Best Practice Examples of Circular Business Models

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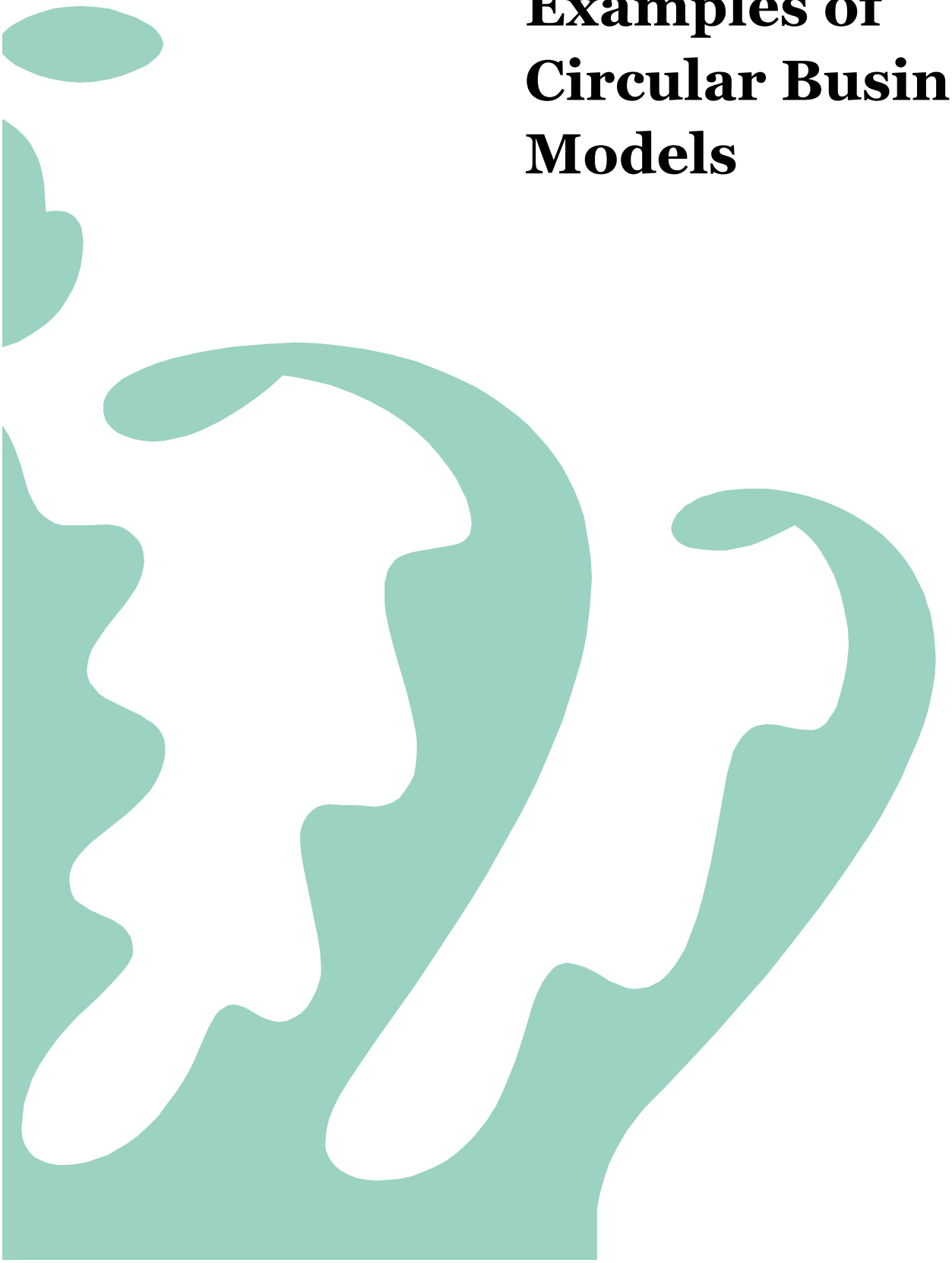

Title:

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Published by:

The Danish Environmental Protection Agency
Strandgade 29
1401 Copenhagen K
Denmark
www.mst.dk/english

Year:

2016

ISBN no.

978-87-93435-86-5

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Foreword

The present report is part of the project Closing Material Loops headed by Aalborg University, Department of Development and Planning and funded by Aalborg University. The project has received a grant from MUDP under the Ministry of Environment and Food.

It is the first of two reports based on the project work, and it focuses on best practice examples of business models oriented towards closing resource loops. The second report will concern the process of developing initiatives based on the circular economy in the eight companies, which have participated in the Closing Material Loops project.

This report would not have been possible if companies around the world, working with circular business models, did not share information about their considerations and operations. In particular, the author would like to thank Michael Aastrup, employed by Desso at the time, Kirsti Holleufer, Grundfos and Sébastien Zinck, Steelcase for giving interviews regarding their respective companies' work in relation to the circular economy.

Eva Guldmann
Aalborg, February 2016

Summary and conclusion

Best practice examples of circular business models are presented in this report. The purpose is to inform and inspire interested readers, in particular companies that aspire to examine the potentials of the circular economy.

Circular business models in two different sectors are examined, namely the textile and clothing sector as well as the durable goods sector. In order to appreciate the notion of circular business models, the basics of the circular economy are outlined along with three frameworks for categorizing the various types of circular business models. The frameworks take point of departure in resource loops, value bases and business model archetypes respectively, and they are applied for analysing and organizing the business models that are presented throughout the report.

The investigations in the report show that circular business models are relevant to businesses because they hold the potential to provide significant economic benefits in addition to new ways of forming partnerships with suppliers and connecting with customers. Furthermore, circular business models generate essential environmental benefits as a result of the improved resource productivity they offer. These benefits are, however, not the key focus of the current report.

The point of the study is to describe the diverse and unique circular business models that companies around the globe have established already within the textile and clothing sector and within the durable goods sector. Even though these two sectors are different, circular business models can be found in both. These models operate in both young and mature firms, small and large, which points to the fact that circular business models can be successfully implemented in a wide range of business settings as long as they are individually tailored to each company.

The notion of individualy tailored business models is important. Hence, the business models are found to be versatile in both industries, and speading across all of the aforementioned resource loops, value bases and business model archetypes. Some companies choose to focus on just one resource loop, while others are involved in several loops. Some work with resource loops in relation to their supply chain, invisible to the end-user, but others built relationships with end-users through new circular offerings. Moreover, in some of the best practice examples presented, resource loops are tightly closed, whereas in other cases they are more open due to initiatives being voluntary, experimental or small scale, covering only part of the market.

The study indicates that the ability of companies to apply life cycle thinking, which involves the entire value chain from sourcing to disposal, and to look for circular business opportunities in this flow of goods and value is key in a circular economy. Establishing new or closer collaboration with stakeholders within or beyond the traditional supply chain is another important skill in creating circular business models.

Many of the examined companies are found to apply a step-by-step or experimental strategy, where they test the resilience of a circular business model within a limited number of product lines or in one business unit at a time. This allows for a corresponding step-by-step organisational learning and for leveraging the risk associated with new ventures.

1. Introduction

In recent years, the concept of circular economy has been much debated. Circular economy has been presented as a concept with promising perspectives for generating profit in new and environmentally conscious ways.

However, it is not entirely clear, what circular economy is. Nor is it clear how companies might apply the newly canvassed ideas. The present report will look into these two issues. First, by giving a brief introduction to circular economy and the business potentials it proposes. Second, by providing examples of how companies around the world are currently selling products and services based on the nascent circular business models.

Special attention is given to examples from the textiles and clothing industry in addition to the durable goods industries. The best practice examples presented aim to demonstrate the diversity of business models found within these industries. Along with the business model frameworks, the examples are intended to provide an impression of the business opportunities in a circular economy that are already utilized by firms today and thus to provide inspiration for companies that wish to examine the potentials of circular business models for themselves.

2. Two types of economic model

2.1 The linear economy

The linear economy has been the prevalent economic model since the Industrial Revolution in the late 18th century. In the linear model, mining companies extract virgin raw materials, which are subsequently processed into products by other companies. The products are sold to customers, who use them for a given time depending on the type of product. Ultimately, the products are disposed of. The disposed products are landfilled or incinerated, mostly with little or no attempt to recover the products or the embedded materials. This linear flow of goods is illustrated in FIGURE 1.

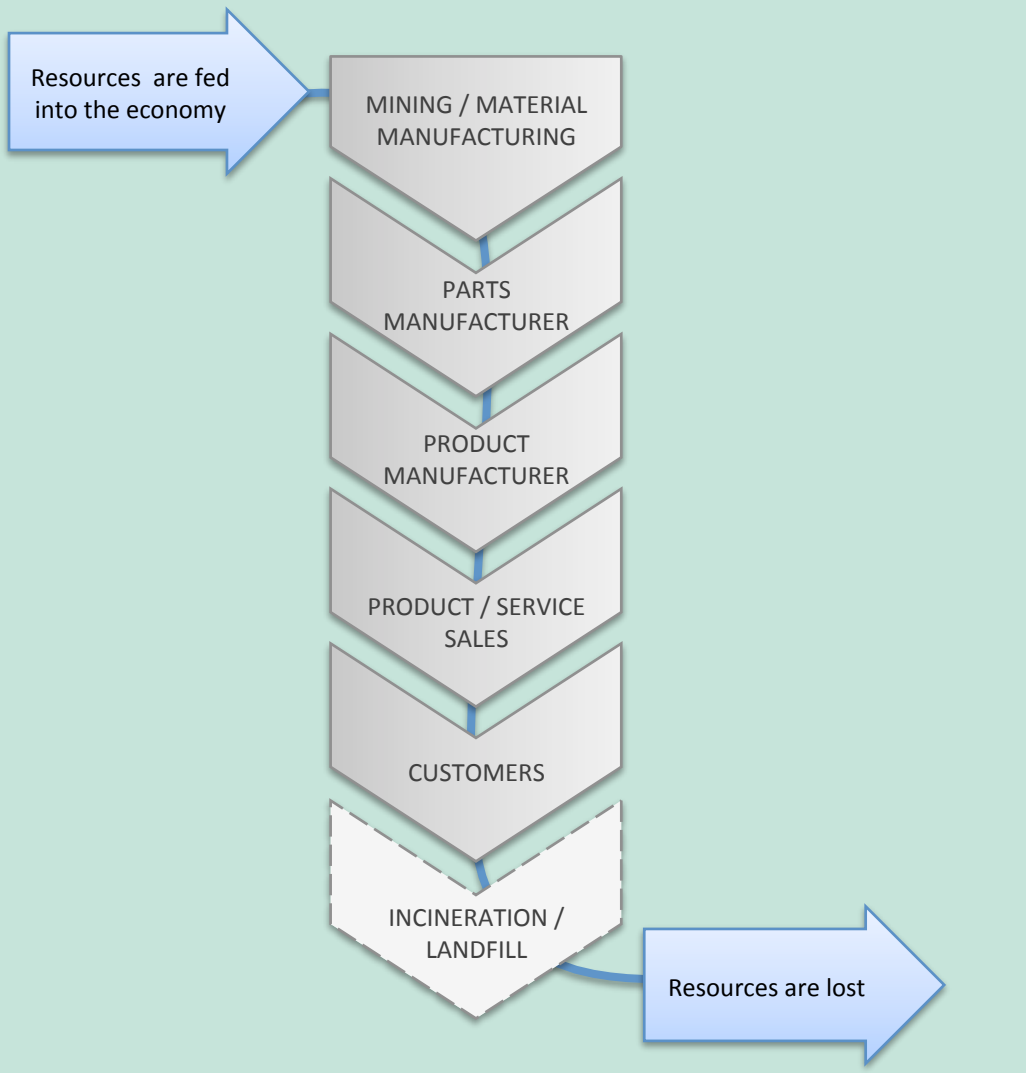

FIGURE 1 THE FLOW OF RESOURCES IN A LINEAR ECONOMY.

In an economy like this, raw material is in continuous demand. Hence, in 2010 no less than 65 billion tonnes of raw material entered the economic system (Ellen MacArthur Foundation 2013c). Global Footprint network explains, "(...) humanity now demands over 50 per cent more than what the planet can regenerate" (Global Footprint Network 2012, p.21). Despite ingenious ways of mining and extracting raw materials, non-renewable resources will inevitably be depleted at some point in time in this economic model.

According to some observers, the implications of material scarcity are evident already in the form of volatile markets and raw material prices (Rosenau-Tornow et al., 2009, Erdmann and Graedel, 2011 both cited Bakker et al. 2014, Ellen MacArthur Foundation 2013c). To the individual company this means uncertainty regarding raw material prices.

Material scarcity is not the only consequence of the linear production paradigm. The negative environmental impacts are also considerable, including climate change, destruction of natural habitats, and generation of waste just to mention a few. The notion of circular economy proposes potential solutions to some of these challenges.

2.2 Circular economy

Resource efficiency concerns getting the most out of the resources that are put into a production system. Resource efficiency has been of interest to the manufacturing industry for years, most recently expressed in manufacturing principles such as Just in Time, Six Sigma and Lean Production. The primary goal of these management strategies is to minimize resource use by identifying and eliminating wasteful procedures. These principles are founded on production philosophies developed by Toyota since the mid 1940'ies. The Toyota Production System itself was inspired by productivity improvements achieved by Ford and other American companies in the preceding 40 years. The philosophy goes back even further, and in fact making the most of the resources that are put into the production system has *always* been of interest to manufacturers.

Resource efficiency is also a cornerstone in the circular economy, but in a manner that is different from what was seen in past manufacturing philosophies. Circular economy is namely *more* than a manufacturing philosophy. It is a systems model in which every part of a product is considered a valuable resource that should be carefully handled from cradle to cradle. Not just within the boundaries of the traditional supply chain, but stretching beyond that to consider raw material sourcing along with the use and disposal phase of the company's products.

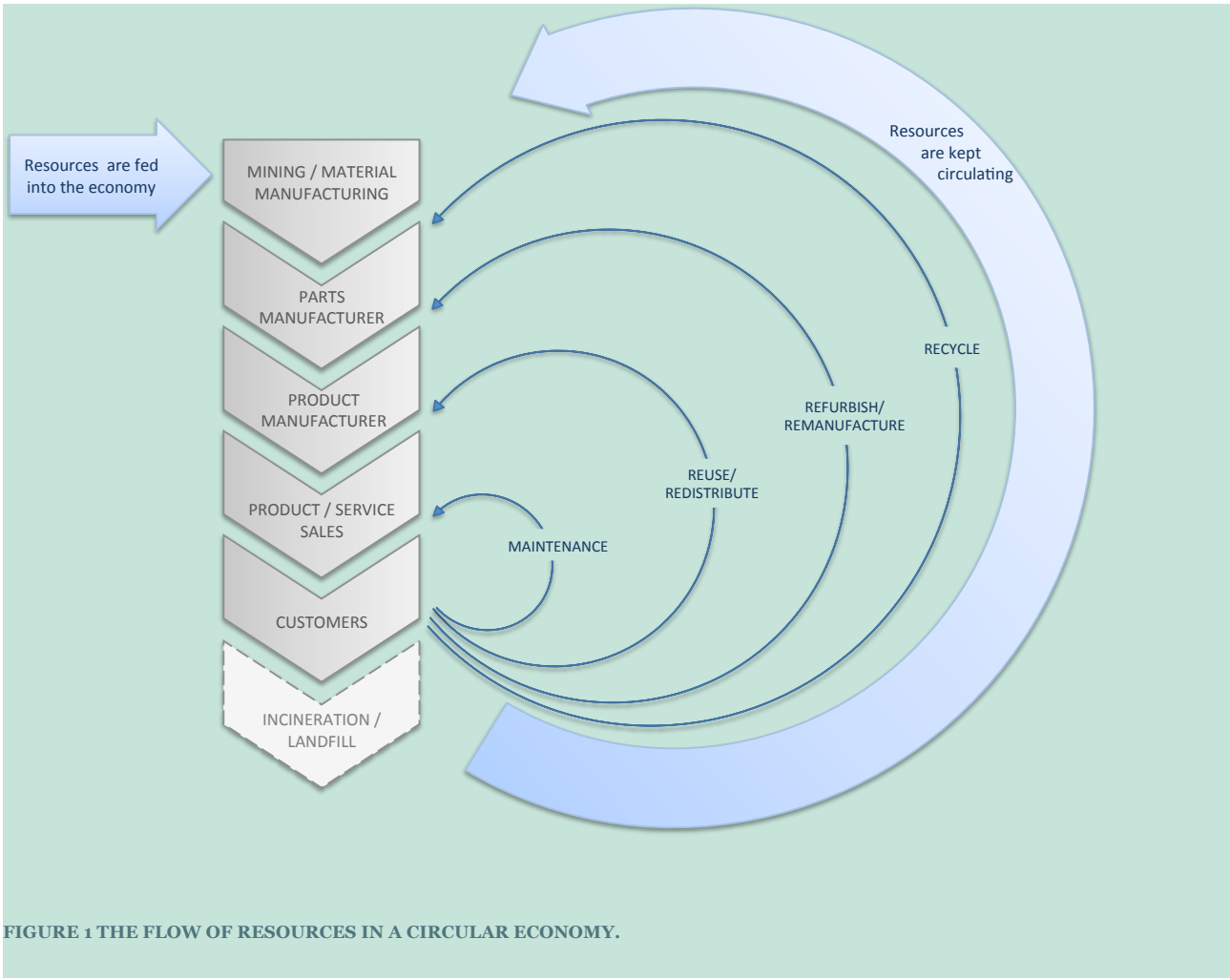

FIGURE 1 THE FLOW OF RESOURCES IN A CIRCULAR ECONOMY.

Circular economy suggests a setup for the production and use of goods in which resources are conserved for as long as possible. Thus, in a circular economy, resources are circulated again and

again through closed loops. The useful life of products, components and materials is prolonged through repair, reuse, remanufacturing and recycling, whereby the resource efficiency is increased and the need for new products and virgin raw material is reduced or ideally eliminated. FIGURE 1 illustrates the fundamentals of this economic model. The centre of the figure shows a traditional, linear supply chain from the top to the bottom, similar to the one depicted in FIGURE 1. In contrast to the linear value chain in the centre, the circles at the side of the figure illustrate possibilities for retaining products, components or materials in four distinct closed cycles or *resource loops*, i.e. the maintenance, reuse/redistribute, refurbish/remanufacture and recycle loops. FIGURE 2 provides an example of how this can be depicted, where the left hand side shows the natural or biological system, and the right hand side shows the technical system.

