



Circular Business Models: The 2016 update



Coop ARC's
business model scan
with 3 new
business models and
improved scan

Colophon		
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Preface

Throughout the world more and more companies have started to develop and apply circular business models. These are business models fitting in a circular economy, i.e. an industrial system that is restorative or regenerative by intention and design. In our view, the essence of a circular economy lies in new types of economic transactions, which focus on performance rather than ownership. This is why we present a scan for circular business models. The combined effect of these business models is an economy with a biotic circle consisting of cascades of biomass (biotic resources) and closed circles of other (abiotic) resources. The latter means that abiotic resources are constantly reused in products and do not end up as waste in nature.

In the EU alone, a circular economy can save valuable resources by avoiding hundreds of millions of tons of waste, create millions of jobs, and strengthen businesses and our economy with opportunities worth € 250-600 billions of euros. Through the concept of the circular economy, Europe can become less dependent on raw materials and energy from outside the continent. Both society as a whole as well as forward-looking businesses will benefit. In addition, IMSA attaches great value to the capacity of a circular economy to reduce negative environmental impacts and the use of toxic substances.

The transition towards a circular economy is far from happening by itself. Many circular businesses are currently succeeding in spite of, rather than because of, the regulatory framework. But that is not the central question in this report. Here, we investigate the question: what circular business models are there? How many are there, and what are their characteristics? From which of these circular business models could a company choose if it decides to pursue circular business?

To our knowledge, such a list of circular business models does not yet exist. Pioneering work of professor Jan Jonker has extensively described the process of how to develop a circular business model. Accenture has identified five circular business models. Others circled around the theme with publications about new business models. What we did was integrating existing knowledge to produce a new list containing 19 circular business models in six categories.

In addition, following a suggestion by our CEO Max van der Sleen, we have developed a circular business model scan for companies. This scan will provide an analysis of your existing business and identify opportunities for creating circular business. While existing scans focus on material flows, mapping of which can involve a lot of work, our approach starts with following the money. That is, we look at the process of value creation, which lies at the heart of the circular economy. Contrary to what you might expect, some of the money flowing through your company will probably already be circular in nature. The scan is completed with a roadmap for implementation.

Part 1 of this report contains an introduction to the circular business models we identified and IMSA's circular business model scan. Part 2, which can be freely obtained by contacting IMSA, describes the circular business models in more detail, along with examples.

We hope this report will inspire you to look into the business models underlying the revenue in your own company and makes you curious to find out what circular opportunities are out there, waiting for you to turn them into real value.

Arthur ten Wolde & Douwe Jan Joustra

Content

1 1. Circular economy and business model innovation

1.1 Introduction

Circular economy is most commonly described as a system that is regenerative by design. Put simply, it aims to minimize the input of new materials in the production system, as well as the amount of waste that is created throughout the entire process. It is a holistic perspective that holds that waste does not exist, since products and abiotic materials cycle in closed loops. The Ellen MacArthur Foundation¹ is currently seen as the leading, global organization on circular economy.

The circular economy theory is based on various schools of thought including cradle-to-cradle, blue economy, regenerative design, sustainable development, performance economy and industrial ecology. From these various disciplines key principles have been derived such as ‘design out waste’, ‘build resilience through diversity’, ‘renewable energy’, ‘think in systems’, and ‘think in cascades’.²

A new economic system, the circular economy, is needed in order to deal with current trends. Growing resource scarcity, volatile price markets, societal unrest and emerging environmental problems such as pollution and rising global temperatures are challenging businesses today and in the near future.

In a circular economy we need circular business models. A business model depicts how an organization creates, delivers and captures value. It is a conceptual tool to understand how a firm does business.³ It’s a simplified rendering of reality.

In the current, linear economic system a take-make-waste approach is apparent, in which natural resources are used to create a product, which ends as landfill after use. This linear system uses certain, well-known, business models, generally described as ‘transactional business models’. The most recognized example is selling, where a product changes ownership from manufacturer to consumer upon sale.

In a circular economy we are looking at fundamentally different business models that organize business outcomes based on performance, and where ownership remains with the producer or service provider. Switching from product selling to service provision is not easy.⁴ Nonetheless, we see successful examples already taking place.

100% circular business models do not exist (yet). Not creating any waste at all is difficult to achieve for physical and practical reasons. In contrast, fossil fuel consumption for example comes very close to pure waste creation. A business model does not necessarily need to close the loop all by itself to be circular. As

part of the bigger system, one business model can be adding to other business models (and companies), which together create a closed loop system.⁵

This document will introduce you to business model innovation, to nineteen circular business models IMSA has identified, and to the scan we have developed to create insight into your costs and revenue streams generated by circular business activities. With the outcomes of the scan you can focus on business model innovation in order to prepare your company to be competitive in the circular economy.⁶ In case you would like to know more, an elaborated report on the nineteen circular business models, is available by contacting IMSA.

1.2 Business model innovation

Business model innovation offers a potential approach to deliver the required change (in this case, the move from linear to circular) through re-conceptualizing the purpose of the firm and the value creating logic, and rethinking perceptions of value.⁷ An important aspect of circular business models is that the consumer often becomes user, instead of owner of a product, which is summarized under the term ‘product service system’, ‘performance based contracting’, or ‘product as a service’. The transition towards a circular economy requires systematic change, because the current system does not allow for the required behavioral change.⁸

Interesting observations on business model innovation are:⁹

- Every exchange in the value chain provides an opportunity for innovation and impact.
- Business model innovation does not happen in a vacuum but depends on surrounding conditions.
- What starts as product innovation, can potentially lead to business model innovation.
- Companies that have demonstrated a business model innovation have often done so by shifting incentives in the value chain.
- Business model innovation is necessary since current business models are only able to exist because of mispriced resources and market distortions that make them competitive.
- Opportunities for circular business models lie in linear threats (supply risk of resources; increased governmental intervention) and in societal trends (circular procurement; multiple value creation; co-creation of value propositions).¹⁰

Business model innovation in general is often initiated by start-ups, where existing companies have the capacity and capability to scale them.⁸ In contrast, we observe that start-ups as well as large companies develop new circular business models. This is illustrated by the examples provided in part 2 of this report, which is available by contacting IMSA.

