social objectives targeting the sustainable development goals. Also, climate finance, making out the largest and most comprehensively surveyed share of green finance, is sometimes used as a synonym for green finance. This makes a clear and generally accepted delineation of the green finance landscape both from a conceptual as well as from a quantitative perspective difficult.

From an institutional investor perspective as of 2014, the *stock* of impact investment reaches USD 60 billion (J.P. Morgan and GIIN 2013, pp. 4-6), making out only 0.08 % of total assets under management, amounting to USD 74 trillion in 2014 (BCG 2015, p. 7). A complete survey on climate finance goes far beyond institutional investors, who play a minor role in climate finance, and also tracks yearly investment *flows* by other private market participants being individuals, households, corporate actors, project developers and commercial financial institutions as well as public market participants being development agency institutions, governments and agencies. Total climate finance is reported to amount to USD 391 billion throughout 2014 (Buchner et al. 2015, pp. 2), a mere 2.3 % of worldwide capital formation being USD 17 trillion in 2014 (World Bank 2016b).

There are different potential reasons for the green finance landscape making out only a minor share of the global overall finance landscape that can be related to the green capital supply or demand side, or based on coordination challenges within financial markets:

- There is a limited interest in financing green business cases.
- There is a limited offer of green business cases seeking capital.
- Green business cases seeking capital do not meet selection criteria of investors.
- Green business cases secure capital from outside the green finance market.
- There are other structural reasons for the offer of and demand for green finance not matching up.

For a green transition of the economy to take place the green finance market has to develop further in size and depth, covering the offer and demand side of capital, and also including all intermediates in-between and other relevant actors surrounding this market landscape.

Findings from this report suggest that there is an interest from the asset owner side to invest green but that there is a lack of appropriate products and services and it is rather unlikely for asset owners to directly invest into green business models, especially at an early stage of development that is perceived to be a high-risk investment.

Future development of the green finance landscape will therefore crucially depend on asset managers and other intermediaries to develop a comprehensive ecosystem and infrastructure dedicated to green finance. It is particularly the asset managers' responsibility to come up with solutions embracing social and environmental objectives their clients are interested in and to develop products and services meeting asset owners' investment objectives and concerns, as well as the legal and accounting requirements and constraints they are facing.

Asset owners call for impact investment options to better match their needs on the following aspects:

- appropriate risk/return spectrum (including adequate risk management for business model execution and management risk, liquidity and exit risk, market demand and competition risk, financing risk, country and currency risk),
- viable products and services (in terms of scale and scalability, track record, liquidity, volatility, investment style and other characteristics to match asset allocation constraints),
- transparency and comparability concerning social and environmental impact, and
- advice and expertise provided by skilled and experienced professionals.

Taking into consideration these findings concerning the green finance landscape, the present report opens up to a number of new research questions relevant to the successful implementation of **Green-Win** business models. The following two research questions are at the very centre for future investigation relevant to boosting the green economy:

- I. **How can more investment be directed towards a green economy?** and
- II. **What are the current barriers to financing SMEs as well as green businesses and how can they be overcome?**

Efforts in finding an answer to these two core questions aimed at a better understanding of the relationship between green finance and the green economy will have to be directed towards investigating selected topics of the following array of open questions detected throughout this report:

1. Why is it that the Green Finance Landscape is so small compared to the overall global finance landscape? Which reasons related to the green capital supply or demand side, or based on coordination challenges within financial markets can explain this situation?
 - a. Why are there not more green business cases seeking for capital on the green finance market?
 - b. What is it that keeps asset owners from embracing green finance?
 - c. When it comes to asset managers and other intermediaries, what kind of products and services do they have to develop in order to better match green capital demand and supply?
2. Who are the investors targeting early-stage high-risk investment options when it comes to SMEs? Is this any different when it comes to green SMEs, or do they face the exact same challenges in securing early-stage high-risk capital as their non-green competitors? Who are the seed / early-stage / venture capital funds specialised in green finance and what sets them apart from their competitors on the financial market?
3. Who are the investors that engage in impact investment at below market rates? What are their motivations? And what does this mean for green finance and the **Green-Win** project?
4. Considering that sustainable and responsible investment is reaching mainstream investors, what is it that keeps institutional investors from embracing green finance?
5. Is there anything specific about investors targeting green business cases? How do they differ from investors selecting business cases without contemplating their greenness?
6. What are investors' respective risk-return preferences? How do investors evaluate expected risk and return characteristics of investment options? When it comes to green finance, is there anything else that is different in their investment selection and management processes beyond caring for and measuring sustainability/greenness? Can certain risk-return profiles be systemised for green business models? And if yes, how?
7. What can asset managers do to match the risk/return profiles and other investment characteristics and requirements of asset owners? Who are the actors on the financial

market concerned with de-risking or blended finance? Who are the actors on the financial market concerned with aggregation of business models (funds and funds of funds)? How do they include green (and social) impact in their business activities? As the demand for solutions, specialties and alternatives is growing, are there any actors specifically targeting green finance and offering solutions, specialties and alternatives featuring green (and social) impact?

8. When it comes to measuring extra-financial impact, how can the process of evaluating social and environmental impact of investment options become more transparent and make investment options more comparable? How do investors measure the sustainability/greenness of business models and to what extent does this have an influence on asset selection and management processes?
9. What is needed to assure the development of a comprehensive ecosystem and infrastructure dedicated to green finance? What can asset managers and intermediaries learn from the development of the sustainable and responsible investment landscape, which has been developing over decades now and thus is far more advanced, both in size and depth?

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