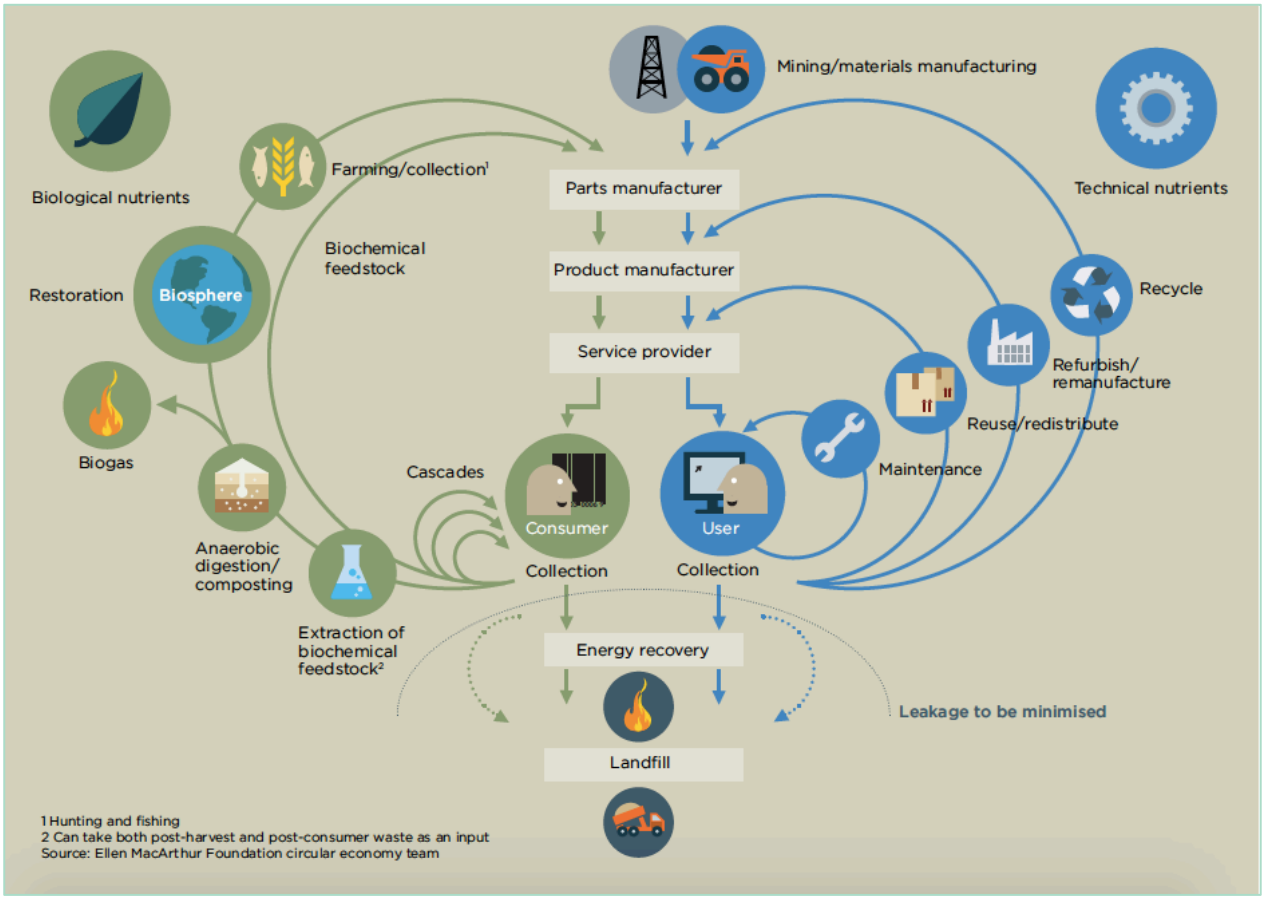

FIGURE 2 CLOSING LOOPS IN THE CIRCULAR ECONOMY (ELLEN MACARTHUR FOUNDATION 2013C, P.24).

To be more specific, the biological system consists of products, which contain only substances that could be safely returned to the biosphere, for instance through composting and extraction of biogas. This includes products such as food and beverages, natural fibre textiles with no harmful dyes, products made out of undressed wood, biodegradable glue and similar. In other words, these products are based on renewable, biological materials, which are not contaminated with anything that would hinder the safe return to the biosphere upon disposal.

Depending on the type of biological product, it may be possible to have cascading use before returning it safely to the biosphere, cf. FIGURE 2. Fruits and vegetables represent an example of this: First grade fruit and vegetables are put up for sale in supermarkets as a first step. If not sold in the supermarket, they could be put up for sale at a reduced price targeting citizens with a low income. It is estimated that this idea has already spread to more than 1.000 stores across Europe

including not only fruit and vegetables, but also all sorts of convenience goods (Holweg, Lienbacher 2014). Similarly, the French supermarket Intermarché has demonstrated that it is possible to have cascaded use of misshapen and therefore unsellable fruit and vegetables by turning them into attractive juices and soups (Cliff 2014). Turning food waste into biogas as a last resort is another case in point, as depicted in FIGURE 2.

Technical products typically contain extracted, non-renewable materials e.g. metals and petroleum-based plastics. Such products require waste treatment before they can be safely returned to the biosphere, and in most cases it is not possible to do so without negative environmental impacts. In addition, the residual value of the products and of the embedded materials is lost when the products are disposed of through incineration or landfilling. To avoid this loss of value and materials, technical products, components and materials should be kept in closed loops for as long as possible.

The term cascade is not mentioned in the right hand side of FIGURE 2, which describes resource loops of importance to technical products. Nevertheless, cascading use is also an important principle for these products. Taking clothing as an example, technical cascading is when garments are kept in the innermost blue circle with its first owner for as long as possible, e.g. by providing high-quality garments that are easily maintained, but eventually moves outwards to the circle of reuse via for instance a second hand shop. After having circulated these two inner circles for a period of time with different owners, the garment is worn-out and handed in at a recycling centre. In the best case, garments are remanufactured to become new garments, however, most frequently the garments are torn apart and the textiles are recycled into products for the automobile industry or similar. Other models for extending the product life will be examined in Chapter 3: Textile and clothing case examples.

System	Activity	Definition
Biological/ Technical	Cascade	The practice of relegating stock to successively less exacting uses
Technical	Maintenance	The action of keeping something in working order, in repair, etc.
Technical	Reuse	To use for a second or further time; to make use of again.
	Redistribute	To distribute something again or differently.
Technical	Refurbish	To restore to good condition, to renovate; (now *esp.*) to repair and redecorate (a building, room, etc.).
	Remanufacture	To put (a manufactured material or product) through a process of manufacture again; to manufacture from recycled material or parts.
Technical	Recycle	To reuse (material) in an industrial process; to return (material) to a previous stage of a cyclic process. To process (waste) so as to convert it into a usable form; to make available for processing into a reusable form. Also: to reclaim (a material) from waste so that it may be reused.

TABLE 1 DEFINITION OF KEY TERMS ACCORDING TO OXFORD ENGLISH DICTIONARY (2013).

TABLE 1 offers a short definition of key terms of the circular economy, which the reader will encounter in FIGURE 2 and throughout the report.

2.3 Circular business models

2.3.1 Definition

Throughout this report the term *business model* is used to describe the core elements of how a company operates. Osterwalder and Pigneur (2010) offer a widely adopted definition of what a business model is: "A business model describes the rationale of how an organization creates, delivers, and captures value." (Osterwalder, A. & Pigneur, Y. 2010, p.14).

The authors point to nine basic elements of a business model. The nine building blocks are: Customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships and cost structure. These building blocks can be combined in numerous ways, allowing for the creation of unique business models. FIGURE 3 gives a visual representation of how the building blocks interlink.

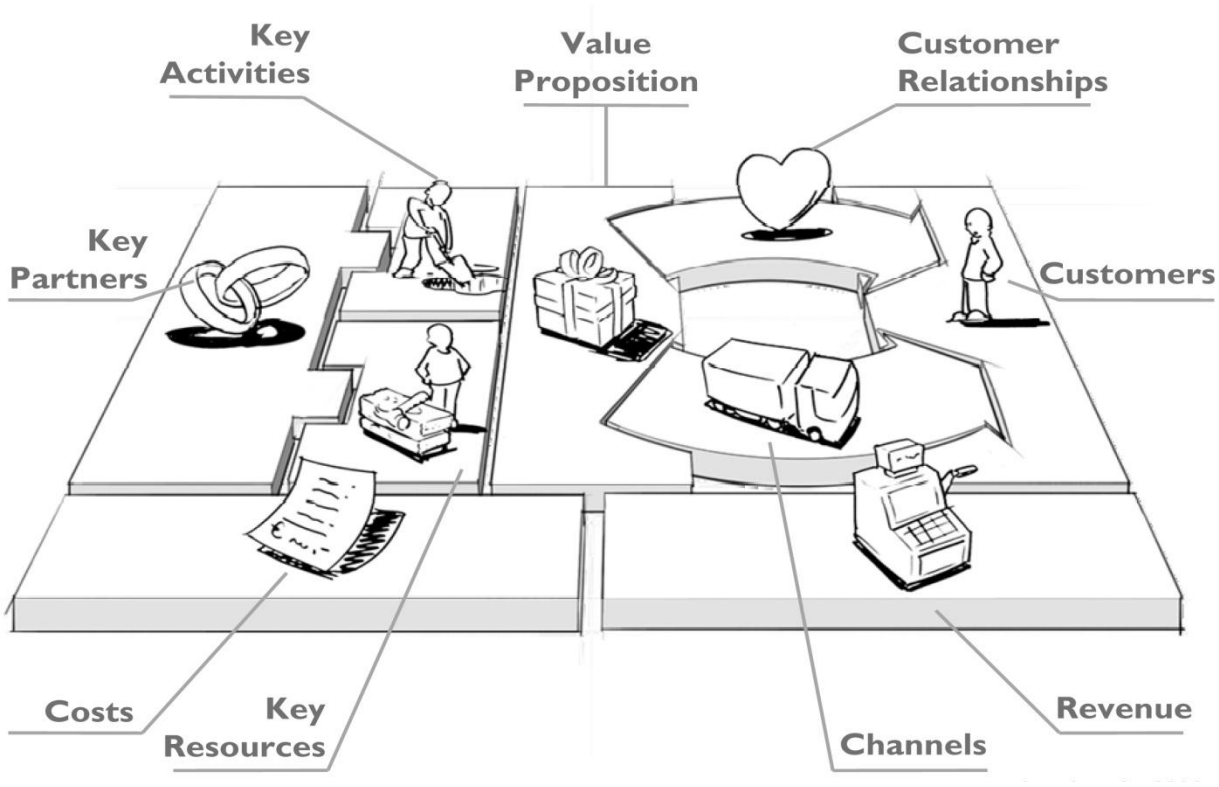

FIGURE 3 ELEMENTS OF A BUSINESS MODEL (OSTERWALDER, A. & PIGNEUR, Y. 2010, P. 18-19).

A company can operate different business models for diverse products and customer segments. For example, a company can offer free service with its products for high-volume professional customers, but no service for small private customers. It can offer leasing agreements in markets

where this is customary, but have over-the-counter sales in other markets. In this way, the unique combination of the nine building blocks makes up each of the business models of the company.

Circular business models are special in the sense that they look for value creation in places usually of little interest to companies that operate in the traditional linear production paradigm. Circular business models thus combine the nine building blocks in innovative ways.

2.3.2 Resource loops as a way of categorising business opportunities

The new ways in which the business model building blocks can be combined to align with the circular economy can be represented in different ways. The technical and biological resource loops of FIGURE 2 provide one example, since each of the resource loops represents an area in which companies can potentially increase their resource efficiency and which may therefore be worth examining closer. In this way, the resource loop diagrams can guide discussions and examinations of circular opportunities involving one or several of the resource loops at a time.

While the *resource loops* will be useful to most companies in finding inspiration for their own circular business models, other frameworks can be useful for categorizing the business opportunities depending on the stage of the business model development and depending on the specific industry and firm. Thus, two other frameworks will be presented below, namely four *value creation bases* and five *distinct business models* of the circular economy.

2.3.3 Four value creation bases

Ellen MacArthur Foundation (2013c) and Nguyen, Stuchtey and Zils (2014) point to four distinct ways in which companies can create value in the circular economy, all of which are based on an improvement of material productivity.

First, the 'power of the inner circle' is about keeping products alive and operating for as long as possible and preferably with the original owner or user. The principle relates to the maintenance loop, cf. FIGURE 2, and to ensuring that products can be kept functioning satisfactory through uncomplicated maintenance and repairs and possibly through convenient updates. Product design and supportive business models play a vital role in taking advantage of this opportunity.

The inner circles of reuse and of maintenance hold the biggest potential to be profitable (Ellen MacArthur Foundation and University of Bradford 2012). Ellen MacArthur Foundation explains it this way: "In general, the tighter the circles are, the larger the savings should be in the embedded costs in terms of material, labour, energy, capital and of the associated rucksack of externalities, such as GHG emissions, water, or toxic substances." (Ellen MacArthur Foundation 2013c, p.30).

No.	Principle
1	Power of the inner circle
2	Power of circling longer
3	Power of cascaded use
4	Power of pure circles

TABLE 2 VALUE CREATION BASES ACCORDING TO ELLEN MACARTHUR FOUNDATION (2013C, P.7).

Second, the 'power of circling longer' refers to keeping products in as many consecutive cycles as possible and prolonging the time of each cycle. For durable goods, cars for example, manufacturers could work towards circling their goods longer by ensuring a long life with the product's first user, for instance by offering a high product quality, easy repairs and upgrades or maybe service schemes that ensure the products remains in pristine order. Step two, could be a long life with subsequent users, for which purpose the above offerings are equally relevant. Step three could be to use the product for spare parts to keep other products alive. Alternatively, components from the old products could be used as building blocks in new products of the same or of different kind. The described model is closely related to the third principle for value creation, namely cascaded use, which is outlined later.

For consumables, other models aimed at circling products longer may be more appropriate. As an example, soft drink cans or bottles do not have a long life with the user. Nonetheless, by carefully choosing the packaging materials and setting up a return system for the cans or bottles, it is possible to optimize resource use. Glass bottles are on average reused 27 times before being recycled, while aluminium cans are used only once before being recycled into new cans. The result is that at a recycling rate of 50% for the cans, virtually all of the aluminium that originally goes into a can is lost after 17 recycling loops, due to collection and production loss at each loop. At a hypothetical recycling rate of 90%, the material is lost after 35 loops (Stahel 2010, p.244-45). Although factors such as convenience and lack of appropriate recycling options may influence the decision to use one material over another, glass is clearly preferable from a resource conservation perspective.

In the case of energy consuming products, the improved energy performance of new products has to be considered compared to the material savings obtained when repairing products. Hence, in the case of white goods, refrigerators, freezers, washing machines and dishwashers of energy efficiency class B or better should, from an environmental performance viewpoint, be repaired rather than exchanged with new, more energy efficient goods. While those with energy efficiency rating of C or lower should not. In the case of mobile air-conditioning units and tumble driers an energy efficiency class of C or better is enough to ensure repairs are preferable to replacement (Larsen et al. 2015).

The 'power of cascaded use' is the third value generating principle that firms could tap into when designing their circular business models. The idea is to diversify reuse of products and materials, within and between industries. Textiles make a good example of cascaded use because clothing can first be reused in the clothing industry as second-hand apparel, then be utilized in the furniture industry as upholstery and end as part of an insulation material for construction. In each case the reused products and materials substitute an inflow of virgin material and hence reduce raw materials cost for the involved companies. Textiles are described more carefully in chapter 3.

Finally, the 'power of pure circles' highlights the importance of uncontaminated material steams, since this is key to maintaining the quality of the materials for many consecutive cycles. Applying cleaner or purer materials is a well-known ecodesign principle, which has been promoted at least since the 1990'ies, see for instance Brezet and Van Hemel (1997). Nonetheless, the notion is as important and relevant as ever.

Application of one of the four principles or 'powers' does not inhibit the application of other principles as well. Several mixes are possible as it will be made clear from the best practice examples in chapter 3: Textile and clothing case examples and 4: Durable goods case examples. Which circular principles are most relevant to incorporate into a company's new business models will depend on a number of factors such as:

- Particular trade and market conditions

- Focus, interests and values of the company
- Existing competences and capabilities

Thus, an individual assessment of ambitions and preconditions of a specific company is necessary in order to decide on relevant resource loops to work with, value bases to build upon and what value propositions to offer to customers. Note also that the most appropriate circular business models may vary between business units within a company (see for instance the description of Philips in section 4.7).

Different frameworks exist, which try to capture the many business opportunities that arise from combining these elements, e.g. that of Bakker et al. (2014), Tan and Prat (2014) and consultancy company Accenture (2014). The framework of Accenture is sufficient for the purpose of this report.

2.3.4 Five distinct types of circular business models

The generic business models that Accenture suggests are based on a recent analysis by the consultancy of more than 120 circular economy case studies primarily in the high tech, textiles, automotive and consumer goods industries. Based on these cases, the company identified five distinct types of circular business models entitled circular supplies, resource recovery, product life extension, sharing platforms and product as a service (Accenture 2014, p.13-14).

FIGURE 4 illustrates how the circular business model interlink with these four value bases: In the left side the four value bases are outlined and in the top row the five generic business models are listed beginning with 'circular supplies'. Coloured sections of the figure indicate common principles between the fundamental value bases proposed by Ellen MacArthur Foundation and the business models archetypes suggested by Accenture.

	Circular supplies	Resource recovery	Product life extension	Sharing platforms	Product as a service
Inner circle					
Circling longer					
Cascaded use					
Pure circles					

FIGURE 4 INTERLINKAGES BETWEEN FIVE BUSINESS MODELS AND FOUR PRINCIPLES OF VALUE CREATION.

The *circular supplies* business model is about phasing out scarce resources by using fully renewable, recyclable or biodegradable resources. Removing inefficiencies and cutting waste is also an integral part of this model. This model is a good fit for companies that deal with scarce commodities or have a major environmental footprint (Accenture 2014). This business model is primarily related to the principle of circling (materials) longer before discarding the materials, which in turn depends on the principle of pure circles, as fully renewable, recyclable or biodegradable resources typically require materials to be of a pure and uncontaminated character.

Next, *resource recovery* is about capturing embedded value at the end of one product lifecycle to feed into another via innovative recycling and upcycling services. This model is based on next generation recycling using new technologies and capabilities. Industrial symbiosis and closed-loop recycling for instance of Cradle-to-Cradle certified products are examples of this business model

(Accenture 2014). The Cradle-to-Cradle standard sets quality requirements for products across five categories with material reutilization being one of them, and Cradle-to-Cradle certified products are thus designed with recycling in mind. The resource recovery business model is especially relevant for companies with large volumes of by-product, or companies with waste material from products that can be both reclaimed and reprocessed cost effectively. This business model can be linked to the principles of pure circles, of circling longer and of cascaded use.

The third distinct business model is *product life extension*. This business model is concerned with extending the lifecycle of products and assets by repairing, upgrading, remanufacturing or remarketing products. This type of business model is appropriate for capital-intensive business-to-business companies such as industrial equipment manufacturers and for business-to-consumer companies in markets where new products bring only little extra performance over the previous version (Accenture 2014). The value creating potential of product life extension business models is based on the power of the inner circle and of circling longer, cf. FIGURE 2.

The *sharing platforms* business model encourages collaboration among product users, whether individuals or organizations. The offered platform facilitates the sharing of overcapacity or underutilization thus increasing productivity. Today, the business model is most often embraced by companies that do not manufacture the shared products themselves. However, the model could also be relevant to manufacturing companies, whose products and assets have a low utilization or ownership rate (Accenture 2014). The value creation in this business model is based on more intensive use of assets and products, which is linked to the principles of inner circle and of circling longer in so far that these two principles stress the relevance of intensive use of assets and products.