Since the transition from a linear to a circular economic system will require transition management and systems thinking, operational processes as well as the company’s vision need to be taken reconsidered. The implementation of circular business models can be obstructed by various factors. The main barriers for implementing circularity with businesses currently present are indicated below.¹¹

Vested interests & culture

- Vested interests by companies with linear business models;
- Lack of cultural acceptance that ownership by the user is not a requirement;
- The dependence of companies on external suppliers.¹²

Wrong incentives

Resource prices do not create the right incentives due to the insufficient internalization of externalities. This results in non-alignment of power and incentives between actors to improve cross-cycle performance.¹³ A related obstacle is the occurrence of split incentives, when actors have different,

individual incentives to operate circular. E.g.: Redesigning for re-use might be more beneficial for the recovery company than the original manufacturer. Adding to this, it leads to mispriced risks, since the sunk costs of resource extraction are not taking properly into account.¹⁴

Supply chain co-operation

Co-operation in the supply chain often proves difficult due to complex, international supply chains and low levels of trust among companies.¹⁵ A related barrier is inadequate recovery infrastructure. Without the proper infrastructure in place, and willingness to arrange this, circular activity is hard to organize.¹³

Barriers for SMEs

- Hindering regulations;
- The requirement of investment costs;
- Accounting systems deal with linear economy;
- Convincing customers through marketing;
- Finding partners to cooperate with;
- Customers do not realize that circular economy is the way forward;
- Scientific knowledge on circular economy issues does not match knowledge demand of SMEs.¹⁶

In spite of these obstacles we have already witnessed successful circular economic activity, ranging from small businesses, to large multinational corporations. This is illustrated by multiple examples throughout the more detailed business model overview in Part 2 of this report.

1.3 Transition and systems thinking

Business model innovation, in a changing economic system from linear to circular, implies transition thinking. Therefore, it is important to understand this process. When we speak about transition models we use a timeframe that crosses generations, around 25-30 years. By means of transition management we aim to accelerate the transition and guide the process towards desired outcomes. The transition path towards a circular economy is shown in Figure 1.

To accomplish a transition, three levels of a business need to be considered and understood (see Figure 2). Most importantly, the relation and interconnectedness between the different levels is crucial to understand. Inside out (process-product-business model), as well as outside-in (business model-product-process) approaches are necessary to understand the system. Systems thinking is the key principle of a circular economy. It is the ability to understand how parts influence one another within a whole, and the relationship of the whole to the parts, in place and in time. Comprehension is needed within your company to have everybody on board when dealing with change, and this is created when taking all relations into account. The inside-out process is reviewed through an evaluation of business processes; the outside-in process by developing a desired vision for the company.

Systems thinking also implies that we take the effects of your business into account. For example, your business has a direct effect on its suppliers, customers, and other value chain partners. Beyond the value chain you are looking at societal and ecological effects that should be taken into consideration. On the

other hand market analysis will need to take place to understand the influence of the system on your business, and which role you can play. Understanding the relation between the company's behavior and other processes is what systems thinking is about.

Figure 1. Transition path towards a circular economy

Source: OPAi & MVO Nederland (2014)¹⁷

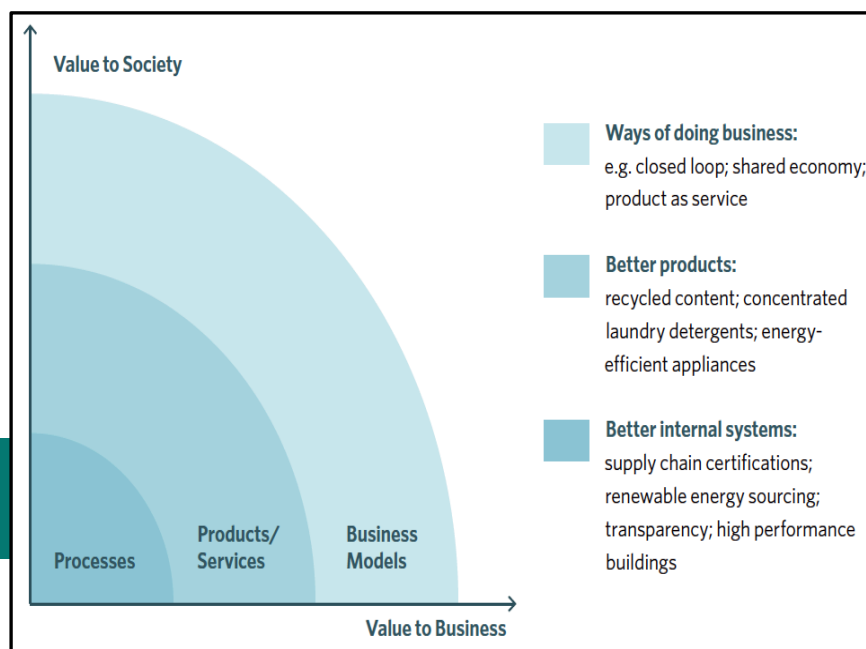
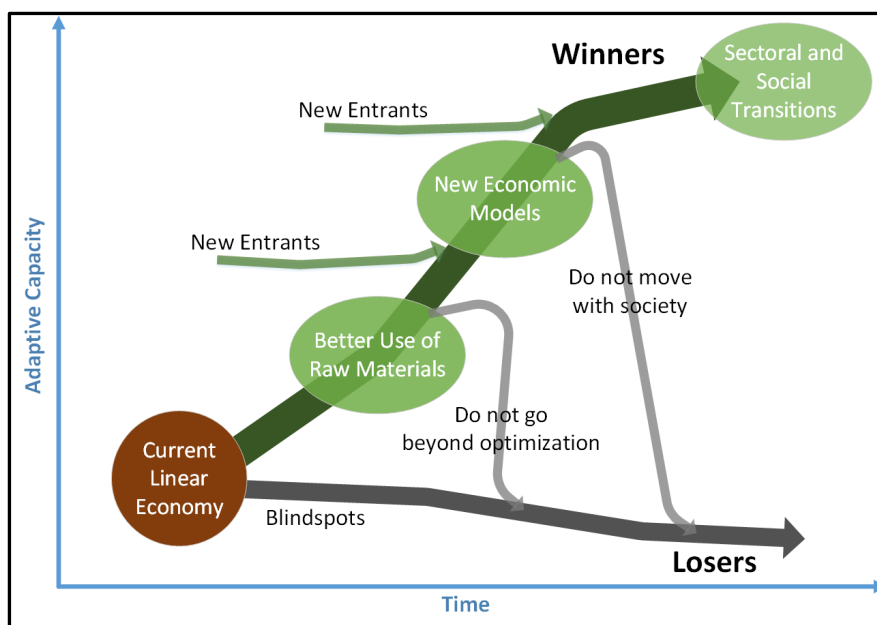


Figure 2. Three levels of business practices

Source: SustainAbility (2014)¹⁸

1.4 Value analysis and categorization of circular business models

What is the value of a circular business model? In which stages of a product development process do you apply certain business models? Which business models are applicable for what product categories? Can I apply multiple circular business models in my company? These are all valid questions that will be dealt with below.