Finally, the *product as a service* business model provides products through lease or pay-for-use arrangements. In this business model, the company has to ensure durability and upgradability. Traditionally, factors such as product longevity, reusability and sharing have been considered a cannibalization risk. Yet, the product as a service business model repositions these elements to become drivers of revenue and reduced costs.

This particular model is especially interesting to companies whose products are expensive to customers and where manufacturing companies have an advantage relative to their customers in maintenance and upgrading of the products (Accenture 2014). These factors will make it attractive to customers to buy services instead of products. The business model is related to the power of the inner circle and the power of circling longer.

2.3.5 An array of opportunities

The different resource loops, the four principles for value creation and the five distinct circular business models provide useful tools for pinpointing and for communicating opportunities for companies in the circular economy. These frameworks point to the fact that there is an array of opportunities available to interested companies, which is validated by the multiplicity of the best practice examples presented later.

What makes these circular business models relevant to businesses is not just that they represent a new way to connect with suppliers and customers, but also the economic and environmental benefits associated with them. The following section will describe the economic potentials at a Danish, European Union and global level, while the environmental benefits will be covered in the best practice examples in chapters 3 and 4.

2.4 Economic potentials of higher resource productivity

McKinsey and Company has estimated the economic benefit of moving towards a closed loop economy by examining the following durable goods industries in the European Union: The automotive sector and other transport; machinery and equipment; furniture; radio, TV and

communication; medical precision and optical equipment; and finally office machinery and computers. By studying these industries they found that: "(...) the circular economy represents a net materials cost savings opportunity of US$ 340 to 380 billion p.a." (World Economic Forum 2014, p. 20).

These savings correspond to a scenario, in which industries are not taking full advantage of the opportunities in a circular economy. In a scenario of advanced circular setups the estimate increases to between US$ 520 and 630 billion p.a. The figures are net of the materials used in reverse-cycle activities in both scenarios. These are substantial cost saving potentials, thus the lower estimate of US$ 340 billion equals 12% of input costs in the listed industries, or 2% of EU GDP (World Economic Forum 2014, p.20).

McKinsey and Company has also examined fast-moving consumer goods. These are goods such as fresh and packaged food, beverages, apparel, beauty, personal care and hygiene. At a global level, material savings could represent as much as 20% of the materials input costs incurred by the consumer goods industry. Corresponding to US$ 700 billion per annum or a recurrent 1.1% of global GDP (World Economic Forum 2014, p.20).

The Danish Business Authority (2013) has done similar research, where it found that the cost of raw materials and of manufactured goods that go into Danish manufacturing companies account for 45% of total production cost, namely 22% and 23% respectively as illustrated in FIGURE 5. In other words, it is possible to accomplish significant saving by rendering use of raw materials and manufactured goods more efficient.

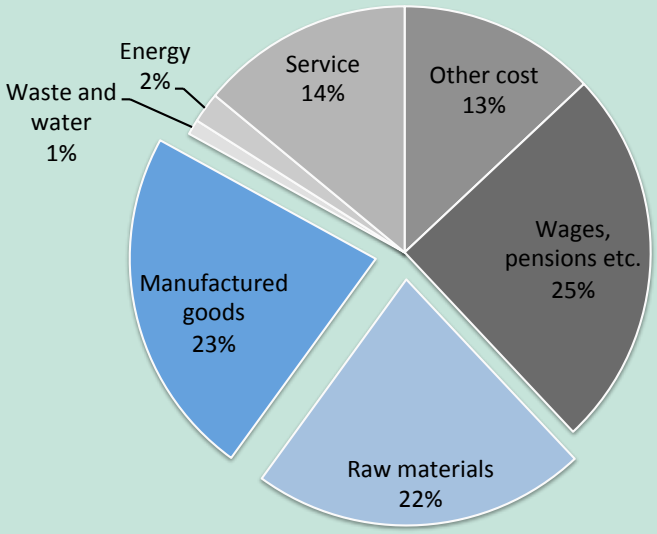

FIGURE 5 COST STRUCTURE IN DANISH MANUFACTURING COMPANIES (THE DANISH BUSINESS AUTHORITY, 2013, P.8).

Resource productivity is another way to look at potentials for resource efficiency improvements. It is calculated as the economic value of the production (in €) compared to the used amount of

resources (in kg), where resources included are biomass, minerals, metals and fossil energy sources. By comparing the resource productivity of the Danish industry to that of the European Union member states, with the highest productivity, the Business Authority found that there is potential for resource productivity improvements in every industry segment examined, although there were significant differences between segments (The Danish Business Authority 2015). These findings are illustrated in FIGURE 6 below.

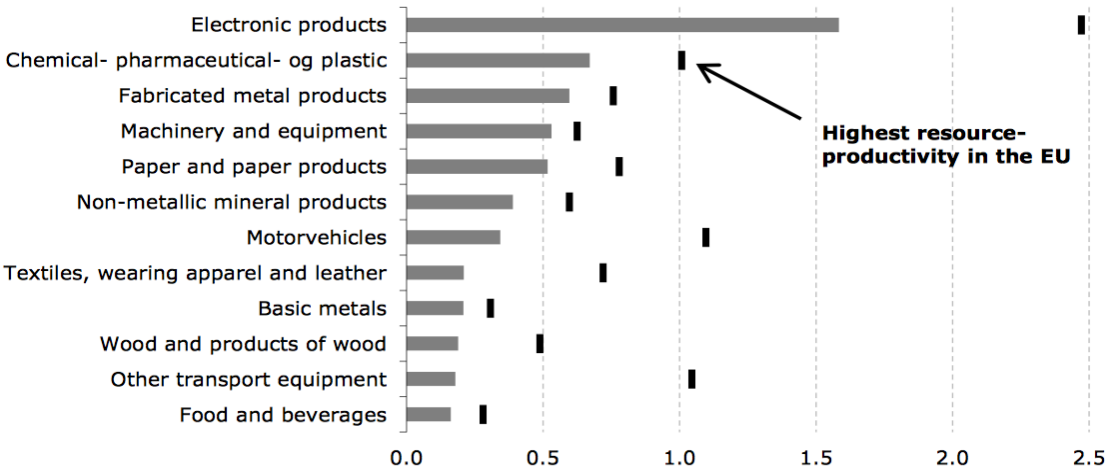

FIGURE 6 RESOURCE PRODUCTIVITY IN DANISH INDUSTRY (THE DANISH BUSINESS AUTHORITY, 2013, P.7).

Resource productivity can be improved e.g. by applying the most efficient technologies available. Based on German experiences, Danish manufacturing industries should be able to save DKK 5-11 billion p.a. on raw materials and manufactured goods by applying existing technologies. This is equivalent to DKK 9 to 18 per work hour, which is substantial as the average wage cost in manufacturing is DKK 252 per hour (The Danish Business Authority 2013, p.9). The potentials identified by The Danish Business Authority are based on resource savings in conventional, linear value chain setups that can be attained by applying existing technologies. The potentials are expectedly much larger if circular business models are included.

2.5 Introduction to best practice examples

In the subsequent chapters 3 and 4, concrete examples of how companies around the world have implemented circular business models are offered. The best practice examples are intended to illustrate the many different ways in which viable circular business models are established.

The cases are organized by industry beginning with cases from the textile and clothing industry and followed by cases from the durable goods industry. Hopefully, Danish companies will find inspiration in these examples and consider how they might take advantage of the circular economy in their own business setting.

3. Textile and clothing case examples

3.1 The textile and clothing industry

The textile and clothing industry is interesting in relation to circular economy initiatives for several reasons. First, the industry is responsible for large environmental impacts. In fact, the fashion industry is the second most polluting industry worldwide (Andersen 2013), which means that the potential for improvements is considerable.

Second, policy makers are putting more attention to the environmental issues of the textile and clothing industry. For example, the Danish Ministry of Environment has decided clothing and textiles is one of five focus areas of the Danish Resource Strategy of November 2013 (The Danish Government 2013), and as early as 2008 the French government established a legal framework for textile recycling that included Extended Producer Responsibility and the establishment of taxation correspondingly (Tiard 2013).

Third, the textile and clothing industry is facing the challenge of accommodating consumer expectations that are in some cases contradictory: On one hand studies have found that "There is an unhealthy “throwaway” consumer culture that fosters overconsumption and waste. Consumers are becoming increasingly accustomed to cheap, poor-quality fashion that they can throw in the garbage after a few washes" (Gjerdum Pedersen, Reitan Andersen 2013, p.3). On the other hand, other studies have implied consumers are increasingly interested in sustainable goods. Thus a recent study from Nielsen showed that "Fifty percent of global consumers are willing to pay more for goods and services from companies that have implemented programs to give back to society" (Hower 2013).

3.2 Selection of best case examples

In the following a number of examples is presented of how companies have raised to meet the challenging conditions of the industry. The best case examples have been chosen to showcase the versatility of business models applied in the industry. Some are fairly experimental, while others constitute well-proven setups. Some operate in the inner circles, and others in the outer. Some take advantage of the potentials of just one resource loop, whereas others combine multiple resource loops simultaneously. FIGURE 7 illustrates some of this multiplicity.

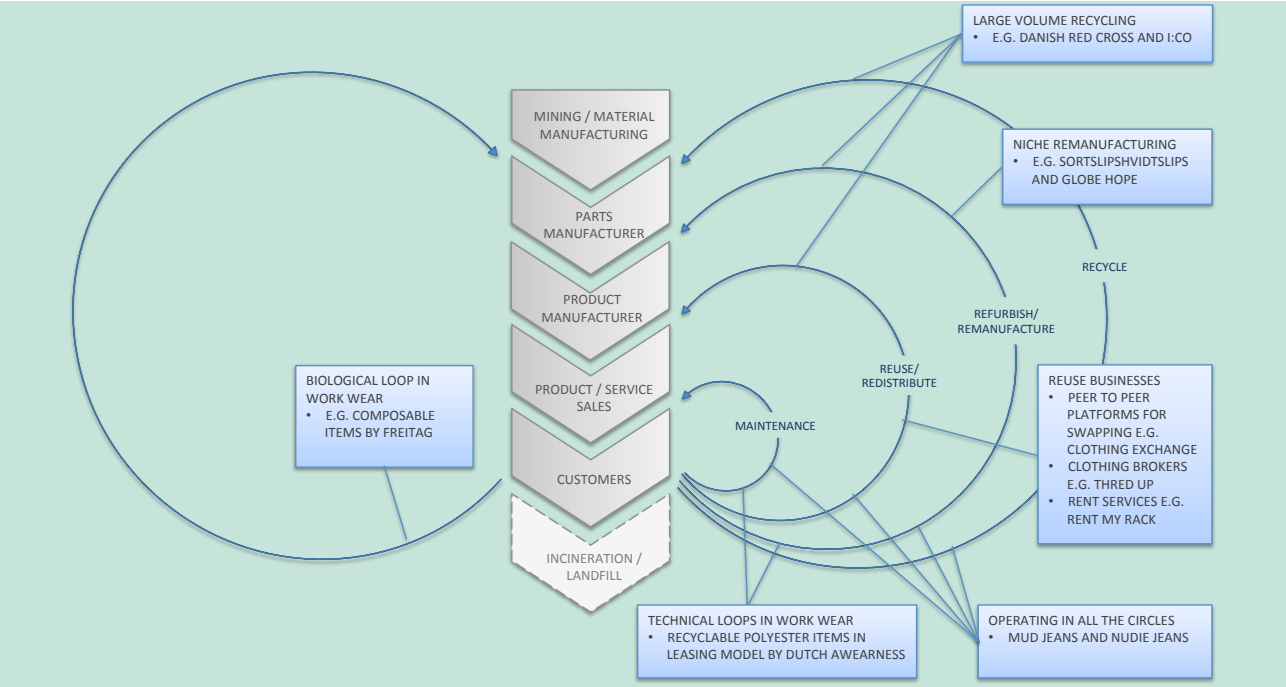

FIGURE 7 EXAMPLES OF HOW TEXTILE CASES RELATE TO THE RESOURCE LOOPS.

The best practice examples span the distinct business models and value creation bases described in the preceding chapter. Section 3.3 commences with firms where the business models span all of the resource loops. Afterwards the focus is moved from the inner circles in section 3.4 to the outer circles in sections 3.5 and 3.6. The final section 3.7 looks at an example of biological cycles as opposed to the technical cycles of the other cases presented.

3.3 Operating in all the circles

Some companies take advantage of opportunities associated with several of the resource circles at once, as illustrated in FIGURE 7. As an example the Swedish men's wear company *Nudie Jeans* operates in the maintenance, reuse, refurbishment and recycling loops. Although Nudie Jeans manufactures different garments, jeans made out of 100% organic cotton constitute the core business. Nudie Jeans has established a return system, where customers receive a 20% discount off a new pair of jeans on return of an old pair in stores in London, Gothenburg and Stockholm. The returned jeans are washed, mended and subsequently put up for sale in the stores as second-hand jeans (Nudie Jeans 2014c). If the jeans are worn out, and thus not possible to reuse, they are recycled instead. Nudie Jeans presents three such recycling initiatives on its website.

First, a special denim-recycling project, in which Nudie Jeans cooperated with various young designers. Second, a limited edition of jeans made from a combination of recycled denim and virgin cotton fibres. Finally, a rag rug project, which seems to be the only active initiative at the moment (Nudie Jeans 2014a). In addition to the return system, the company offers free repairs of jeans in selected stores and sends repair kits free of charge to customers, who prefer to do repairs themselves or cannot visit the repair shops in the selected stores (Nudie Jeans 2014a, Nudie Jeans 2014b).

Through their business model of cascading use, Nudie Jeans keeps first the jeans and later the denim fabric alive for longer, thus minimizing environmental impacts from the production of virgin cotton fibres. These elements of the business model correspond to the circular economy value creation principles of power of the inner circles and of cascading use described in section 2.2. At the same time, Nudie Jeans is likely to improve customer relations through its service offerings and its sustainable company profile.

To sum up, Nudie's business model works at different levels: Organic cotton is the choice of raw material, which has less environmental impact than conventional cotton; the company offers customer repair services; it mends and resells returned jeans; and finally jeans are recycled into e.g. rugs, when they are no longer suitable to wear. FIGURE 8 outlines Nudie Jeans' operations.

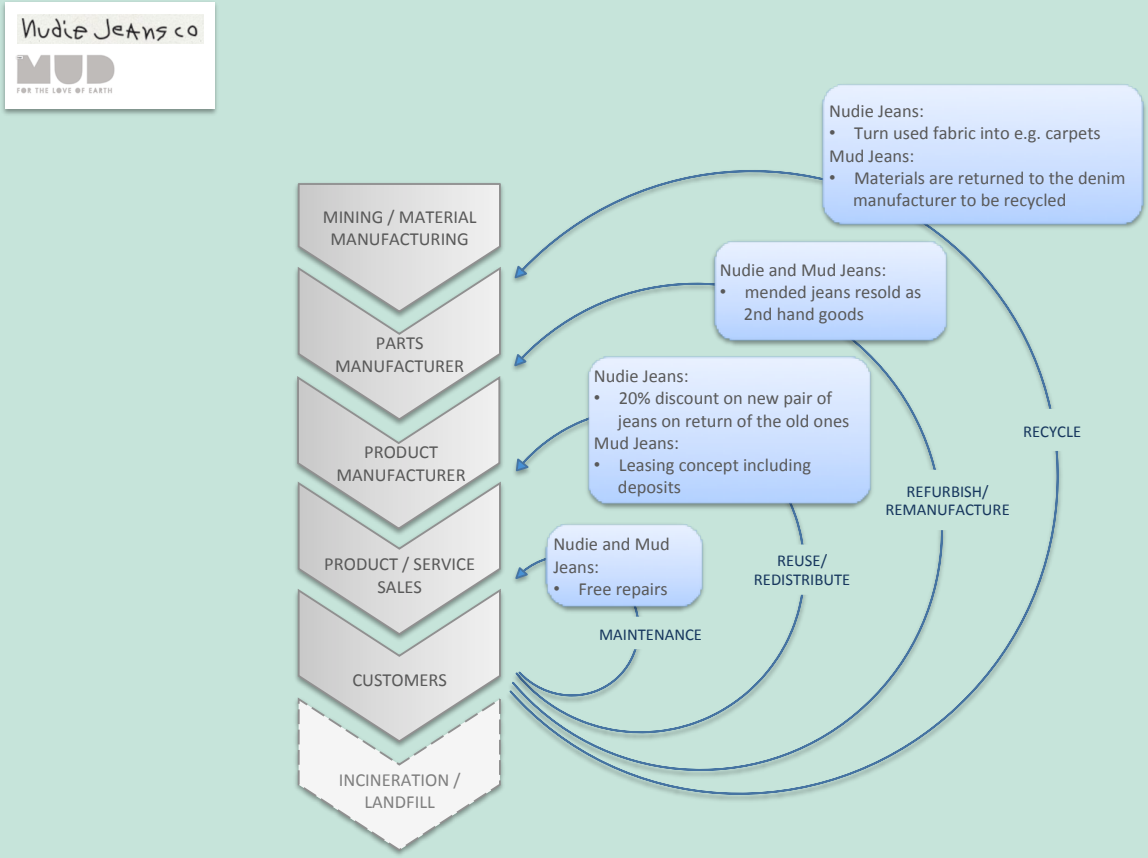

FIGURE 8 NUDIE JEANS' AND MUD JEANS' CIRCULAR BUSINESS MODELS.

Mud Jeans is another company that operates in this business model category, although in a slightly different manner. The Dutch fashion company offers a range of apparel such as jeans, t-shirts, shirts, hoodies and bags. What sets Mud Jeans apart from most other fashion companies is the fact that customers are able to *lease* jeans and hoodies. In the case of jeans, the customer pays a €25 member fee, in addition to a 12 month rent of €7,50. At the end of the 12-month lease, the customer has three choices: Keep the jeans, get a new pair of jeans in exchange for the old ones, or send the jeans back. When returning a pair of jeans, whether leased or purchased, the customer receives a €10 voucher for a later purchase at Mud Jeans (Mud Jeans 2015).

The system of lease and deposit ensures that a least part of the jeans are returned to Mud Jeans at the end of their useful life with the customers. Through this, the company can minimize consumption of virgin organic cotton for new jeans, and reduce material cost correspondingly.

The two companies, Nudie Jeans and Mud Jeans, take advantage of combining an array of business model types into unique value propositions for their customers. Thus, they apply a circular supplies business model to ensure raw material sourcing is environmentally friendly virgin organic cotton or recycled cotton. This sourcing model is combined with a resource recovery model to have jeans returned for repair and resale (product life extension) or capturing the fabric for different kinds of recycling. Repair kits offered to customers during the use phase are another example of the product life extension business model. Finally, Mud Jeans' rent-a-jeans and rent-a-hoodie services are examples of applying a product-service business model.

3.4 Reuse businesses

Other companies have a narrower focus, for instance some that simply accommodate reuse of clothing in different setups. In other words, reuse without making changes to the original design of the apparel. This business model has been in operation for decades, but mostly in non-profit setups such as relief agencies and municipal services. It has, however, recently spread to profit oriented online market places like Australian *Clothing Exchange* and Danish *TrendSales*, which connect private users that want to sell, buy or swap clothes (cf. FIGURE 9). Users post items and negotiate prices or "swap-items" together with shipment terms via the online websites, while the platform companies turn a profit through transaction and membership fees and by selling premium services and advertising on the websites.

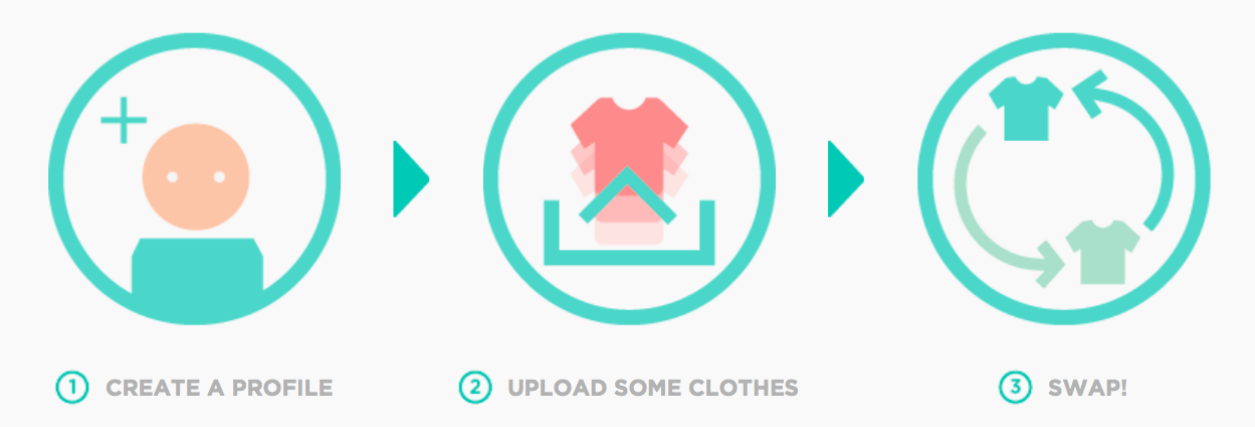

FIGURE 9 THE CLOTHING EXCHANGE MODEL (CLOTHING EXCHANGE, 2014).

These marketplace models take on many shapes including business models based on a sharing platform - a so-called shared wardrobe. *Resecond*, which focuses on dresses, is an example. For a monthly fee users are allowed to borrow as many dresses as they wish, with the extra requirement that they share the same number of dresses in the collaborative online closet (Resecond n.d.). The same principle of a collaborative closet applies in *Share Your Closet,* but here no money is involved. Instead, when your clothing is borrowed by other members you earn points and these points allow you to borrow from others. This way users can easily try out new styles, fancy shoes and so on, with no other expenses than the postage. Members keep the garments for as long as they like or until others would like to borrow them (Share Your Closet 2015). Through these collaborative approaches garments are likely to be used more frequently before being discarded of.

American *Rent the Runway*, British *Girl Meets Dress* and Australian *Rent My Rack* represent even more business models based on collaborative use. The companies offer the opportunity to rent designer fashion online and in physical stores. In this way, quality clothes for special occasions that would usually only be worn a few times, is given a much longer useful life with different users. In addition, customers that would not normally be able to afford designer clothing are given a chance to wear these garments.

Reuse has been the focus of traditional second hand stores for years. Recently, this kind of business has been supplemented with physical and online luxury second hand stores. These stores function as middlemen between sellers and buyers. *Thred Up* is an example of an American company that operates based on apparel mailed from all over the US to the distribution centre. The items are inspected and subsequently put up for sales online. The company focuses on "on-trend, in-season pieces" in "like-new condition" (Thred Up 2014). The seller is paid up to 80% of the sales price. Details of this business model are explained in FIGURE 10

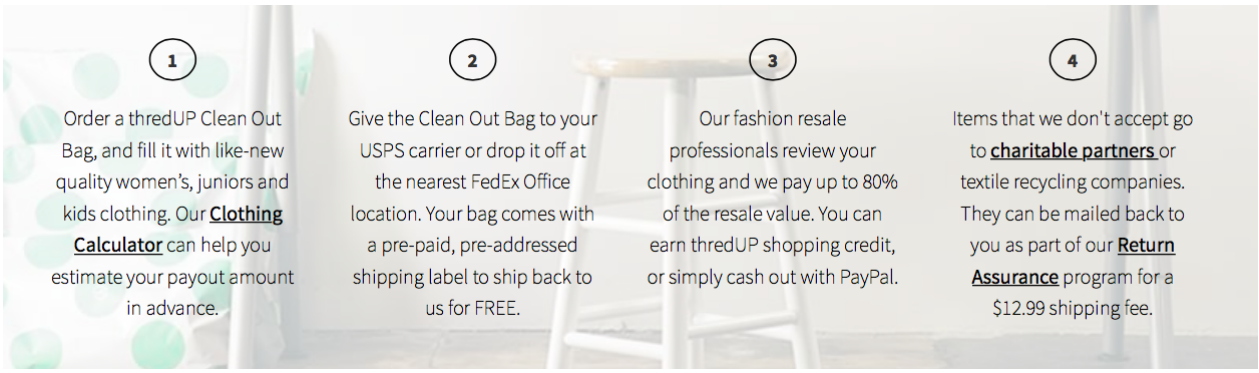

FIGURE 10 ILLUSTRATION OF HOW THREAD UP WORKS (THRED UP, 2014).

The growth in the apparel reuse businesses is made possible by a shift in consumer beliefs and behaviour. Used clothing, whether rented, swopped or bought is socially acceptable today as opposed to earlier. The trend is found across the western world, and research into UK consumer attitudes has shown that more than two-thirds of the population is willing to buy and wear pre-owned clothing (WRAP 2012).

3.5 Niche remanufacturing

Examples of business models, which are focused on remanufacturing and upcycling of materials, include companies like *SortSlipsHvidtSlips* and *Globe Hope*.

SortSlipsHvidtSlips creates made-to-measure clothes for women and men in their store in Copenhagen. The clothes are made from discarded linens, serving aprons and hospital gowns, which are supplied by a steam laundry company. Clothes from SortSlipsHvidtSlips are high-end, niche products, in unique styles.

In a similar way to SortSlipsHvidtSlips, the Finnish company Globe Hope specializes in unique garments made from leftover and discarded textiles, but in this case the textiles come from a wider range of sources. The company uses materials such as vintage fabrics, advertising banners, sails, vintage army blankets and vintage army raincoats. The vintage fabrics are found at flea markets, at textile sorting centres, and at textile factories with deadstock. Furthermore, Globe Hope turns the materials into a broader variety of clothes in addition to bags and accessories (Globe Hope 2014a).

FIGURE 11 EXAMPLES OF WORK FROM GLOBE HOPE (LEFT), DEADWOOD (MIDDLE FRONT), RE/DONE (RIGHT) AND SORTSLIPSHVIDTSLIPS (BACK) (GLOBE HOPE 2014B, DEADWOOD 2014, RE/DONE 2014, SORTSLIPSHVIDTSLIPS 2012?).

Globe Hope and SortSlipsHvidtSlips emphasize their appreciation and use of traditional craft skills and offer products in a distinct design that stand out. Interestingly, the story of the reused materials seems to add to the exclusivity of the products in both cases, which is also the case for *RE/DUN*, which turns old jeans into new ones with unique looks and for *Deadwood* that does something similar, only with leather.

Many other companies manufacture new products based on used materials in the accessories and bags segments. Examples include *FeuerWear* that produces bags, belts and wallets out of discarded fire hoses and old life vests, *Bag to life* that makes bags out of old parachutes and *Freitag* that also manufactures bags, but from old tarps.

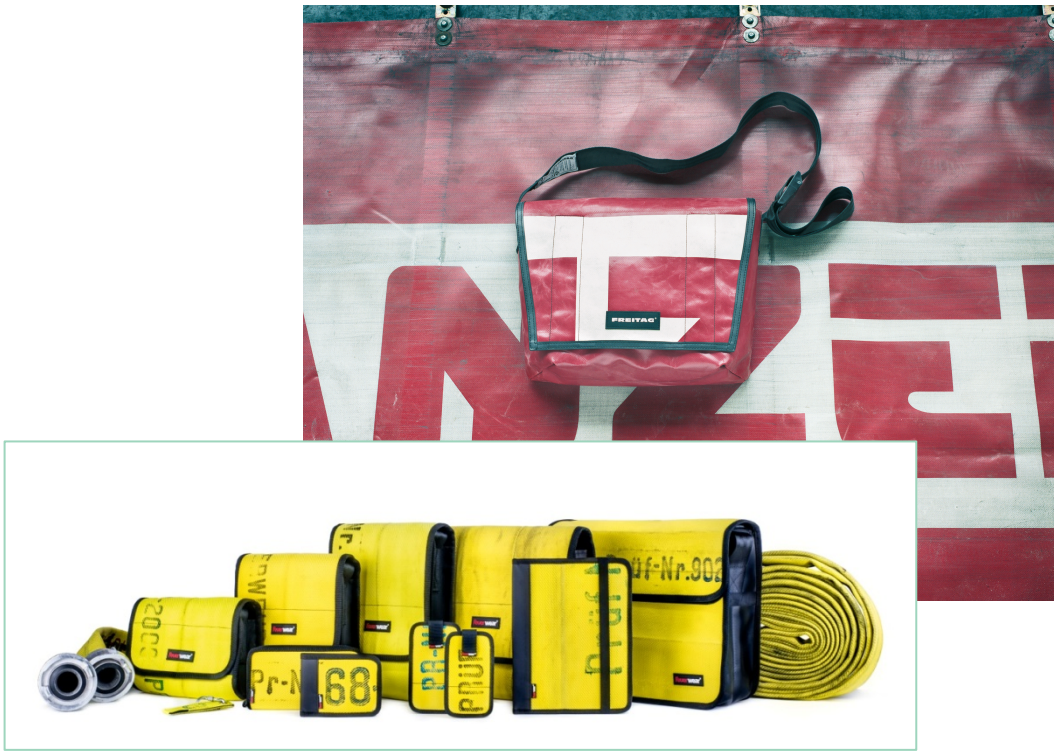

FIGURE 12 EXAMPLES OF APPAREL FROM FREITAG AND FEUERWEAR (FREITAG 2015C, FEUERWEAR 2014).

The companies mentioned share the trait that they operate business models based on the recycling and remanufacturing loops, making use of materials that would otherwise be regarded as waste. The story behind the products, the unique designs and the craftsmanship involved in manufacturing add to the perceived exclusivity of the products and allows for a premium sales price.

Some of the business models are based on materials from within the textile and clothing industry (Globe Hope, SortSlipsHvidtSlips, RE/DONE, Deadwood) while others are based on materials from outside the industry (Freitag and FeuerWear). Hence, they constitute examples of cascaded use of clothing, textiles and other materials from both within and between industries.

The remanufacturing efforts transform the textiles or clothes into new products of similar or higher value, thus representing an advanced form of the principles of circling longer and of cascaded use in which product value is retained or improved. The principle of pure circles is of high importance likewise since only clothes, textiles and other materials of high quality and pureness (e.g. no chemical contamination, clean from dirt/ cleanable, unwanted parts such as old zippers or metal fitting can be easily cut off etc.) are attractive as input into the remanufacturing processes.

3.6 Large volume recycling

Textile collection bins at supermarkets, at recycling points, and at recycling centres are commonplace in many countries. In the Nordic countries they have primarily been operated by charity organizations. The textile collection system has been in place for decades and is a well-proven example of a circular business model, in which product life is prolonged through reuse. The system ensures that at least some of the used clothes (20-45%) are collected and sorted. In the case of Denmark, the top 10% of garments by weight is typically resold and thus reused in the domestic market, while 80% of the clothing is exported. It is estimated that around half of the exported clothes are reused, whereas the other half is sorted and used for cloths, new threads and fibres, synthetic felt or incineration. The remaining 10% by weight is non-textile trash (put in collection

containers instead of in garbage bins) or textiles of no other value than for energy recovery purposes and is thus incinerated (Tojo et al. 2012). TABLE 3 illustrates the types and volumes of textile fractions for one of the many Danish textile collectors, the Danish Red Cross.

	Totals	Domestic Reuse	Domestic Incineration	Exported and Reused	Exported and used for cloths, thread, fibre, felt or incineration
Tonnes	6000	600	600	2400	2400
%	100	10	10	40	40

TABLE 3 DANISH RED CROSS COLLECTION STATISTICS (TOJO ET AL. 2012).

Reusing and recycling is good for the environment, and at the same time the resale of high quality second hand clothing allows the charity organizations to generate a profit that can finance other work (Palm et al. 2014). As an example, the Danish Red Cross, which accounts for approximately 15% of the textiles collected in Denmark, turns a profit of around US$ 5m. from these activities (Danish Red Cross n.d.).

Hence, textile collection can be profitable, and over the past few years various private companies have introduced textile collection programs, too. The Swiss company I:CO, which collaborates with a number of companies internationally, such as Walmart, Esprit, American Eagle Outfitters, H&M, Jack & Jones and NameIt, is an example.

The collection system is promoted by I:CO as a means of dealing with used garments responsibly, which is easy to communicate to customers. Besides, having customers return old clothes is a way of ensuring customers have space for new clothes in their closets, and since customers are given a discount voucher they are likely to generate turnover in the visited shops (I:CO 2014). In the case of H&M, the customer receives a 15% discount on a product of her choice for every bag of textiles returned (H&M 2014a), and according to (Nguyen, Stuchtey & Zils 2014), "H&M executives view the program as a way to increase in-store traffic and customer loyalty."

I:CO accepts clothing, belts, bags and cushions, along with bed-, table- and household linen. The used goods are sorted at large sorting facilities and the sorted fractions are sold to second hand retailers and to customers in the auto, construction and packaging industry to mention a few (I:CO 2014). The residual amount (1-3%) of textiles is incinerated (Nguyen, Stuchtey & Zils 2014). FIGURE 13 presents an outline of the elements of the business model.

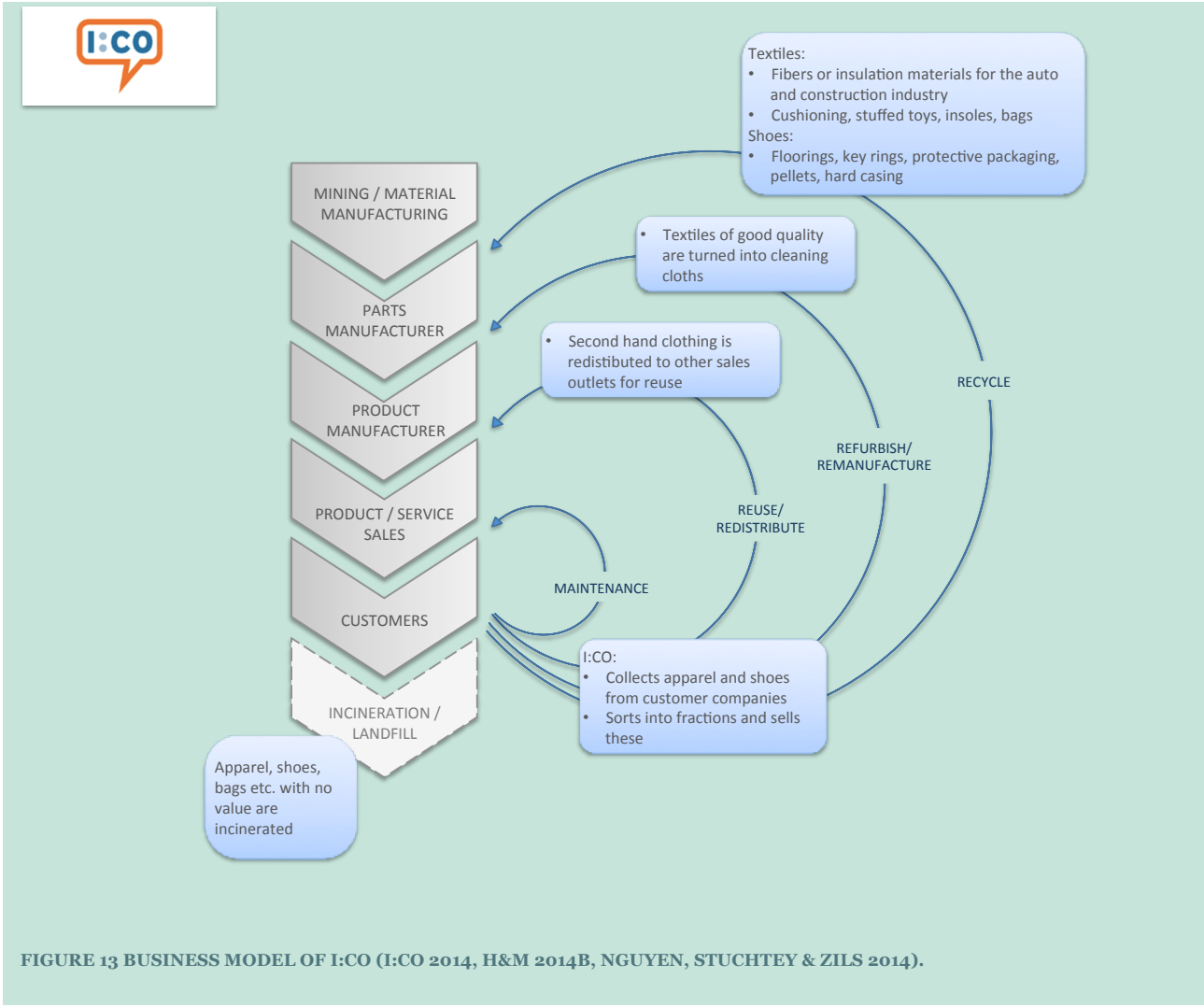

FIGURE 13 BUSINESS MODEL OF I:CO (I:CO 2014, H&M 2014B, NGUYEN, STUCHTEY & ZILS 2014).

The Danish Red Cross, I:CO and any other clothing and textile recyclers tap into the power of the inner circle (cf. section 2.3.3) with direct reuse, which offers the most significant economic return. Cascaded use is another important principle to these companies, since the clothes begin as second hand clothing, move on to e.g. cloths in a subsequent loop of remanufacturing and end up as e.g. insulation material in the outermost loop of recycling.

3.7 Biological and technical loops in work wear

Public authorities in France, Scotland and Denmark have shown interest in the circular economy. For *Herning municipality* in Denmark work wear has been of particular interest, and the municipality has examined how circular business models could be established in relation to work wear services purchased by the municipality. The usual tender document templates were ill-suited for promoting the closed loop services they wanted. The existing templates were simply inadequate with respect to quality requirement descriptions for the work wear at the operating stage, i.e. where uniforms are washed and mended in consecutive loops, where they are passed on to other workers, in case of personnel changes, and where the uniforms may be used by different departments through their lifetime. For this reason the municipality decided to develop a guide and a new template for public tenders that could be used to set appropriate, 'circular' requirements for work wear used in the municipality (Herning Municipality & Danish Technological Institute 2014, Herning Municipality 2014). The guide and templates are now publicly available to enable other authorities to build on the experience Herning municipality has gained so far.