In our view, a circular business model ideally has the following characteristics:

- Ownership (and thus responsibility) of items remains with the producer;
- Functionality is intended;
- It is a holistic systems perspective;
- It holds social and organizational aspects;
- Resource inputs and waste creation is minimized.

In practice, most circular business models fulfill these criteria only partially. We can illustrate this with our list of business examples, where we see for example, that most circular business models do not lead to a zero footprint business operation.

Accenture has presented a first analysis, which identified five different circular business models.¹⁹ Using a different approach, we have analyzed the value and prospects of using circular business models in different market segments to create insight in business opportunities.

Four cycles, as discussed in ‘Ondernemen in de circulaire economie’²⁰, are useful for circular business model segmentation. The Ellen MacArthur Foundation describes these cycles as ‘four ways of circular value creation’.²¹ These four cycles are:

1. The power of short cycle: maintenance, repair and adjustment of existing products and services.
2. The power of long cycle: extending lifetime of existing products and processes.
3. The power of cascades: creating new combinations of resources and material components, and the purchasing of upcycled waste streams.
4. The power of pure circles: 100% reusing resources and materials.

We believe that a fifth and sixth cycle could be added to the list, namely:

5. The power of dematerialized service: shifting physical products to virtual services. This implies resource savings and productivity gains.
6. Produce on demand. Only produce when demand is present.

Based on these 6 cycles, IMSA has categorized nineteen existing circular business models. An overview is created in Table 1. A more detailed overview of these nineteen business models including real life examples is freely available by contacting IMSA.

Table 1. Circular business models (IMSA, 2015)

1. Short cycle		
1	Pay per use	One time payment to use product or service
2	Repair	Product life extension by repair services
3	Waste reduction	Waste reduction in the production process
4	Sharing platforms	Products and services are shared among consumers
5	Progressive purchase	Pay periodically small amounts before purchase
2. Long cycle		
6	Performance based contracting	Long term contract and responsibility with producer
7	Take back management	Incentive to ensure product gets back to producer
8	Next life sales	Product gets a next life
9	Refurbish & resell	Product gets a next life after adjustments
3. Cascades		
10	Upcycle	Materials are re-used and its value is upgraded
11	Recycling (waste handling & repurpose)	Materials are cascaded and reused, recycled or disposed
12	Collaborative production	Cooperation in the production value chain leading to closing material loops
4. Pure circles		
13	Cradle to cradle	Product redesign to 100% closed material loops

Supply and delivery	Use	Recovery
Waste reduction	Sharing platforms	Take back management
Use secondary raw materials or sustainable biomass	Performance based contracting	Refurbish, Remanufacturing & Resell
Collaborative production	Product-based services	Biomass cascading
Cradle-to-cradle	Pay per use	Upcycling
Digitisation	Subscription based rental	Recycling (waste handling & repurpose)
Produce on order	Maintenance	
Customer vote	Repair	
	3D printing	
	Progressive purchase	

2.2. Value generation of circular business models

In this report, IMSA distinguishes six advantages of using circular business models. Some businesses pioneering in the circular economy already benefit, see Box 1.

2.1 Innovation and competitive advantage

Switching to circular business models will strengthen your competitive position in the short- and long term because the above-mentioned arguments will accumulate and translate to a stronger competitive business. It is rather evident that the economic system will be changing, and early adaptors of the new system will gain a competitive advantage. As Ban Ki-Moon already expressed during the World Economic Forum 2011 in Davos: 'The global economic growth model is a global suicide pact.'²² Furthermore, for laggards, the concept of creative destruction will apply, what means that new business models will rise, at the expense of existing business models.²³

2.2 Additional revenue streams

Additional revenue streams are likely to occur, since new or next life markets become available, from retaining existing customers to servicing new ones. Besides, many circular business models will deliver your company with a preferred sustainable image, which can result in additional customers and premium pricing.

2.3 Long term contracts

Since consumers no longer buy a product, but become users of a product, they do not obtain the ownership. Therefore, they are in a permanent contract with the manufacturer, who can retain his customers for a longer period of time.

2.4 Customer loyalty and feedback

Maintaining longer relationships with your customers provides ample opportunity to receive product feedback. Besides, by providing additional and personalized services during a contract, like maintenance or refurbishment, you create longer-term customer relations and can strengthen customer retention.

2.5 Multiple benefits of internal resource management

When materials (resources) come back to the company, major benefits are threefold.

- You can secure your business from resource scarcity;
- You become more resilient against volatile market prices as well as against changing law and regulation concerning natural commodities;
- Cost reductions are most likely to occur.

2.6 Beneficial partnerships throughout the value chain

Since circular economy requires systems change, we can no longer focus solely on individual businesses, but we have to consider the entire value chain. Opportunities arise for strengthening strategic partnerships and cooperation with other business in the value chain. Overall, this will strengthen the entire chain, making all partners, and most importantly your company, more resilient in a competitive world.

Box 1. Benefits of circular business models

Ricoh

“Now on the theme of business creation and integration, we were able to shift to a new profit model that provides customers with greater value by transforming a traditional product-based business into a new model composed of both products and services—solutions that address our customers’ needs. In addition, we were able to expand business in emerging markets, grow our new production printing business, and create new businesses, with an emphasis on industrial products.”²⁴

Unilever

“Eliminating waste has avoided more than €200 million of cost and created hundreds of jobs. In Egypt, for example, the local team has launched a programme which gives disabled employees the opportunity to earn extra income by recycling waste material from production lines.”²⁵

3 3. Circular business model scan

3.1 Why a scan

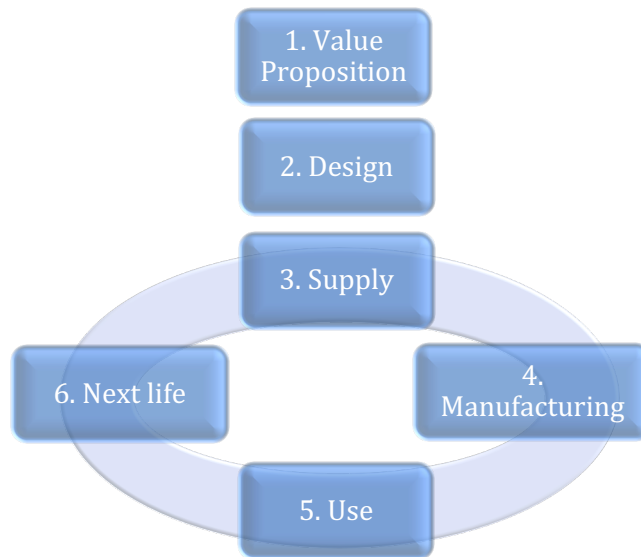
The scan will deliver concrete outcomes that make the transition from a linear to a circular business model possible. It will deliver insights that provide direction and enable your company to deal with implementation burdens presented earlier. The scan outcomes provide insight in which business models can be used.