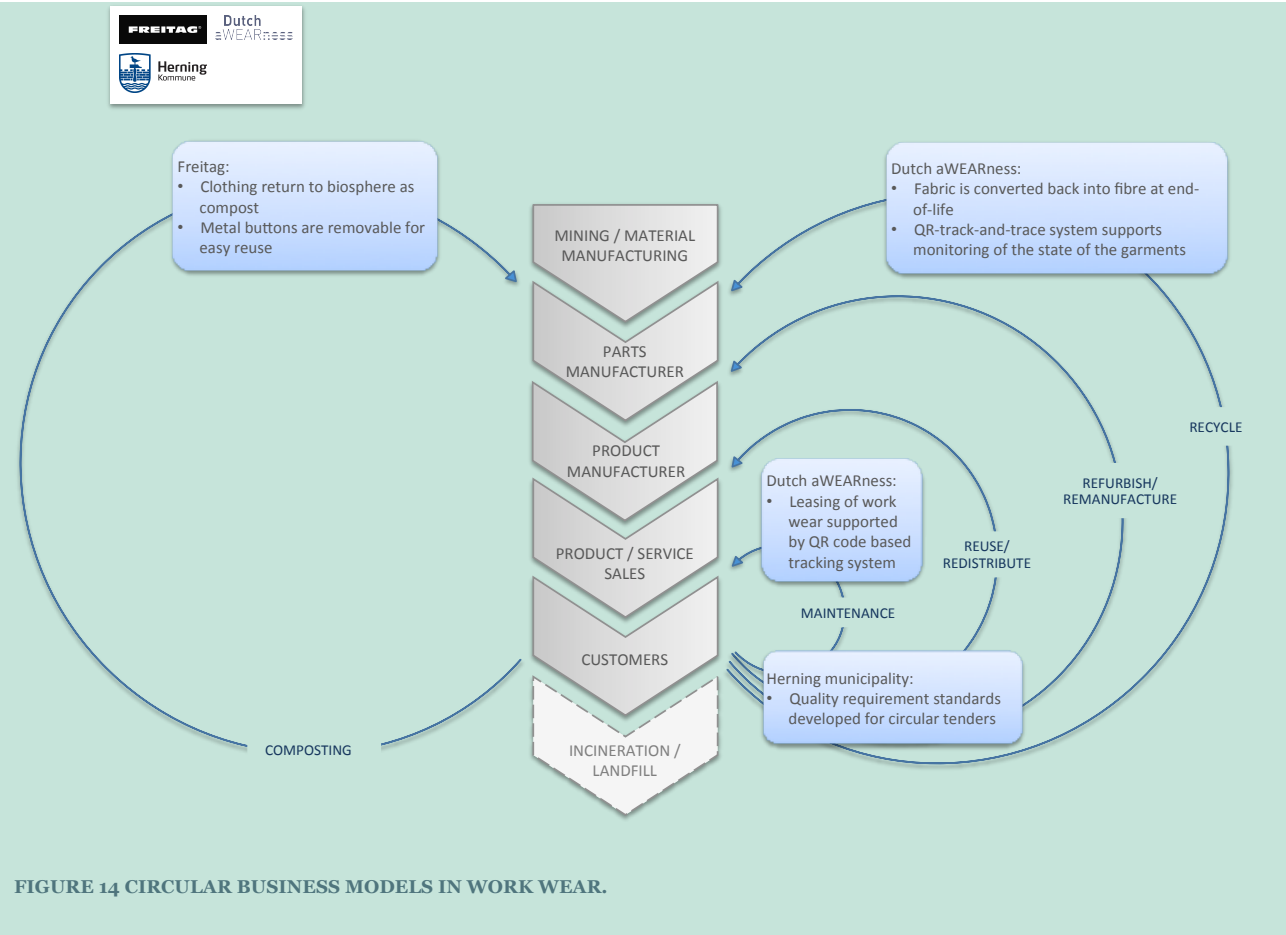

FIGURE 14 CIRCULAR BUSINESS MODELS IN WORK WEAR.

The issue of ensuring an appropriate quality in terms of look, feel and performance, which Herning municipality encountered, may be resolved by monitoring the state of the work wear through its life cycle. Such monitoring is known from the laundry service industry, where chips sewn into the individual garments are used to ensure quality of the work wear through regular controls and repairs or replacement as needed. The chips also ensure that individually fitted work wear returns to the right owner after each cycle of washing (Vraa Dampvaskeri 2015).

The textile and clothing company Dutch aWEARness has developed a similar track-and-trace system to be used with the company's work wear, which covers not only the life cycle of the work wear but all life cycle stages of the reusable fibres that the clothing is made of (Dutch aWEARness 2014).
FIGURE 15 illustrates this system that allows for real-time monitoring of garments and raw materials, their quality levels, energy and material performance of the associated processes and Life Cycle Assessment to mentioned a few of the system features (Dutch aWEARness n.d. a).

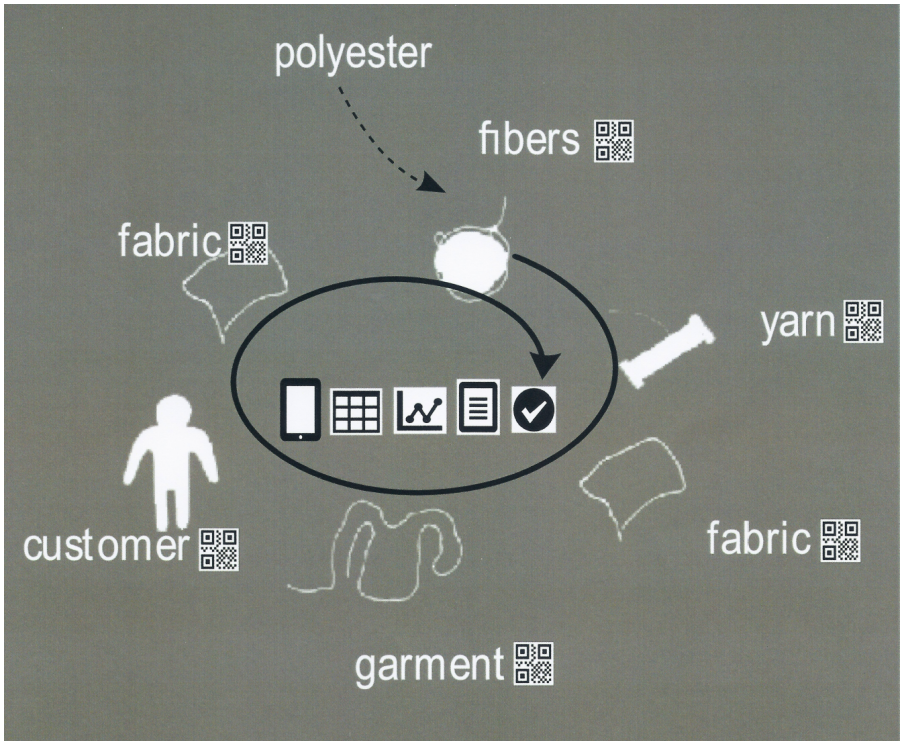

FIGURE 15 QR CODE REGISTRATIONS (DUTCH AWEARNESS N.D.).

Dutch aWEARness retains ownership of the garments, which are designed and produced in a way that allow them to be recycled into new garments or into a composite of fibres and bio-based plastics at the end of life depending on the raw materials used for the clothing (Dutch aWEARness n.d.b). Although this tracking system is used for work wear, it could be equally relevant for other kinds of products since delivering the quality guaranteed in every product or material cycle is vital to safeguard customer satisfaction and thus to ultimately ensure continual success of any circular business model.

Freitag has recently launched a new work wear collection in addition to its usual selection of bags. The company had been looking for sustainable work wear for its factory workers for some time, with little luck, before deciding to develop its own garments. The result is a small collection of work wear that is produced solely in Europe. The fabrics are based on mixtures of linen, hemp and modal. The jersey is knitted in Portugal, while the pant and lining fabrics are woven in Italy. The sewing takes place in Poland.

According to Freitag (2015b) this all-European setup means that its workpants travel less than 5,000 km on their journey from raw material, to weaving and sewing and on to Freitag's headquarters in Switzerland. Although this may seem like at long journey, it is short compared to the average 40,000 km travelled by a typical pair of jeans. The local sourcing and manufacturing has a positive environmental effect and creates jobs locally in Europe. Furthermore, the Swiss work wear has the added benefit of being 100% biodegradable. Over and above its natural raw-materials and non-toxic processing, Freitag has namely developed a bio-degradable thread and two unique buttons, viz. a small bio-degradable shirt button and a larger screw-off trouser button made of metal, which can easily be removed before composting garments (Freitag 2015a).

FIGURE 16 BIODEGRADABLE WORK PANTS (FREITAG 2015A).

The biodegradable character of work wear means that it fits into the biological system that was illustrated in FIGURE 14, as it can be returned safely to the biosphere where it decomposes into compost as shown in FIGURE 16. This runs contrary to most modern clothing, which contains mixtures of natural and synthetic fibres and thus belongs to the technical system. The mix of different fibres is problematic, as the fibres cannot be reused for the production of new fabrics. Thus direct reuse and various kinds of downcycling are the only options, at least with current textile mill technologies. Mixing fibres is an example of violation of the principle of pure circles, which was discussed in the previous chapter.

3.8 Findings from the textile and clothing cases

The cases presented have demonstrated how companies can work with the four value creation bases (power of inner circle, of circling longer, of cascaded use and of pure circles) to enhance resource efficiency. A company such as Nudie Jeans demonstrates the power of the inner circles since it offers repair services and second-hand jeans for resale and thereby facilitates maintenance and reuse. SortSlipsHvidtSlips and Deadwood further represent examples of the value of circling textiles and clothing longer through remanufacturing efforts. Firms like I:CO and FeuerWear exemplify cascaded use where materials from one industry (e.g. fire hoses) are brought to use in a different industry (e.g. fashion accessories). Finally, the principle of pure circles constitutes an important element in all of the textile recycling initiatives described in this chapter, and Freitag and Mud Jeans constitute two examples, where pure fibres are vital to allow for composting and fibre recycling, respectively.

The four value creation bases described by the Ellen MacArthur Foundation interlink with the generic business model types proposed by Accenture as shown in section 2.3.4. To illustrate the interconnectedness, a selection of the best practice examples is plotted in FIGURE 17 in a diagram similar to that presented in FIGURE 4. The figure serves to illustrate the number of opportunities available to businesses and the diversity of applied business models. Correspondingly, FIGURE 7 presented how a section of the textile and clothing cases spans the four different resource loops. Thus, it is clear, from the case descriptions throughout chapter 3 and the examples depicted in the two mentioned figures, that the approaches taken by textile and clothing companies are wide-ranging.

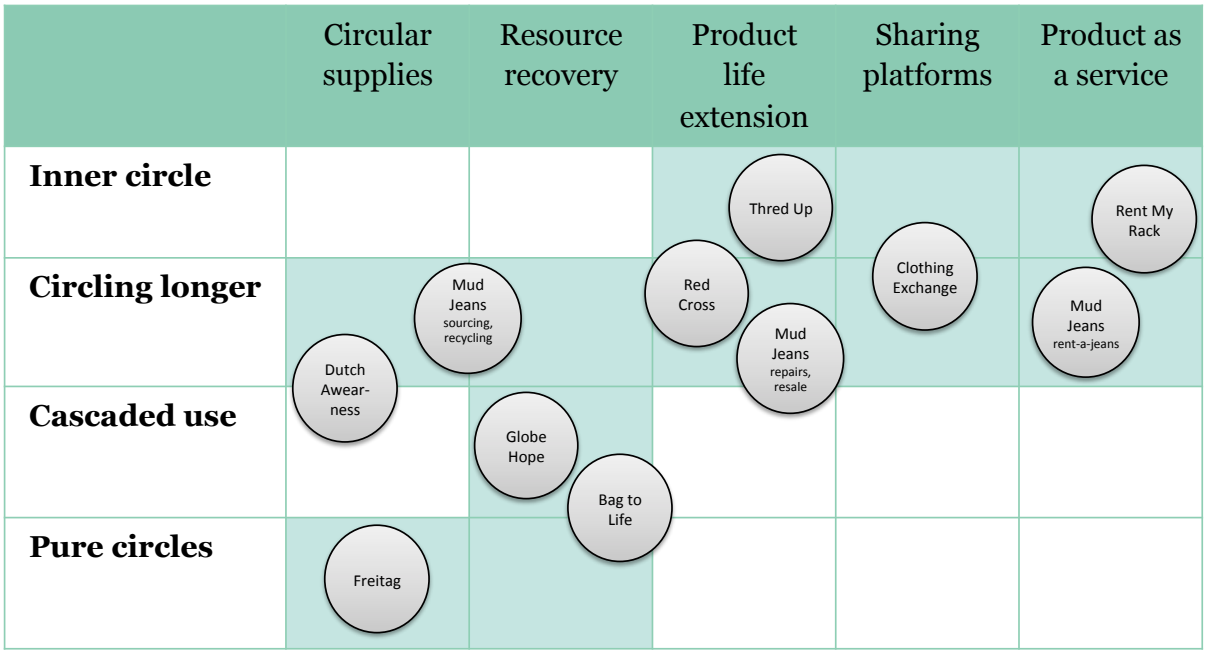

FIGURE 17 A FEW TEXTILE COMPANY EXAMPLES RELATED TO THE BUSINESS MODEL FRAMEWORKS.

So far, SMEs seem to be most innovative and committed in their pursuit of circular business models in the textiles and clothing industry, and they demonstrate diversity and creativity. The steps taken by larger companies are more moderate and at a slower pace, but they are important to support the gradual transformation of the industry. Disseminating and scaling up the business models of the innovative textile and clothing companies can yield significant improvements in resource efficiency and environmental benefits for the massive $1.7 trillion industry (Textile Exchange 2015). The potential benefits are associated with raw material savings and reduced supply volatility risks in addition to the opportunity of forging stronger customer relations, particularly in environmentally conscious markets.

This applies in a Danish context as well, as the best practice examples indicate that circular business opportunities are already available in the Danish market, cf. TrendSales, SortSlipsHvidtSlips and Resecond, to mention a few. Hopefully, Danish textile and clothing companies will find inspiration for their own circular business models in the best practice examples, presented thus far. Companies in other industries may find the case examples in the next chapter, on durable goods, more relevant to their business setting.

4. Durable goods case examples

4.1 The durable goods sector

Durable goods include product groups such as automobiles, machinery, furniture, radio, TV, communication, office machinery, computers and medical equipment. These product groups often contain significant quantities of rare earths, metals including precious metals, plastics and other non-renewable resources. At the same time, large amounts of energy are required to process these raw materials into refined durable goods.

The potential for environmental and economic savings from optimizing the resource efficiency of individual products and of industries as a whole is substantial, and prospective materials savings for these product groups have been estimated at somewhere between US$ 340 and 630 billion at EU level (World Economic Forum 2014, p.20).

In the following sections, a number of best practice examples from these industries are described. The approaches taken by companies are very individual due to the unique context of every industry and, in fact, of every product placed on the market. For this reason, the best way to increase resource efficiency and close resource loops will depend on those unique settings.

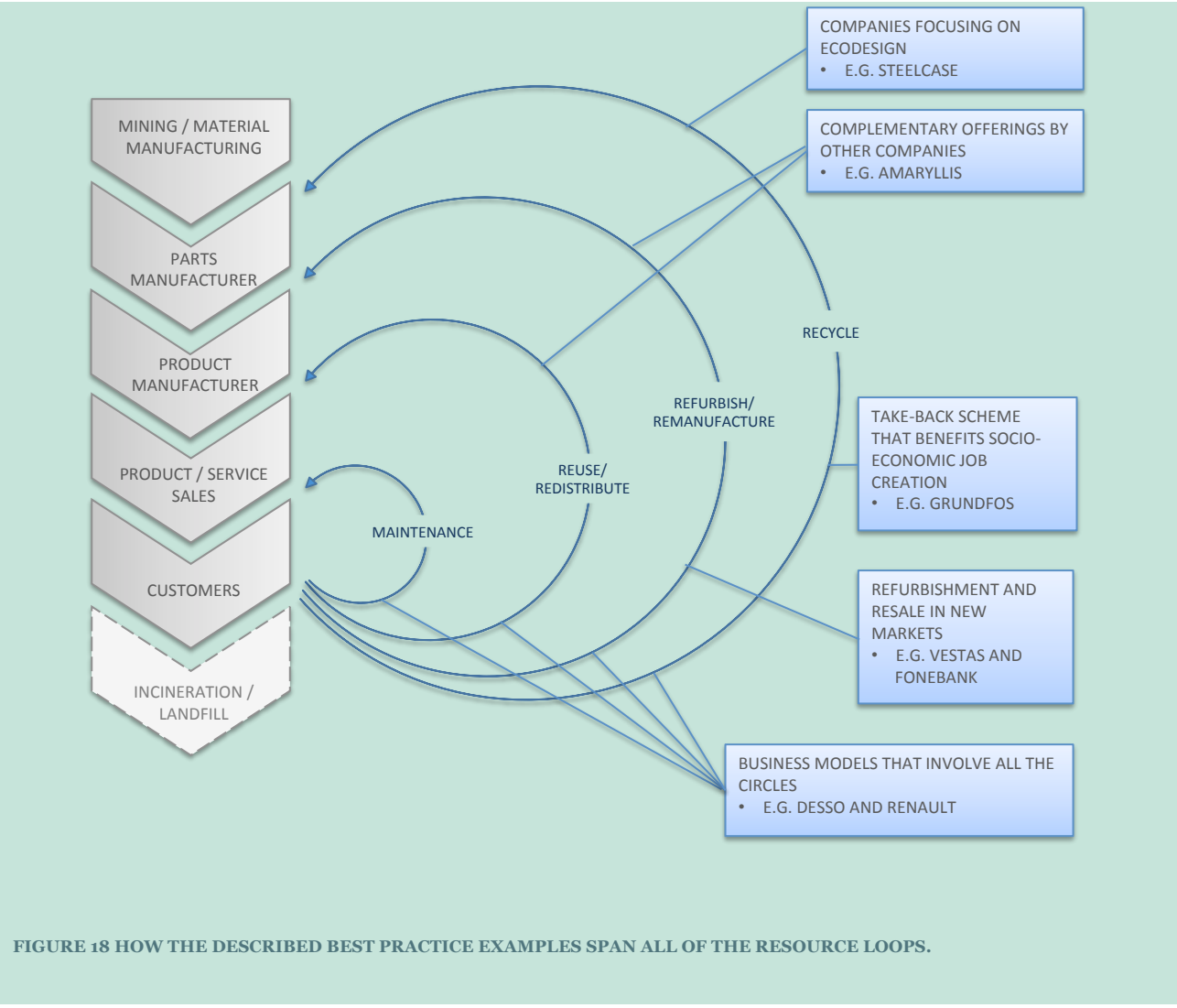

FIGURE 18 HOW THE DESCRIBED BEST PRACTICE EXAMPLES SPAN ALL OF THE RESOURCE LOOPS.

As in the textile and clothing chapter, the best practice examples in this chapter span all the resource loops. FIGURE 18 indicates how a selection of the examples are organised with respect to these loops. The description of cases in the subsequent sections 4.2 - 4.10 point to how companies build on the four value bases in ways that often fit with one of Accenture's proposed business models.

In the following sections, carpets and furniture represent the first focal point. Subsequently, circular business models for electronic products, for industrial goods of various kinds, for cars and for packaging are described. The chapter finishes with a summary of key findings including a mapping of how the presented best practice examples are distributed among the four value bases and five distinct business models.

4.2 Maintenance and remanufacturing of carpets

The Dutch carpet manufacturer *Desso* was among the first companies to strive for closed loop manufacturing in the carpet industry. Desso's efforts began around 2007, and since then it has developed a number of Cradle-to-Cradle certified carpet tiles. The certification was a first step for Desso since only non-harmful, reusable raw materials were used for the production of the new line of carpet tiles. This strategy allowed for the development of a remanufacturing process for the tiles. In other words, the principles of pure circles unlocked the opportunity to build a system for the recycling of tiles.

In the remanufacturing process Desso separates tiles in a top and bottom piece corresponding to separating the yarn from the back of the tile. The two parts are treated in individual processes: The nylon yarn is cleaned and respun into new yarns, while the backside is granulated and made into new backing (Aastrup 2013).

Notably, the modularity of carpet tiles allows for smart maintenance, since it is possible to change only the tiles demonstrating visible wear and tear. In this manner, Desso can prolong the life of the majority of tiles, which are not placed in “high-traffic” areas, before ultimately taking them in for remanufacturing. This is in accordance with the powers of the inner circle and of circling longer because Desso thereby ensures that the individual tiles are used for as long as possible.

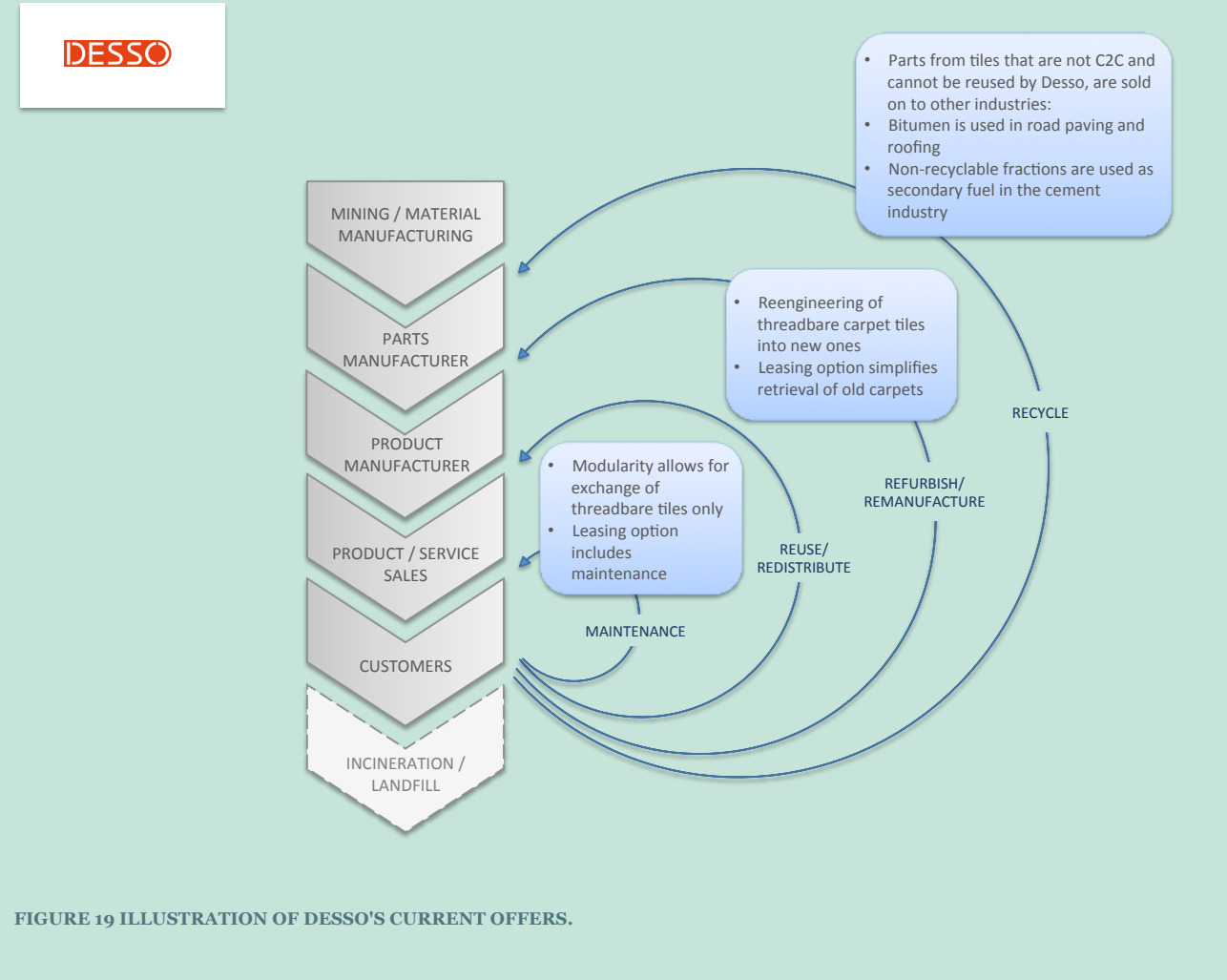

FIGURE 19 ILLUSTRATION OF DESSO'S CURRENT OFFERS.

One of Desso's latest initiatives is to offer customers a carpet leasing service, in collaboration with De Lage Landen a supplier of leasing, business and consumer finance solutions. Desso perceives the leasing option, which includes installation, cleaning, maintenance and eventually removal as an important element in the company's transition to a circular economy (Desso 2015). So maintenance is an integral part of the leasing agreement, improving both the customer experience and the durability of the carpet.

Furthermore, retrieving the old carpets gets simpler this way, because as Desso explains: "Instead of owning the carpet, customers view it as a service provided by Desso, who will then take back the

carpet at the end of its life for recycling. Via this leasing construction collection of old carpet products is more easy and positively contributes to closing the loop." (Desso 2015). Leasing is assumed to be interesting to municipalities, among others, since budgets are often tight and there is a need to minimize expenditures accordingly. The investments needed for large-scale refitting such as new flooring could be spread across several years via such leasing agreements (Aastrup 2013).

4.3 Preparing for closed loops in furniture

The furniture industry is also driving sustainability initiatives, even though material loops for the most part remain to be closed. Steelcase, a leading manufacturer of office furniture, has been working with sustainable design, in the form of ecodesign, in part of its product portfolio for years according to Design for the Environment (DfE) Manager at Steelcase Inc., Sébastien Zinck (Zinck 2014). The Think chair is one of the best examples of what the company has achieved this way: The materials have been carefully chosen, the chair has been designed to be low-weight and the chair is highly recyclable (Zinck 2014). The Think chair is marketed at a competitive price, and it is a Steelcase bestseller in most markets (Zinck 2014).

Steelcase has take-back schemes in some markets such as the Eco'Services offer in France and the Phase 2 program in the US. The aim of both programs is to either donate, resell or recycle the old furniture to avoid landfilling: "The intent is for these used products to be placed back into service for reuse with other organizations, or because of age and condition of the used products, be recycled into new usable products." (Steelcase 2016).

In addition to the services offered by large businesses like Steelcase, a number of smaller, independent service companies that facilitate the closure of reuse, refurbishment and recycling loops are found in the industry. Amaryllis is an example of such a company, which operates in the UK market. Amaryllis offers recycling, renovation, reuse and disposal of office furniture, equipment and general waste (Amaryllis 2012a).

Notably, Amaryllis also operates a reuse and recycling programme for companies where profits are shared. Amaryllis describes it this way: "Working with many large organisations, we can develop a company-wide reuse and recycling programme. (...) Using our network of resale channels, we offer a financial gain share mechanism – operated on an 'open book' basis" (Amaryllis 2012b).

The Eco'Services offer and the Phase 2 program of Steelcase as well as Amaryllis' operations are examples of companies applying a product life extension business model in different ways. A business model that results in higher utilization of the office furniture.

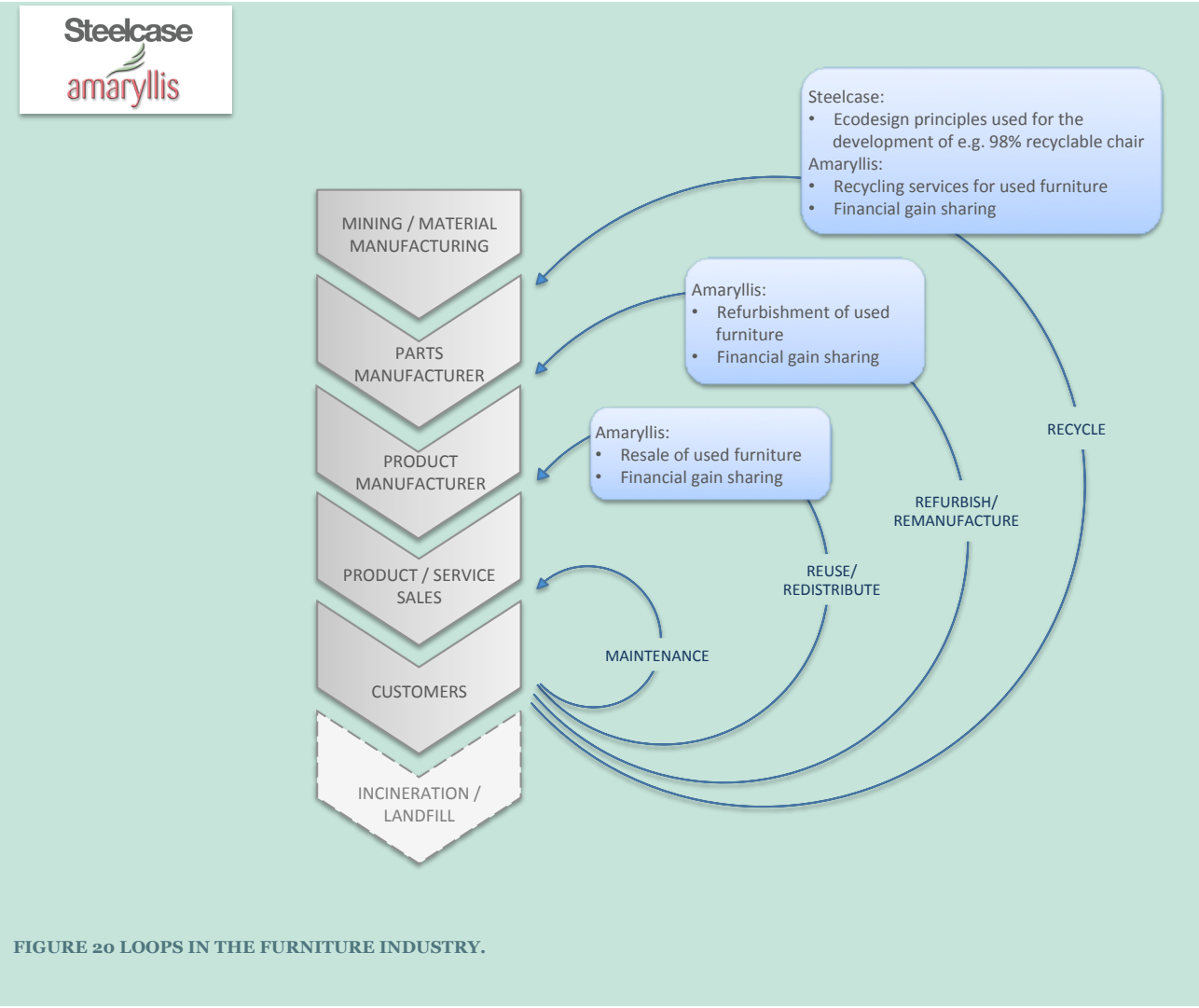

FIGURE 20 LOOPS IN THE FURNITURE INDUSTRY.

4.4 Resale and refurbishment of electronic products

Corporate Mobile Recycling is a mobile phone recycling company operating in 10 counties with a staff of 75. It is reselling and recycling 70,000 mobile phones and electrical devices each month (Corporate Mobile Recycling 2014). *Fonebank* is an affiliate, which purchases fully functioning or broken-down phones and tablets from private households and companies in Western countries and sells the refurbished products in Europe, Asia or Africa depending on the condition of the goods.

In short, Fonebank's refurbished products are marketed at a reduced price compared to new products, which makes them accessible to new customer segments in developing countries. In Africa, where 70% of the mobiles are resold, Fonebank argues that its phones help businesses run, and families to stay in touch (Fonebank 2014b). In practice, Fonebank offers economic and social benefits in developing countries. These benefits add to the environmental advantages derived from reducing demand for factory fresh mobile phones, such as lesser mining for precious metals and rare earth elements, required in the manufacturing process and less electronic waste going to landfills. Quantities are fairly substantial as Fonebank buys 40.000 mobiles each month in its business division alone (Fonebank 2014a).

Developed countries also stand to gain economically from this business model, as owners of used electronic equipment are given an economic incentive to put used devices into a new life cycle with a new user. So far, Fonebank has paid 80 million GBP to people who sell used equipment to the company (Fonebank 2014a). Clearly, Fonebank profits from this exchange and is able to create new jobs based on this.

Other companies in the user electronics industry focus solely on repairs, *iRep* and *iRepair* are two examples of this. iRep is a repair shop for mobile phones and tablets while iRepair is a repair shop for iPods and laptops in addition to phones and tablets. In both cases it is possible to visit physical stores around the country, or use their online interface to fill out the necessary paper work before mailing the broken products to the repair shops. The companies accommodate both private and business customers. Often, such companies also collaborate with insurance providers to ensure a steady inflow of repair work.

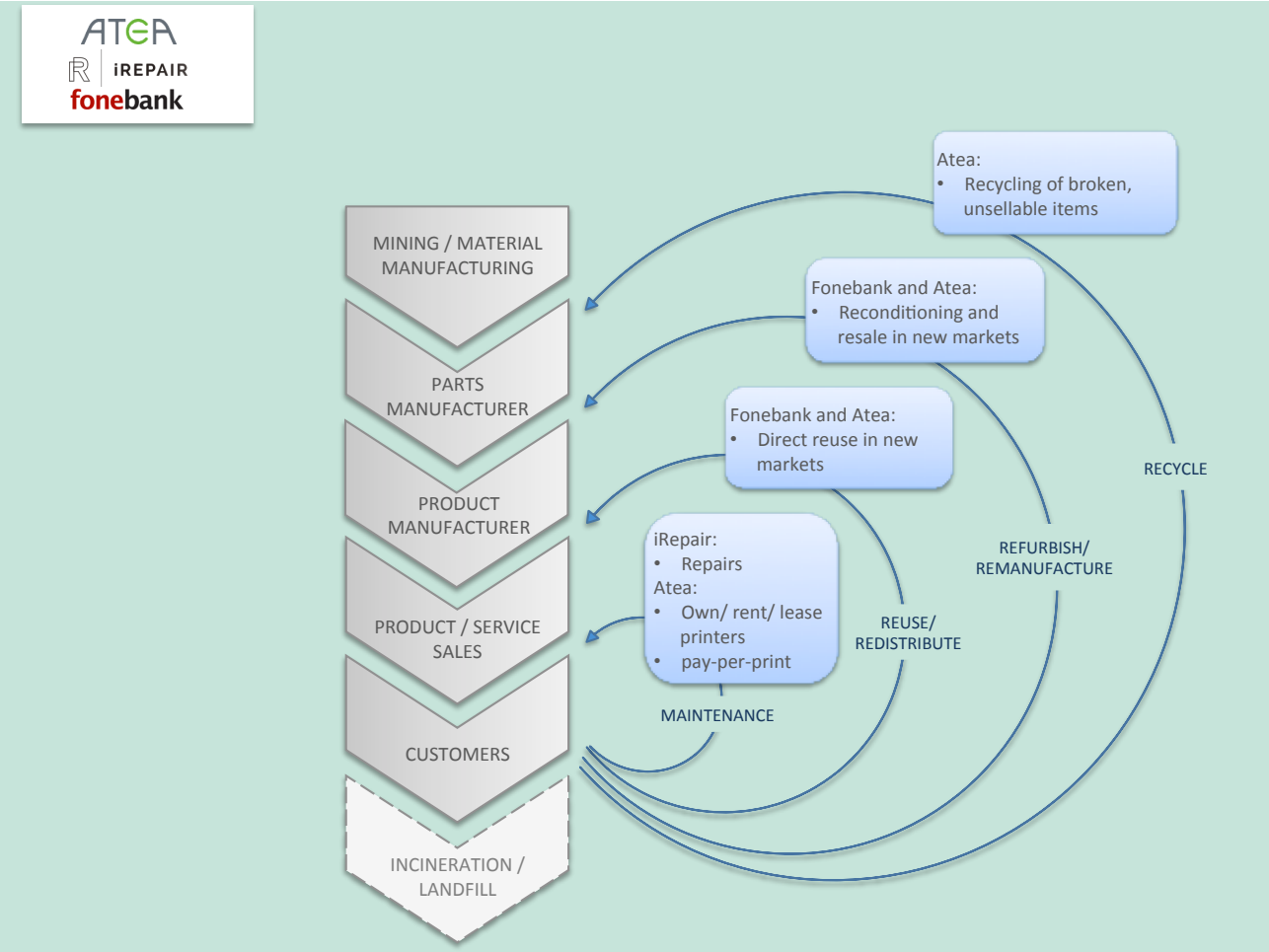

FIGURE 21 BUSINESS MODELS IN ELECTRONICS.

IT company *Atea* offers a comprehensive range of IT-related services. With respect to circular business models, the company's GoITloop service and as-a-service concept are especially interesting. With GoITloop customers can choose from several models for reconditioning and recycling. The one loop option involves simple collection of used electronic equipment and

environmentally friendly recycling, while the other loop options include reconditioning and resale of old equipment wherever possible. In that case the customer receives a reimbursement from the resale of reconditioned units (Atea n.d. c). According to Atea, 99,7% of the collected IT equipment is reused, and the remaining 0,3% is disposed of in an environmentally friendly way (Atea n.d. a).

With respect to printers the company offers different solutions to customers, one of which is based on a pay-per-print principle:

- The customer rents a printer and pays a price per print
- A leasing model where either the customer or Atea takes care of ordering toner and of service
- A solution where the customer owns the printers but Atea monitors the machines to order new toner cartridges and service printers as needed
- Traditional ownership of the printers where the customer manages everything himself (Atea n.d.b)

The companies presented in this section represent examples of different circular business model archetypes, cf. FIGURE 21. Thus iRepair and iRep represent examples of product life extension oriented towards the original product owner via their repair services. This business model is also found with Fonebank although the extended product life is attained through sales to new users in new markets. Further, Atea offers examples of the product as a service business model since printers can be rented with a per-per-print agreement or leased with toner supply and service outsourced to Atea.