3.2 How does the scan work

The scan consists of a methodology that is developed by IMSA around the business processes that take place in a company. It will provide all the necessary information that is required to move your company ahead into the circular economy. An objective evaluation of business processes is executed, that will provide clear direction towards circular business models.

The company's activity will be mapped and reviewed. This inside-out approach evaluates the technical aspects of your company; it's processes and behavior, while also taking a close look at your current business model. To do so, a systematic design is created that breaks the organization down into 6 process stages along the value chain. Revenue streams and costs are also mapped.

The value proposition and design stage are held out of the 'grey circle' (see Figure 3) since there are no physical materials moving around in these two stages. Once materials and resources are entering the process during the supply stage it becomes relevant to keep these resources cycling within the system. Thus not having virgin materials entering and no resources 'leaving' the system as waste.

Figure 3. The six process stages of the value chain (IMSA, 2015)

For the scan an extensive list of questions is developed around these 6 stages. To give you an idea, we challenge you to think about the following questions.

1. Have you considered a performance based value proposition?
2. Do you know how the design of your product can support the realization of your value proposition?
3. Do you know with which materials you supply your business?
4. Have you considered how much waste is created during manufacturing?
5. Are you interested in what happens with your product once it's in use?
6. Do you know what happens with your product after use?

3.3 Outcomes of the scan

The outcomes from the scan are twofold.

1. Linear activity and revenue streams.
 - Where do opportunities for innovation show?

- Where are the opportunities for new, circular business models?
- 2. Circular activity and revenue streams.
 - On which circular fundamentals can we continue building a stronger business case?

In both outcomes obstructions and obstacles will be included, as well as revenue- and cost streams, which provide ample opportunities to move forward with.

From this analysis prospects for the use circular business models will come forward that are applicable for your business, accompanied with examples and strategies that provide helpful tools for action. In case you believe that the circular economy is the economy you want to operate successfully in, a second scan is available. This scan will deliver a roadmap to implementation for circular business models specified to your business.

4 4. Roadmap for implementation

A second scan can take place as follow-up after first scan has been embraced and there is decisiveness to move forward with the outcomes, towards actual implementation of circular business models. Therefore three more steps are required. First, a market analysis will be conducted. Secondly, the development of a desired vision for your company is guided, including stakeholder perspectives. Thirdly, a roadmap for implementation will be created.

4.1 Market analysis

Important to understand what is happening in the market your business is active in. Therefore a market analysis will be performed in close cooperation with your company, to create a better understanding of the dynamics that shape the current business landscape of your sector.

4.2 Company vision review

When developing a vision we are looking at an outside-in approach, and have to take into consideration where the company wants to be in the future. A shared vision is needed to provide the company with direction. In which way do you want to conduct business? What is your reason for existence? What are the desired economic and societal achievements your company wants to deliver?

4.3 Stakeholder analysis

Your vision cannot solely be achieved by your company, but has to be taken towards the entire value chain. Ultimately, when you intend to achieve certain results, your chain partners should not neglect this. In other words, their actions should be in line with yours, making cooperation inevitable. Therefore a stakeholder analysis is part of the development process of your company's desired vision. The outcomes of the first scan will be used to find fields for synergy and cooperation, in order to bring chain partners closer together. This process can lead to supply chain negotiations.

4.4 Roadmap

What follows from the business model scan, the market analysis, the vision and the stakeholder analysis are business models and a roadmap for implementation that allow your company to become successful in the circular economy. This roadmap will plot the desired changes over time and will indicate which action is required.

Business model scan + Market analysis + Vision + Stakeholder perspectives

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5 5. Summary

5.1 Overview

Circular business models are crucial for resilient companies in the economy of the future. Designing and implementing them is not easy. IMSA has identified 19 circular business models and developed a two-step scan delivering concrete outcomes that make the transition from a linear to a circular business model possible. The first scan yields the company's linear and circular activities and revenue streams. The second scan provides a roadmap for implementation of circular business models.

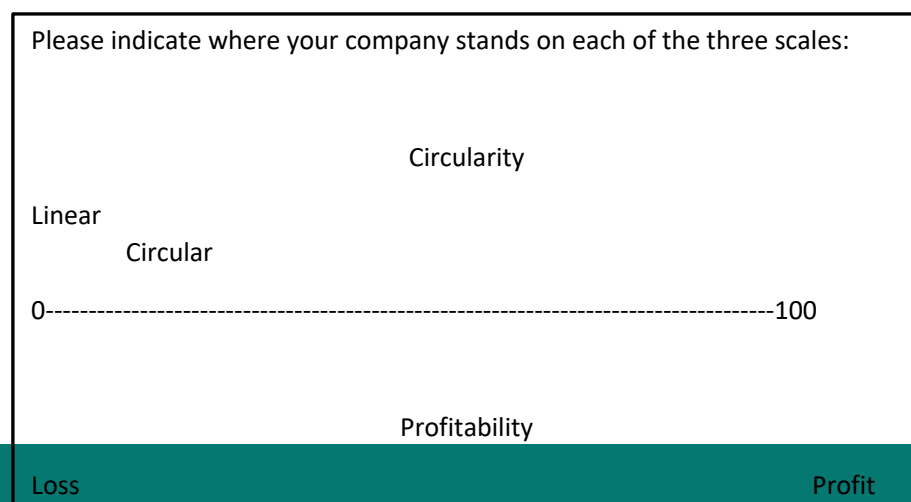
5.2 Deliverables of the scan

- Revenues and activities based on linear business models
- Revenues and activities based on circular business models (insofar already present)
- Focus areas for revenue generation and cost reductions
- Market analysis
- Company vision review
- Stakeholder analysis
- Options for promising circular business models
- Roadmap for implementation and innovation
- Strengthened relationships with chain partners
- Increased innovation, competitiveness and resilience.

5.3 Brainstorm

Figure 4 depicts a little game to get you thinking about circular business models and systems thinking. Indicate the perception of business performance on three issues: circularity, profitability, and sustainability. Outcomes are subjective, but can be used to benchmark the perception of your business towards these three themes, as well as their relation to one other.

Please indicate where your company stands on each of the three scales:



The diagram shows three scales arranged vertically. The top scale is labeled 'Circularity' and has 'Linear' at the 0 mark and 'Circular' at the 100 mark. The middle scale is labeled 'Profitability' and has 'Loss' at the 0 mark and 'Profit' at the 100 mark. A third scale is partially visible at the bottom, with 'Linear' and 'Circular' markers.