4.5 Remanufacturing of automobile parts

The French automobile manufacturer *Renault* is highly dedicated to business models based on a circular economy, describing their view on resources and sustainable business in this way: "Upstream a responsible company ensures product sustainability and control of its resources. It anticipates product dismantling and reuse and protects its raw material capital" (Renault Communications 2014c).

This philosophy has shaped Renault's activities, and the company is now engaged in service models for battery leasing, redesign of components for dismantling, remanufacturing of parts, recycling of parts and materials and development of service model agreements with suppliers. In addition, Renault has been a member of the UK-based Ellen MacArthur Foundation since 2010 (Renault Communications 2014b). The foundation aims to accelerate the transition to a circular economy, and has been active in pursuing this goal.

The remanufacturing business is perhaps the most impressive of Renault's circular business model initiatives. Thus, the Choisy-le-Roi plant near Paris has repaired parts belonging to six different product families since Renault acquired it back in 1949. The operating margin is higher than that of other Renault plants, and the process is waste free. Hence, 43% of the parts supplied to the plant by Renault's European network are recuperated in the remanufacturing process, 48% are unserviceable and are thus recycled in the company's foundries into new parts, while the remaining 9% is valorised in treatment centres. In total 30.000 engines, 20.000 gearboxes and 16.000 fuel injections systems are remanufactured at the plant each year providing jobs for 345 people (Renault Communications 2014c, Renault Communications 2014a, Ellen MacArthur Foundation 2013b).

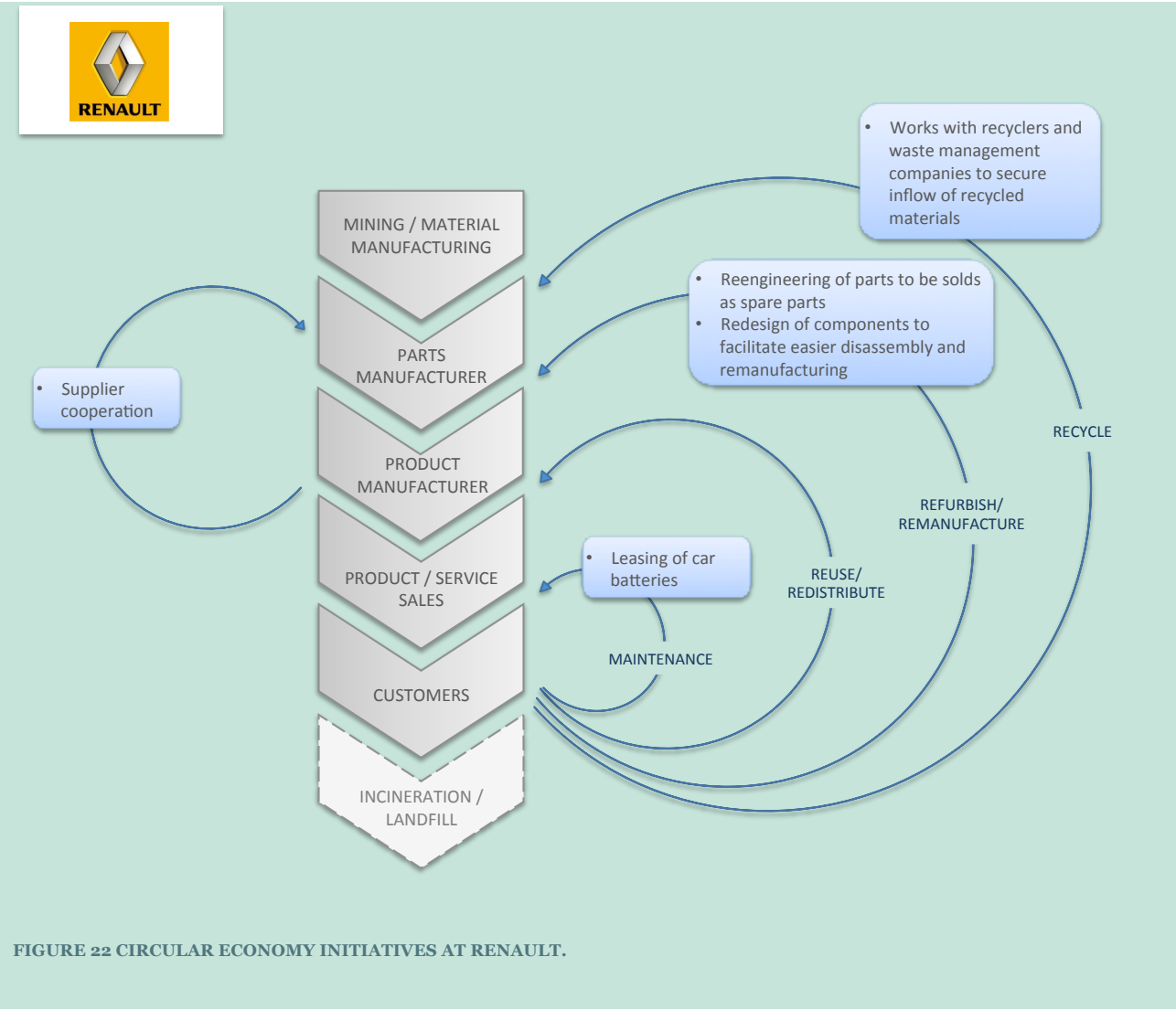

FIGURE 22 CIRCULAR ECONOMY INITIATIVES AT RENAULT.

Renault's business models demonstrate the principles of circling parts longer and of ensuring cascaded use of the embedded materials, when the parts cannot be recuperated. The principle of pure circles also comes into play, as parts have to be carefully designed to allow for remelting and subsequent reuse. Thus, the knowledge gained at Choisy-le-Roi and at vehicle recycler Indra, which is a subsidiary, on dismantling of components is used by Renault's product design engineers to redesign certain components for easier dismantling and reuse (Nguyen, Stuchtey & Zils 2014).

FIGURE 23 CHOISY-LE-ROI PLANT (RENAULT COMMUNICATIONS 2014B).

The remanufacturing business offers benefits to both Renault, Renault's customers and the environment. First, it is less expensive to remanufacture units than to assemble a new unit. Second, the parts are, therefore, 30-50% less expensive for customers compared to new parts (Nguyen, Stuchtey & Zils 2014, Renault Communications 2014c). Finally, the remanufacturing process is more resource efficient. In fact, there are considerable savings when producing a remanufactured part compared to a new part:

80% less energy
88% less water
92% less chemical products
70% less waste production
(Ellen MacArthur Foundation 2013b)

Philippe Klein, Renault's Executive Vice President, Product Planning, Programs & Light Commercial Vehicle Division summarises the advantages: "The circular economy now impacts our business in a positive way. (…) closed-loop recycling is an important lever of risk management for the company. Another example is re-manufacturing of parts: the profitability of Choisy-le-Roi is far higher than the average profitability of Renault's industrial sites. If you look at Choisy as an individual business unit, the business model is already very profitable." (World Economic Forum 2014).

Besides, remanufacturing activities, Renault is active in the recycling/upcycling business through their involvement with Indra. Indra is a joint subsidiary of Renault and SITA, and provides Renault with raw materials and spare parts for repairs. A network of more than 300 approved vehicle dismantlers supplies the carcasses across France (Indra 2012). Working with raw material recovery

is important to Renault, as 20% of a car's price is associated with raw materials (Renault Communications 2014c).

Supplier relations are also part of Renault's business, especially as suppliers account for 57% of a car's cost (Renault Communications 2014b). In this area Renault applies circular economy principles as well. Renault asked its cutting oil supplier to take over the full service and maintenance obligations for the oils, and this resulted in the development of a new lubricant with better performance that saves Renault around 20% in total costs compared to the old oil (Nguyen, Stuchtey & Zils 2014).

Renault acknowledges the on-going shift in business models from product ownership to product use or service use. Other examples include Philips' Pay-per-use models and clothing rental services such as Rent-a-jeans and Girl-meets-dress. In the automobile segment, both car sharing and private leasing has become more popular. For instance, Denmark has had an increase in the number of privately leased cars from 5.100 in 2013 to 9.200 in the first 10 months of 2014 (DR1 2014). Thus, there seems to be a growing interest in services as opposed to traditional ownership. This trend can also be seen as a move towards Product-Service-Systems.

In Product-Service-Systems the customer becomes a user and rents the service. Renault has offered such rental services with respect to their electrical vehicles in Europe. Here, the customers can lease batteries for the vehicles. This allows Renault to keep track of the batteries, retain the materials and ensure recycling at end-of-life (Renault Communications 2014c). This model has the additional advantage to customers that they know the value of their used electrical vehicle can be compared to that of a vehicle with a combustion engine, when they want to replace it. Thus, customers are reassured about their investment in electric technology. This is an advantage to the customers but also to Renault, since this means more electrical vehicles are sold.

4.6 Return logistics for circulators

Grundfos is a pump manufacturer headquartered in Denmark, employing 18.000 people worldwide and operating in more than 56 countries. Since 2012, Grundfos has operated a take-back scheme for used circulators. The scheme covers the Danish home market, and has been developed in cooperation with wholesalers (Holleufer 2015). All major circulator wholesalers are participating in the voluntary scheme, corresponding to more than 200 wholesalers across Denmark (Hansen 2015).

The return scheme is designed so that installers are invited to bring back old circulators for recycling, when they are replacing circulators in plants and in private homes. The defect pumps are brought back to the wholesaler at convenience, and collected in batches of 300 kg before they are sent back to Grundfos. Grundfos pays the wholesaler and the wholesaler pays the installer.

There is little financial benefit to the installers and wholesalers that participate in the scheme, as the price paid for the scrapped pumps by Grundfos is similar to the price, which recycling companies pay. Grundfos is not expecting to make a profit from the initiative either. Rather, the main reason behind the introduction of the scheme has been the potential to ensure work for employees on special terms, since Grundfos has an ambition to have at least 5% of the Danish workforce employed on special terms (Holleufer 2015).

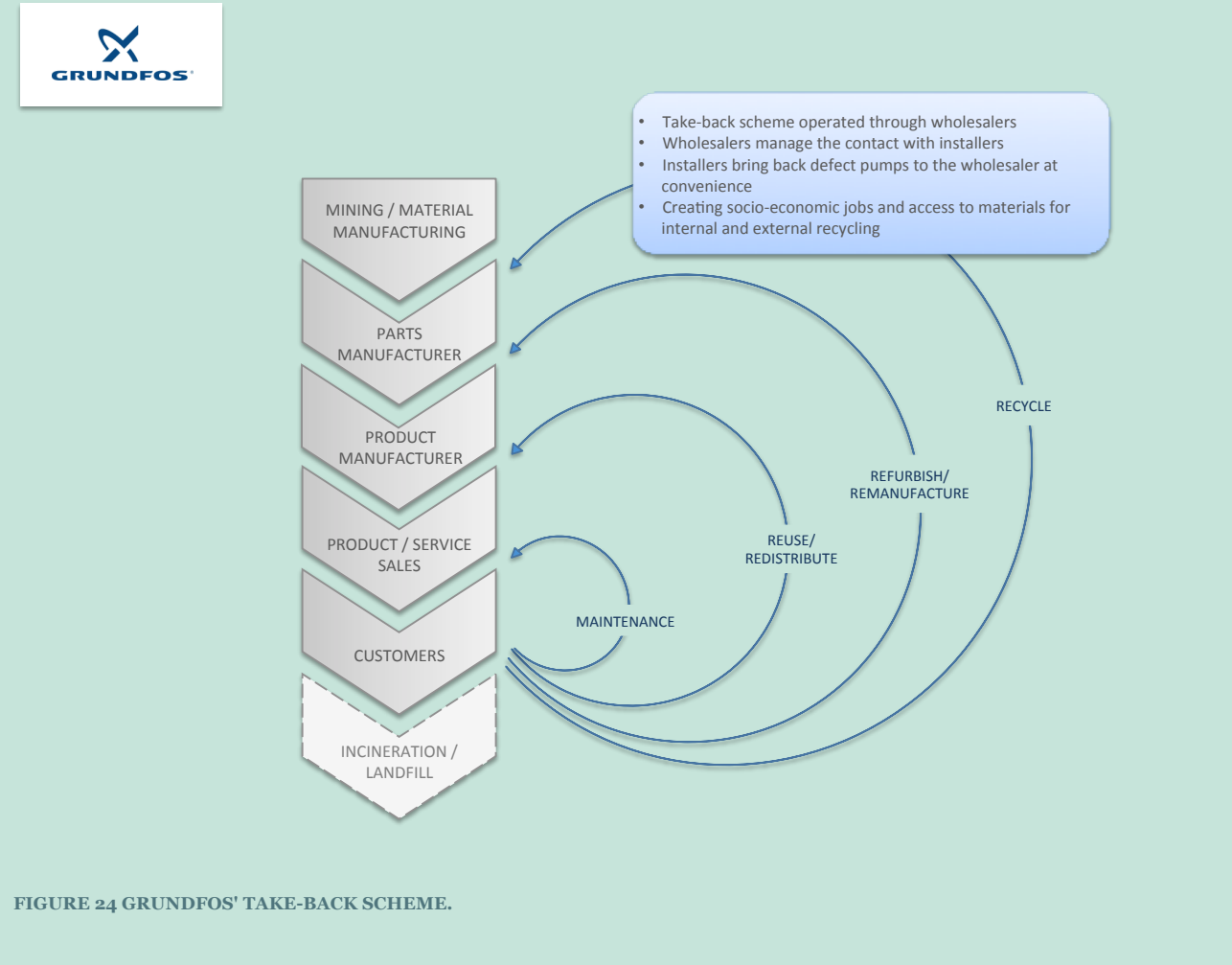

FIGURE 24 GRUNDFOS' TAKE-BACK SCHEME.

The scrapped pumps are returned to the Recycling Department, which is on of the departments where employees on special terms work. In addition to the dismantling of the pumps received via the return scheme, the 12 employees of the department deal with machine disassembly and the recovery of various other scrap products and materials. The activities of the department helps Grundfos achieve a high recycling rate for the involved materials along with a high sales price due to the purity of the sorted material fractions.

A minimum of 90% of the old circulators can be reused (Grundfos 2014), and Grundfos use the recovered aluminium in its own melting furnaces for the production of new motor casings and pump housings, while the other recovered materials are sold on to recycling companies (Holleufer 2015). Around one year after the return scheme commenced Grundfos had collected 2,1 ton of scrapped circulators (Holleufer 2015).

In addition to ensuring jobs for employees at special terms and the advantage of direct access to recyclable aluminium Sustainability Consultant at Grundfos, Kirsti Holleufer, points to the following motivational factors behind the initiative:

- Better wholesaler (and installer) contact
- Potential for data collection in the long term
- Prepare for possibly stricter WEEE-legislation
- Some marketing effect (Holleufer 2015)

There is also environmental benefits from handling the old circulators responsibly. Yet, if the pumps were not dismantled and materials sorted at Grundfos, recycling companies would handle the old pumps via dedicated shredder machinery, which must also be regarded an environmentally responsible recycling setup. In any case, to Grundfos and its wholesalers the opportunity to ensure socio-economic jobs was the most important benefit of establishing the return scheme (Holleufer 2015).

4.7 Healthcare and lighting as a service

Philips is a Dutch technology company operating in healthcare, consumer lifestyle and lighting. The firm is present in more than 100 markets worldwide (Philips 2014). Philips has been working with circular economy principles for around 20 years. Robert Metzke, senior director of group strategy, explains Philips' view on circular economy in the following way: "(...) the circular economy simply makes good business sense. It's a major driver of innovation. Importantly, embracing circular thinking will also help businesses to become more resilient, minimize raw material price volatility and remain relevant and profitable in the future." (Earley 2013).

The company has incorporated circular business models in two of its business divisions, viz. the health care division and the lighting division. In 2014 Philips joined the Ellen MacArthur Foundation as one out of five partners (including Renault, as described in section 4.5). One of many initiatives of the foundation is the 'Circular Economy 100' programme, created in 2013, which is a platform for collaboration among companies, innovators and regions (Ellen MacArthur Foundation 2013a). Philips is actively taking part in this collaboration initiative, too.

In the healthcare division, refurbished medical imaging equipment is offered with full warranty but at a lower cost. This business has grown over the last 20 years from zero to some 5-10% of overall business volume. The complex medical equipment is often acquired via trade-ins. This has the dual benefit of supplying Philips with equipment for refurbishment and upgrading, while at the same time ensuring customers a good trade-in price for the used equipment (Philips 2013).

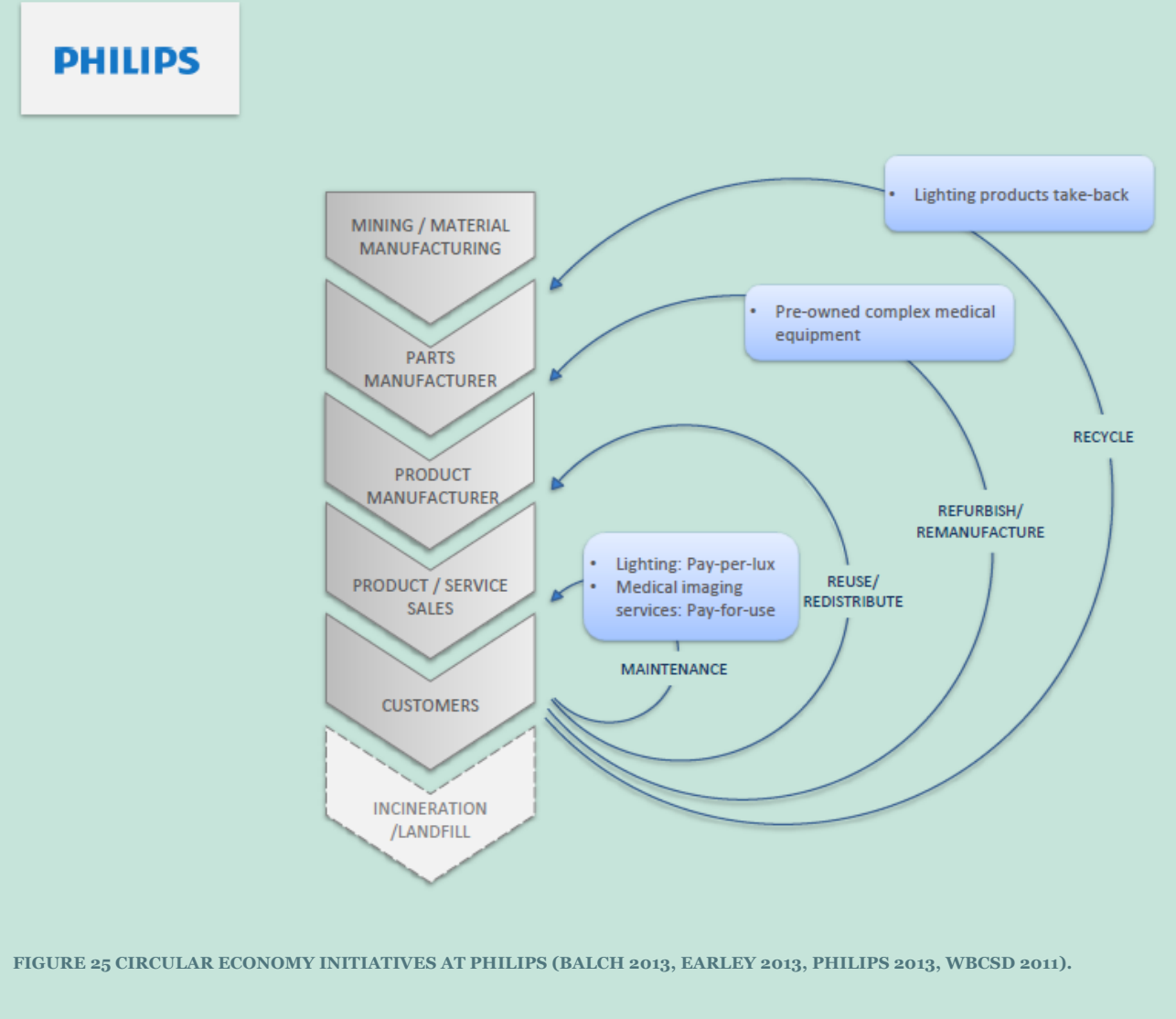

FIGURE 25 CIRCULAR ECONOMY INITIATIVES AT PHILIPS (BALCH 2013, EARLEY 2013, PHILIPS 2013, WBCSD 2011).