Figure 4. A little game

6 Sources

7 1. Introduction

This report provides an overview of circular business models, with examples of companies that are already putting the circular economy into practice. It further explains the models that were introduced in IMSA's report 'Circular business models - Part 1: an introduction to IMSA's circular business model scan'.

A business model can be generalized on four considerations:

1. What you do – product or service you deliver
2. How you do it – processes and supply chain
3. For who you do it - customers
4. Why you do it – financial incentives.

Breaking circular business models down in these four considerations creates valuable insights in why certain business models could work for your company and why not. In Part 1 of this report, we introduced 19 different business models that came out of the IMSA analysis. These are summarized in Table 1. For each of the nineteen business models the what, how, who and why question is answered as concisely as possible. Besides, best practice examples of all business models are provided and these can be found in Table 2. The examples from Table 2 are explained again in even greater detail in Appendix 1.

Two notions are applicable to the list of examples provided in this report. First, the real life examples associate companies with one particular business model. However, some company examples can be categorized under one or more business models as well. In reality we see that many business models are mutually beneficial and are to be used in combination for optimizing success. The interconnectedness of the business models will be discussed in chapter 3. Secondly, the examples provided are chosen because we believe they illustrate the particular business models rather well. However, besides the listed examples in this report, more examples of successful circular business practices exist. For example, the CE100, an initiative of the Ellen MacArthur Foundation lists 100 companies that have pledged to move towards a circular economy.

In our view, a circular business model ideally has the following characteristics:

- Ownership (and thus responsibility) of items remains with the producer;
- Functionality is intended;
- It is a holistic systems perspective;
- It holds social and organizational aspects;
- Resource inputs and waste creation is minimized.

Many of these characteristics are reflected in the examples provided in this report, which show a variety of creative solutions. We believe that this development has only just begun and that further business model innovations by companies will drive the transition to a circular economy.

8 2. Circular business models

Summary overview of circular business models

1. Short cycle		
1	Pay per use	One time payment to use product or service
2	Repair	Product life extension by repair services
3	Waste reduction	Waste reduction in the production process
4	Sharing platforms	Products and services are shared among consumers
5	Progressive purchase	Pay periodically small amounts before purchase
2. Long cycle		
6	Performance based contracting	Long term contract and responsibility with producer
7	Take back management	Incentive to ensure product gets back to producer
8	Next life sales	Product gets a next life
9	Refurbish & resell	Product gets a next life after adjustments
3. Cascades		
10	Upcycle	Materials are re-used and its value is upgraded
11	Recycling (waste handling & repurpose)	Materials are cascaded and reused, recycled or disposed
12	Collaborative production	Cooperation in the production value chain leading to closing material loops
4. Pure circles		

Table 1. Circular business models

Extensive overview of circular business models

Table 2. Circular business models explained

For more information on the examples see Appendix 1.

1. Short cycle

1. Pay per use	
What	One time payment to use product or service – short term use
How	Provide accessibility to customers while remain owner
Who	Customers that are in need of your service or product performance
Why	Revenue is generated because people use your service or product. Since you provide a low threshold to use your product, it is easily accessible and attractive for customers. Customers have no responsibility with the product or service after use.
Examples	Car2go - https://www.car2go.com/en/amsterdam/what-is-car2go/ Hertz – car rental www.hertz.com NS – train ticket www.ns.nl OV fiets – http://www.ov-fiets.nl/ovfiets/wat-is-ov-fiets/submenu/ov-fiets.html

2. Repair	
What	Product life extension by repair services
How	Providing service on location or via logistics to do it at the service company
Who	People that benefit / profit from extending product life
Why	People pay you for your service. It provides a secondary revenue stream if you also delivered the product initially. This can become a third – fourth, etc... This can help you to build longer-term customer relations. Your costs are fairly low since you don't have to provide high investment costs for new resources, since products already exist.
Examples	Ricoh service - https://www.ricoh.com/environment/management/concept.html

3. Waste reduction

What	Waste reduction in the production process
How	Better, smarter design Use your created waste, again as a resource (closed loop)
Who	Your company, companies that manufacture
Why	Reducing waste leads to less demand for purchasing materials, which results in cost reductions that boost profitability. Cost not only go down from purchasing less, waste handling will be less, reducing costs as well. Reselling leftover materials as secondary resources can bring considerable additional revenues that further reduce production costs. Furthermore, you become less depend on your supply chain for resources, and more resilient against resource (world market) price dependency. This can boost your competitive position in your sector.
Examples	AkzoNobel - http://www.theguardian.com/sustainable-business/recycling-reuse-fresh-approach-paint-waste Unilever – Radio interview Paul Polman - http://www.bbc.co.uk/programmes/p02gyp65

4. Sharing platforms	
What	Products and services are shared among consumers
How	Making sharing accessible, for example via platforms Design, manufacture, create financial & social incentive to enhance sharing
Who	Companies that currently sell to single clients only Consumers that seek for lower product prices and who do not want to possess everything individual, but want easy access to products and services.
Why	You can increase your target market by reaching more potential customers, even though they share, you can gain market share, increase brand loyalty, and receive more feedback to improve your product. Customer demand for sharing is increasing; facilitating these consumers will provide you with a competitive advantage. On the contrary, not setting up sharing possibilities your self will most likely mean that consumers will share via other platforms.
Examples	Peerby – www.peerby.nl AirB&B – www.airbnb.nl ThredUP – http://www.thredup.com/mythredup FLOOW2 – http://www.floow2.com/sharing-marketplace.html Parkflyrent – http://parkflyrent.nl

5. Progressive purchase - Pay periodically small amounts before purchase	
What	Pay periodically small amounts before purchase
How	Provide a (expensive) product against a low price for a long period of time. Be able to finance investments up front
Who	Customers with low spending power, which would benefit from your product substantially
Why	Lease period is guaranteed revenue, with revenue streams of selling eventually. Better accessible for consumer with low spending power, potentially tapping into a huge target market of consumers. Opportunities of scale, brand loyalty and innovation.
Examples	Simpan networks - http://simpanetworks.com

2. Long cycle

6. Performance based contracting	
What	Providing long term access to a product or service, where ownership and responsibility remains with producer
How	Logistics need to be in place to deliver, maintenance and take back products Long term contracts are most likely to be established
Who	Customers that want convenience, a performance
Why	You offer the customer convenience of accessibility to a product or service. This makes the threshold lower for consumers to use it, while long-term contracts are most likely to be established, enhancing your customer relation. Constant contact with your customers creates the possibility of product feedback, enabling improvement of your deliverables. Since you remain owner, products get back to you at the end of contract, providing you resources for new cycles. Benefits are resource security, becoming more resilient against market volatility. Supply chain cooperation is likely to occur to arrange logistics, strengthening the value chain's competitive position.
Example	<p>Michelin – pay per km - http://www.ellenmacarthurfoundation.org/business/articles/snapshot-michelin.pdf</p> <p>Rolls Royce. – pay by the hour (airplane engines) - http://www.rolls-royce.com/news/press_releases/2012/121030_the_Hour.jsp</p> <p>Philips – pay per lux – http://www.lighting.philips.com/pwc_li/main/shared/assets/downloads/casestudy-rau-int.pdf</p> <p>Interface - http://www.interfaceglobal.com/Sustainability/Products/Manufacturing.aspx</p>

7.1 Take back management: Closed loop	
What	Ensure product gets back to producer
How	Logistics to organize this action
Who	Customers are serviced (not having to deal with waste), you gain resources
Why	<p>Returning products make you more resource resilient, allows risk reduction of resource scarcity, and risk reduction on price volatility. Costs reductions can occur for procurement. Chain agreements for costs burden of collection will strengthen partnerships and value chain cooperation.</p> <p>Positive brand image.</p>
Examples	<p>Desso – http://www.desso.nl/c2c-corporate-responsibility/cradle-to-cradle-mijlpalen/</p> <p>Dell – http://www.dell.com/learn/us/en/uscorp1/corp-comm/closed-loop-recycled-</p>

[content](#)

Interface – <http://www.interfaceglobal.com/Sustainability/Products/Manufacturing.aspx>

Cisco – http://www.cisco.com/web/about/ac227/ac228/ac231/about_cisco_takeback_recycling.html

7.2 Take back management: Variable resell price

What	Incentive to ensure product gets back to producer
How	Provide financial incentive to customer to return a product Logistics to organize this action
Who	Customers that want to monetize used products
Why	You create an incentive for customers to (re)buy products again with your company, for example by providing them with a credit only to be used at your company. Returning products make you more resource resilient, allows risk reduction of resource scarcity, and risk reduction on price volatility. Costs reductions can occur for procurement. Chain agreements for costs burden of collection will strengthen partnerships and value chain cooperation. Positive brand image
Examples	Ikea Barendrecht – Return product, get credit. – http://www.ikea.com/ms/nl_NL/img/local_store_info/barendrecht/beeldmateriaal_overig/Meubel%20inruilservice.pdf

7.3 Take back management: Guaranteed resell price

What	Incentive to ensure product gets back to producer
How	Provide a guaranteed resell price for a purchased product upon returning after use Logistics to organize this action
Who	Conscious consumers
Why	You create an incentive for customers to (re)buy products again with your company, for example by providing them with a credit only to be used at your company. Returning products make you more resource resilient, allows risk reduction of resource scarcity, and risk reduction on price volatility. Costs reductions can occur for procurement. Chain agreements for costs burden of collection will strengthen partnerships and value chain cooperation. Positive brand image
Examples	Mud Jeans – http://www.mudjeans.eu/lease-philosophy/

7.4 Take back management: Disposal service

What	Incentive to ensure product gets back to producer
How	Build in logistics to pick up used products Have disposal services in store
Who	Conscious consumers

Why	Having delivery and return logistics in place creates the image of a responsible company, adding to a positive brand image. In addition, it provides consumers with an easy way to dispose the products, which makes this service more acceptable. Returning products make you more resource resilient, allows risk reduction of resource scarcity, and risk reduction on price volatility. Costs reductions can occur for procurement. Chain agreements for costs burden of collection will strengthen partnerships and value chain cooperation.
Examples	<p>Auping – http://www.auping.nl/web/over-auping/duurzaam-en-veilig/auping-take-back-system</p> <p>Nespresso – Cups take back - http://www.nespresso.com/ecolaboration/fr/en/article/9/2906/recycling-from-home.html</p> <p>H&M - http://www.hm.com/nl/longlivefashion</p>

8. Next life sales	
What	Product gets a next life
How	Create a resell / reuse moment Logistics Via your company or by individuals
Who	Consumers that do not mind used products, often paying a lower price
Why	<p>Currently we see next life sales being organized by individuals or platforms that collectively organize transactions. As a business you want to be in charge of this second, third, fourth, etc. moment of sales. Multiple moments of revenue generation become available against low production costs, creating profitable margins.</p> <p>It provides opportunities to expand your target market and thus getting more customers loyal to your brand. Emerging markets show interest in next life products, conscious consumers do as well as customers with less spending power.</p> <p>As a sales platform operator you can generate revenue from advertising space since you reach a very large group of people.</p>
Examples	<p>Tata Motors Assured – http://www.tatamotorsassured.com</p> <p>Marktplaats & Ebay – Connecting individuals and businesses on second hand products.</p> <p>Ikea – http://www.the9billion.com/2013/11/06/ikea-creates-online-flea-market-to-resell-reuse-2nd-hand-furniture/</p> <p>ThredUp – http://www.thredup.com/mythredup</p>

9. Refurbish & resell	
What	Product gets a next life after adjustments
How	Assuring quality standards Resell logistics
Who	Consumers that do not mind used products, often paying a lower price
Why	<p>You can create a second, third, etc. revenue stream against low production costs. Multiple moments of revenue generation become available against low production costs, creating profitable margins.</p> <p>It provides opportunities to expand your target market and thus getting more customers loyal to your brand. Emerging markets show interest in next life products, so do conscious consumers, as well as customers with less spending power.</p>
Examples	<p>HP - http://www.hp.com/sbso/buspurchase_refurbished.html</p> <p>Dell - http://www.dell.com/learn/us/en/uscorp1/corp-comm/closed-loop-recycled-</p>

[content](#)

Caterpillar - <http://www.caterpillar.com/nl/company/sustainability/remanufacturing.html>

Techreturns - <http://www.techreturns.com>

BMW - <http://www.fastcoexist.com/1681904/5-business-models-that-are-driving-the-circular-economy>

3. Cascades

10. Upcycle	
What	Materials are re-used and their value is upgraded
How	By using materials that otherwise would go to waste
Who	Conscious consumers Seems to be a small / niche market currently
Why	This business model generates value because resources are obtained against low costs. Low purchasing costs allows generating margin, especially since products are often sold at a premium. Positive corporate image, attracting those conscious consumers.
Examples	Worn Again - http://wornagain.info Freitag.ch - http://www.freitag.ch/about/production Upcycled.nl - http://www.upcycled.nl/index.html