More recently, Philips has begun experimenting with circular business models in its lighting division. Hence, a collaboration with RAU Architects is established in which Philips sells light as a service. Here, Philips owns the materials, while RAU pays for maintenance and servicing.

The collaboration has resulted in an energy reduction of 55% at RAU Architects, as RAU has benefitted from the in-depth expertise of Philips in energy efficient lighting (Earley 2013). Thomas Rau from RAU Architects explains the advantages: "Since the summer of 2010 we only pay for the actual amount consumed light (lux), not for the raw materials used in the products and we're using dynamic light at our office which tunes to the exact needs of that working area." (Rau 2013).

Because Philips retains ownership of the products and the embedded materials, the company is able to refurbish or recycle the lighting equipment once it is no longer wanted at RAU Architects. The arrangement also means that part of Philips' revenue now comes from services rather than products. Metzke comments on the general shift in revenue stream when moving to a circular economy: "This new model will see performance and durability come to the fore as Philips' customers invest in lighting and healthcare 'services' or 'functionality' rather than buying new products." (Earley 2013).

4.8 Refurbished wind turbines for rural Africa

Vestas is a Danish wind turbine manufacturer with global presence. In 2011 Vestas' CMO, Morten Albæk coined the idea of Wind for Prosperity. A model aimed at bringing "(...) affordable and reliable electricity to rural and island populations that currently lack it" (Vestas 2014).

The idea is to provide refurbished wind turbines to some of the 50 million people that live in rural areas with limited infrastructure and no electricity, but with abundant wind resources. Currently, the primary focus area is Africa. The portfolio of wind turbine models offered under the Wind for Prosperity brand are robust with proven reliability suited to the conditions they will face in their new sites. Other factors has to be taken into consideration when establishing local mini-grids. To this end, Vestas guarantees the turbines are "(...) easy to transport, simple to erect, reliable and simple to maintain (...)" (Vestas 2015).

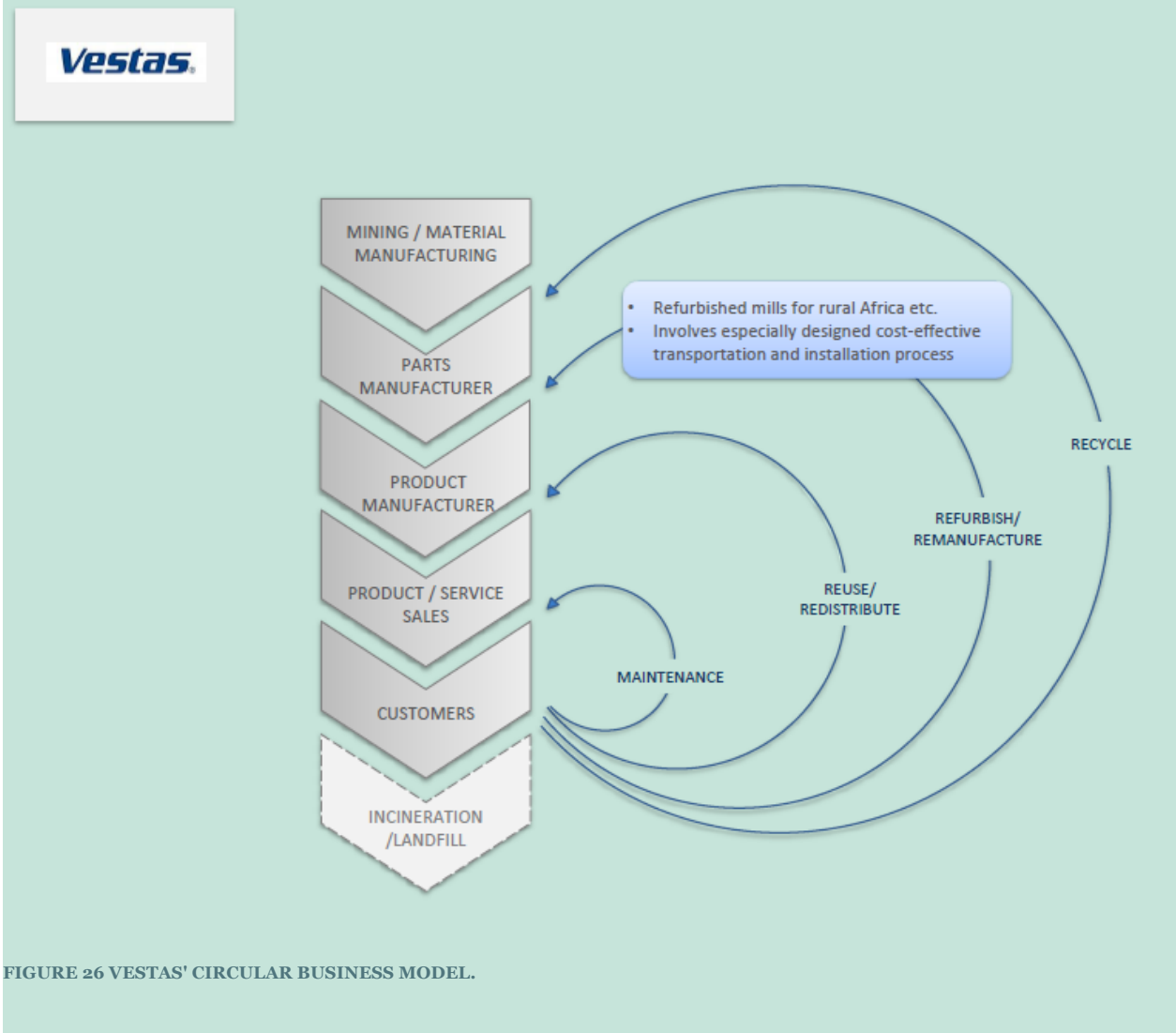

FIGURE 26 VESTAS' CIRCULAR BUSINESS MODEL.

Despite the challenges in providing power to remote communities the proposed wind hybrid systems are expected to supply electricity at a lower cost than the diesel based alternative. Estimates by Vestas show electricity will be at least 30% cheaper (Vestas 2015). The Wind for Prosperity concept is commercially based and typically requires private investors and governmental energy agencies to get involved in public-private partnerships. Companies that need reliable

electricity can invest in the turbines as well, if they agree to deliver part of the output to neighbouring communities.

Vestas has invested in the concept via its marketing budget, and the cost has been in line with that of regular media campaigns. Other than that Vestas has not invested in or donated money for Wind for Prosperity as it is not a charity concept. The African customers pay for the refurbishment, transportation and installation as they would with regards to a traditional sale. However, the cost of a refurbished turbine is lower that that of a new one, and the transportation and installation process is optimized to keep investment requirements low.

Vestas demonstrates an example of how companies can take advantage of extending product life by spanning different markets. It is a circular business model similar to that of Fonebank, which reconditions mobile phones from developed countries and resells them in developing countries, cf. Section 0.

4.9 Bicycle and car sharing services

Sharing is not a common business model in most durable goods sectors. Yet, in the bicycle and automobile sectors this model has been explored for at least the last decades or so in cities across the globe. Bikes for rent or borrowing have been offered by many cities including Paris, where the service is called Velib' and was established in 2007. It involves 20.000 bikes and 1.800 bike stations located every 300 meters (Velib' 2010). A 1-day ticket is available for €1,70 for visitors, but 7-day tickets and subscriptions are possible as well.

Autolib' is a car sharing service in Paris similar to the bike sharing service. It was opened to the general public in 2011 and offers more than 2.000 electrical cars, 800 stations and 4000 parking and charging spots today (Autolib' 2015). The service has recently been expanded to Lyon and Bordeaux and will be moving to London and Indianapolis shortly (Henley 2014, King 2013).

Zipcar, Hertz on Demand, Co-wheels and others offer competing car-sharing platforms. In terms of value bases, the business model enables a more intensively utilization of the cars through sharing, as opposed to the cars sitting idle most of the time in a car park. Furthermore, since the car renting companies retain ownership of the cars, they take good care of the cars to ensure they are in order and can continue to attract customers. In this way the car renting companies facilitate that the cars can operate longer, thus taking advantage of the business opportunities in the value base of circling goods longer. This business model is an example of what Accenture refers to as sharing platforms.

4.10 Progress in packaging

Finally, an example of a circular business model based on biological cycles. The US-based material science company, Ecovative, has developed a new type of plastic based on mycelium from mushrooms. Ecovative suggests the bioplastic can form an alternative to e.g. synthetic insulation or foam packaging, and the new materials have the advantage over traditional packaging materials that they can be composed at home (Ecovative 2015).

In addition to working with the biological cycle, Ecovative clearly bases its business model on pure circles, which allows for a safe return of the mycelium materials to the biosphere in the form of compost. In terms of Accenture's business model types, Ecovative's business model fits within the circular supplies business model.

4.11 Findings from the durable goods cases

The case descriptions indicate that the approaches adopted by companies across the durable goods sector differ significantly. The circular business models described span the four value creation bases, the five distinct business models and all resource loops. Thus, FIGURE 18 at the beginning of the current chapter gives an overview of how a selection of the examples is distributed across all resource loops. Correspondingly, FIGURE 27 sums up how a few of the described best practice examples are spread across the four value creation bases suggested by the Ellen MacArthur Foundation and across the five distinct business models proposed by Accenture.

The variety of business models observed illustrates that companies in the durable goods sector take an individual approach to exploring the opportunities of the circular economy. This is equivalent to what companies in the textile and clothing sector were found to do in the preceding chapter.

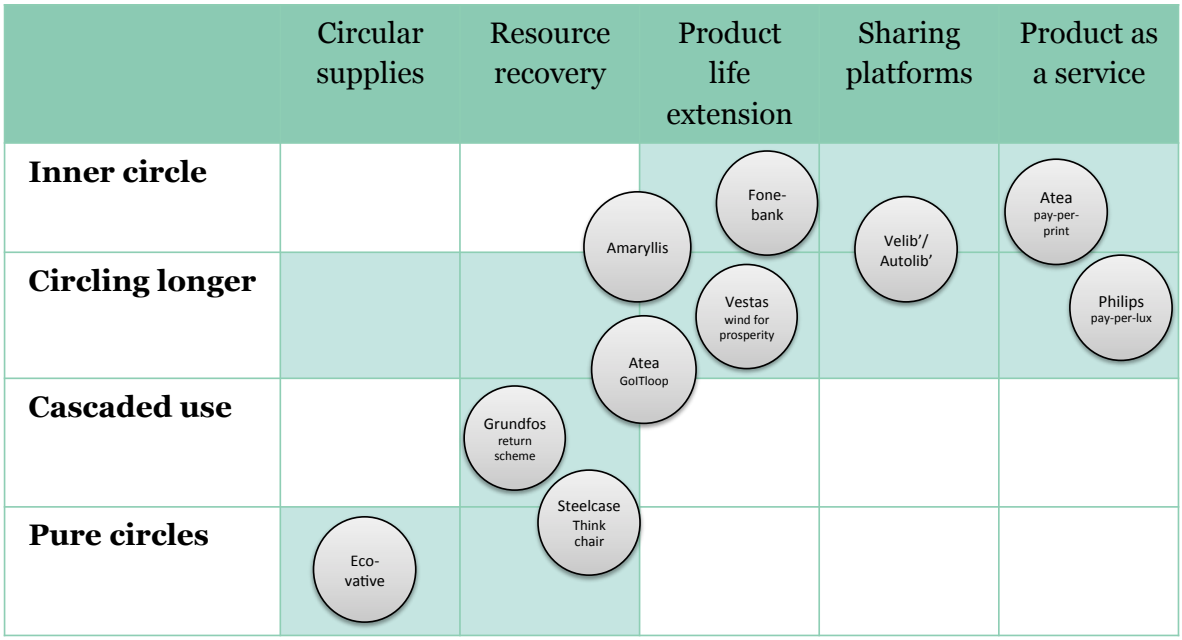

FIGURE 27 A FEW DURABLE GOODS COMPANY EXAMPLES RELATED TO THE BUSINESS MODEL FRAMEWORKS.

As highlighted in the case studies, a number of large companies in the durable goods sector are currently experimenting with circular business models. Some companies, such as Renault, Desso and Fonebank, have even operated these models at scale for years. Others are still in a start-up phase, which involves only a few business units in setups with limited financial risk, e.g. Grundfos and Vestas.

The best practice examples described in this chapter highlight the importance of collaboration between companies in successfully closing resource loops. This is exemplified by the Grundfos case, insofar as the company has established new relationships within its existing supply chain to enable the formation of a reverse logistic scheme. Renault is another case in point, as the automobile manufacturer has created new partnerships with suppliers of such diverse products as lubrication oil for production machinery and automobile carcasses for spare parts and raw materials. Partnerships are also essential to Vestas' Wind for Prosperity concept, in which extensive collaboration is required with parties beyond the traditional supply chain. In practice, close cooperation between local authorities, investors and Vestas is needed to ensure the success of the business model.

The cases from the office furniture business illustrate another pivotal point in building resource efficient industries namely that individual companies do not need to span all the resource loops of an industry. Companies can, instead, opt to complement each other. Companies such as Steelcase and Amaryllis offer a good case in point, since Steelcase delivers high quality, recyclable office furniture and Amaryllis complements this business by providing recycling, refurbishment and resale services for the furniture.

The case examples of Grundfos, Vestas and Fonebank illustrate how socio-economic benefits can form an integral part of circular business models resulting in jobs on the home market in all three cases, while at the same time improving access to electricity and communication for citizens of developing countries in the cases of Vestas and Fonebank respectively.

5. Discussion

The numerous examples from the clothing and textile as well as the durable goods industry presented in the preceding chapters illustrate the varied approaches businesses have taken when creating circular business models. Circular business models have been implemented in various industrial sectors and in both business-to-business and business-to-consumer markets. This diversity of company examples seems to point to the fact that individually tailored circular business models can be successfully implemented in most business contexts.

Which business areas, value bases, resource loops or business model archetypes are most relevant to focus on for a given company depends on its unique context, including internal capabilities and market conditions. A step-by-step experimental approach where the company focuses on the potentials of individual business areas one at a time may be advisable. Companies such as Vestas, Grundfos and Philips seem to have followed this procedure, which allows for a corresponding step-by-step organisational learning and for leveraging the risks inevitably associated with new business ventures.

The circular business model examples in the textile and clothing chapter indicate that young companies and SMEs are most agile and better at implementing company-wide, innovative business models, illustrated for instance by Nudie Jeans and Globe Hope. Nevertheless, in the durable goods industry there are examples of established companies like Desso and Renault being committed to operating circular business models, which span most of the companies' business areas. Therefore, based on the presented examples, a conclusion is that young and mature, small and large companies alike have already adopted the idea of a circular economy and have taken advantage of the inherent opportunities.

In some of the best practice examples, resource loops are fairly tightly closed because economic incentives are in place to return goods and/or because solid partnerships between supplier/wholesaler/dealer and the production company have been developed, which Renault is an example of. In other cases, the resource loops are left more open due to initiatives being voluntary, experimental, small scale or covering only part of the market. At any rate, establishing new and/or closer collaboration with stakeholders within or beyond the traditional supply chain seems key to creating circular business models.

The report has provided examples of how companies have developed such partnerships. For instance, Grundfos has established closer collaboration with its wholesalers while the wholesalers have forged closer collaboration with the installers in connection with the set up and operation of Grundfos' take-back scheme. Renault has a network of 300 vehicle dismantlers and a joint subsidiary vehicle recycler that support its remanufacturing business model. I:CO represents yet another example as the company has established partnerships with retailers globally including large companies such as Walmart and H&M. Finally, IRep represents an example of how a small company has developed its network, as the firm not only offers service to both companies and private customers but is also a designated repair shop for insurance companies.

In the present report, focus has been on opportunities rather than challenges, but there are also difficulties associated with capturing new business opportunities. The new kind of cooperation described above is one possible obstacle. Limited customer knowledge of circular opportunities is

likely to be another, since customers are familiar with the traditional linear model and expect services based on this. Communicating the new types of services and business models as well as convincing customers of the benefits is thus important, but can be difficult if the company is operating in a global marketplace with diverse customer segments or if it has little contact with the customers traditionally.

Typically, capturing some of the opportunities will require companies to apply new life-cycle-thinking that involves the entire value chain from sourcing to disposal and to look for circular business opportunities in this flow of goods. Companies will need to develop new skills and capabilities to successfully move to this kind of thinking and to capture the business opportunities inherent in the circular economy. Co-creating offerings with customers or suppliers is one way to approach this challenge, as in the case of Philips and RAU Architects. Circular business model thinking will also require companies to find ways to assess economic and environmental risks and potentials in circular business cases and to get acquainted with regulation that applies to operating circular business models.

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Best Practice Examples of Circular Business Models

Best practice examples of circular business models are presented in the report as well as particular methods applied by companies using these models in the development of their businesses in textile and clothing and durable goods sectors. The purpose is to inform and inspire interested readers - in particular companies that aspire to examine the potentials of the circular economy.

One conclusion is that individually tailored business models are important. Examined companies are found to apply a step-by-step or experimental strategy, where they test the resilience of a circular business model within a limited number of product lines or in one business unit at a time. This allows for a corresponding step-by-step organisational learning and for leveraging the risk associated with new ventures.

The study also indicates that the ability of companies to apply life cycle thinking, through the entire value chain from sourcing to disposal and to look for circular business opportunities in this flow of goods and value, is essential. Establishing new or closer collaboration with stakeholders within or beyond the traditional supply chain is another important skill in creating circular business models.

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