11. Recycling (including waste handling & repurpose)	
What	Materials are cascaded and reused, recycled or disposed
How	Waste collection – sorting – recycling – cascading – energy extraction
Who	Waste companies Citizens
Why	Waste becomes a resource, since it holds potential value. By recycling materials the need for new inputs in the system will decrease making the recycled content, especially with increasing virgin resource prices more and more valuable.
Examples	MBA Polymers - http://www.mbapolymers.com/home/images/PDF/mba_polymers-corporate_social_responsibility_report_2014-2015.pdf Suez & SITA. - http://www.suez-environnement.fr/wp-content/uploads/2014/09/CP-Matinée-Plastique-23-09-2014_VA1.pdf Van Gansewinkel - http://www.vangansewinkel.nl/over-van-gansewinkel/afval-bestaat-niet.aspx Rubies in the Rubble - http://www.rubiesintherubble.com/our-mission/

12. Collaborative production	
What	Cooperation in the production value chain leading to closing material loops

How	Seeking partnerships, synergy & cooperation
Who	Value chain partners
Why	Value chain resilience will occur because of long-term cooperation between chain partners. This creates for the entire chain, including your company, a stronger competitive position. Resource use is likely to be reduced since synergy will take place leading to more efficient processes. This will reduce costs and boosts profitability. Cooperation could also lead to better resource resilience when resources cycle between value chain partners.
Examples	<p>Carlsberg – http://www.carlsberggroup.com/investor/news/Pages/Carlsbergmakesfurtherprogressonsustainability,environmentalefficiency.aspx#.VSOme8ZnW2V</p> <p>Steinbeis – www.steinbeis.de</p> <p>Dutch aWEARness - http://dutchawareness.com/circulareconomy/circular-economy/</p>

4. Pure circles

13. Cradle to cradle	
What	Product redesign to 100% closed material loops
How	Design and manufacture process in such a way products can be easily and fully dissembled, not containing any toxic materials.
Who	<p>Circular purchasers</p> <p>Conscious consumers</p>
Why	By using cradle to cradle you can become a preferred supplier or manufacturer. It will deliver you a positive corporate image. When companies only want to purchase circular products or services they will often search for cradle to cradle. Besides you might benefit from legal issues in the future when for example law restricts the use toxic materials in production.
Examples	<p>Desso – http://www.desso.nl/c2c-corporate-responsibility/cradle-to-cradle/</p> <p>Herman Miller – http://www.hermanmiller.com/about-us/who-is-herman-miller/our-story.html</p> <p>Van Houtum - http://www.vanhoutum.nl/mvo/293/cradle-to-cradle.html</p> <p>Ahrend – http://www.ahrend.com/en/Royal-Ahrend/CSR/Cradle-to-Cradle-Company/</p>

14. Circular sourcing	
What	Only sourcing circular products or services

How	<p>Circular suppliers</p> <p>Sourcing / purchasing strategy</p>
Who	For your company
Why	<p>You set your company up for future resource security since circular products and services will remain available. This could lead to cost reductions in procurement, and creating resilience against price volatility on the market. Besides you might benefit from legal issues in the future when for example law restricts the use virgin materials in production.</p> <p>N.B. A shared definition of what exactly qualifies as circular products and services is currently lacking. Each company should therefore develop their own criteria while seeking connection with other stakeholders about what circular products are. For more information see the program created by Dutch government and businesses 'Green Deal, Circular Purchasing in the Netherlands'. http://www.mvonderland.nl/publicatie/green-deal-circulair-inkopen (links to a Dutch webpage)</p>
Examples	Interface – fishnets – http://www.sustainability.com/library/model-behavior#.VNIdU8Yre2U p. 30

5. Dematerialized services

15. Physical to virtual	
What	Shifting physical activity to virtual
How	IT services, internet, software and logistics
Who	Customers with access to virtual world
Why	Shifting could substantially lower overhead costs. For example the costs of a shop or office space. Having less fixed assets makes your company more flexible in the market and better able to respond to changing customer demand, creating competitive advantage. Furthermore you can reach and thus serve a larger market, theoretically everyone connected to the internet. It also allows for better customizing demand, focusing on the needs of customers. Reducing transaction costs can boost profitability.
Examples	<p>Sungevity – http://www.sustainability.com/library/model-behavior#.VNIdU8Yre2U</p> <p>HelloFresh – www.hellofresh.nl</p> <p>Capgemini – http://www.capgemini.com/resources/saas-myths-and-realities</p> <p>Blendle – www.blendle.com</p>

16. Subscription based rental	
What	Against a low periodic fee consumers can use a product or service
How	IT services, internet and software
Who	Customers with access to virtual world
Why	With low periodic fees there is easy access for consumers. The large base of users provides commercial value by means of advertisement for example. Upgradability provides revenue potential, also adding to personalization of demand.
Examples	<p>Netflix – http://www.sustainability.com/library/model-behavior#.VNIdU8Yre2U p. 30</p> <p>Spotify – www.spotify.nl</p>

6. Produce on demand

17. Produce on order	
What	Only producing when demand is present
How	Ensure you create demand
Who	Customers in need of capital intensive products or products with an unpredictable market demand
Why	You prevent unnecessary production, preventing waste, boosting profitability. You can customize your supply, with the same effect. You do not have upfront investments, or no stock keeping, before sales.
Examples	Zelf je boek uitgeven (print your own book) - http://www.zelfjeboekuitgeven.nl/pod/ Airbus and Boeing – www.airbus.com & www.boeing.com

18. 3D-printing	
What	Using 3D printing to produce what is needed
How	Deliver access to those in need of particular objects
Who	People in remote locations People in need of only one spare part for an expensive machine to keep functioning
Why	You prevent unnecessary production, preventing waste, boosting profitability. A 3D-printer can operate independent of geographic location. 3D-printing holds scaling potential. You attract customers since you offer a more economic alternative for consumers than existing supply.
Examples	Print 3D Matter - http://www.print3dmatter.com 3D systems - http://www.3dsystems.com/nl/node/3427

19. Customer vote (design)	
What	Making customers vote which product to make
How	Reach potential customers and let them (design) vote what to produce Sales / marketing to reach customers
Who	Customers that value personality & identity
Why	You can create customer loyalty when you allow them to be part of your production process, enhancing the social value of co-creation and customer engagement. Besides this can save you on designing costs, boosting profitability. You receive instant feedback on demand from consumers that can be used to improve your products and services. You

	prevent unnecessary production and waste, boosting profitability.
Examples	Threadless T-shirts – Fout! De hyperlinkverwijzing is ongeldig. p. 25 LEGO Cuusoo – http://www.sustainability.com/library/model-behavior#.VNIdU8Yre2U

9 2. Circular business model characteristics

2.1 How circular are circular business models

Based on the list of circular business models, and the theory on circular economy, we generated the following list of five questions to categorize circular business models.

1. Is the producer responsible (PR) for the product after exchange?
2. Does the business model require product- or production redesign (RD)?
3. Does the business model require value chain cooperation (VCC)?
4. Do you become more resource resilient (RR)?
5. Do you create additional revenue opportunities (ARO)?

The answers in the table are indicated with a Y (yes) or an N (no), or with an O (open) in case both answers are possible. For instance, when redesign is not strictly necessary but highly beneficial. An overview of this analysis is shown in Table 3.

Observations from Table 3

- Performance based contracting is the only business model that answers each question with yes.
- When you use multiple business models together, the combined level of circular character will often increase.
- All business models in the long cycle offer opportunities for additional revenue generation.

Note

It should be stated that the answers are generalized based on processes currently prevalent in business and information available. It can vary per specific company how these questions are answered per business model.

Table 3. Characteristics of circular business models

Business model		PR	RD	VCC	RR	ARO
<i>Short cycle</i>						
1	Pay per use	Y	Y	N	Y	Y
2	Repair	O	O	Y	N	Y
3	Waste reduction	N	Y	N	Y	N
4	Sharing platforms	N	Y	Y	O	Y
5	Progressive purchase	N	N	Y	N	Y
<i>Long cycle</i>						
6	Performance based contracting	Y	Y	Y	Y	Y
7	Take back management	O	N	Y	Y	Y
8	Next life sales	N	N	O	Y	Y
9	Refurbish & resell	O	N	Y	Y	Y
<i>Cascades</i>						
10	Upcycle	N	Y	O	O	N
11	Recycling (waste handling & repurpose)	N	O	Y	O	N
12	Collaborative production	O	O	Y	Y	N
<i>Pure circles</i>						
13	Cradle to cradle	O	Y	Y	Y	Y
14	Circular sourcing	Y	Y	Y	Y	N
<i>Dematerialized services</i>						
15	Physical to virtual	O	Y	Y	Y	Y
16	Subscription based rental	O	Y	Y	N	Y
<i>Produce on demand</i>						

17	Produce on order	N	N	O	O	N
18	3D printing	N	Y	Y	Y	Y
19	Customer vote	N	Y	Y	N	N

PR = Producer responsibility

RD = Redesign

VCC = Value chain cooperation

RR = Resource resilience

ARO = Additional revenue opportunity

2.2 Interconnectedness of circular business models

The business models identified are by no means independent but highly interconnected. In Table 4, the interconnectedness of circular business models is visualized. The table provides an overview of the business models that are mutually beneficial, in other words which business models can well be used together. Often, in order to reach optimal circular activity in your company a combination of business models will need to be considered. If you are deciding to use a certain business model, this table directs you to take a few more into consideration as well.

Table 4. Interconnectedness of circular business models

1. Pay per use

Performance based contracting

Take back management

Recycling - waste

Collaborative production

Subscription based rental

3D printing

2. Repair

Performance based contracting

Take back management

Next life sales

Upcycle

3D printing

3. Waste reduction

Recycling - waste

Collaborative production

Produce on order

Customer vote / design

4. Sharing platforms

Next life sales

Physical to virtual

Subscription based rental

Customer vote / design

5. Progressive purchase

Performance based contracting

6. Performance based contracting

Pay per use

Repair

Progressive purchase

Take back management

Next life sales

Refurbish & resell

Subscription based rental

Recycling

Collaborative production

Cradle to cradle

Produce on order

3D print

Costumer vote / design

7. Take back management

Pay per use

Repair

Performance based contracting

Next life sales

Refurbish & resell

Recycling - waste

Cradle to cradle

8. Next life sales

Repair

Sharing platforms

Performance based contracting

Take back management

Refurbish & resell

Upcycle

Cradle to cradle

Circular sourcing

3D printing

9. Refurbish & resell

Performance based contracting

Take back management

Next life sales

Upcycle

Cradle to cradle

3D printing

10. Upcycle

Repair

Next life sales

Refurbish & resell

11. Recycling - waste

Pay per use

Waste reduction

Performance based contracting

Take back management

Cradle to cradle

12. Collaborative production

Pay per use

Waste reduction

Performance based contracting

Produce on order

3D printing

Costumer vote / design

13. Cradle to cradle

Performance based contracting

Take back management

Next life sales

Refurbish & resell

Recycling - waste

Circular sourcing

14. Circular sourcing

Next life sales

Cradle to cradle

15. Physical to virtual

Sharing platforms

Subscription based rental

3D printing

16. Subscription based rental

Pay per use

Sharing platforms

Performance based contracting

Physical to virtual

Costumer vote / design

17. Produce on order

Waste reduction

Performance based contracting

Collaborative production

3D printing

18. 3D printing

Pay per use

Repair

Performance based contracting

Next life sales

Refurbish & resell

Collaborative production

Physical virtual

Produce on order

Consumer vote

19. Costumer vote / design

Waste reduction

Sharing platforms

Performance based contracting

Collaborative production

Subscription based rental

3D printing

Observations from Table 4

- Every circular business model can be combined with at least one other business model.

- Performance based contracting is the business model that can be used in combination with the highest number of other circular business models. This confirms that this business model lies at the core of circular economy.
- Progressive purchase can be used in combination with only one other business models.

10 Appendix 1. Examples circular business models explained

Category 1. Short cycle

1. Pay per use

Car2go

A car rental service available in various large cities around the world, operated by Mercedes-Benz. Cars aren't picked-up or dropped-off at fixed locations but can be left anywhere in town. You gain access to a vehicle by using your smartphone. You pay time you use the vehicle.

<https://www.car2go.com>

Hertz

You rent a car, don't buy one. It is a one time transaction to transport yourself from one point to another (example can be given for any car rental company)

www.hertz.com

NS

You buy a train ride. Not a train. It is a one time transaction to transport yourself from one point to another. (example can be given for any commercial train provider. It must be said that the NS is using 'green' energy on their grid making them a preferred example)

www.ns.nl

OV-Fiets

The OV-fiets is a public transportation bike that can be used against a low fee. At most Dutch train stations there is the availability to use a bike.

<http://www.ov-fiets.nl/ovfiets/wat-is-ov-fiets/submenu/ov-fiets.html>

2. Repair

Ricoh

Ricoh has, since 1994, it's Comet Circle concept in place.

This philosophy aims at achieving 3 goals.

1. identifying and reducing environmental impact at all stages of lifecycle
2. putting priority on inner-loop recycling
3. establishing a partnership at every stage

Ricoh has implemented their 'Comet-Circle' concept that aims at reusing materials brought into the product cycle as optimal as possible by what they call 'inner loop recycling'. This includes having scheduled repair and maintenance work done on all their machines.

<https://www.ricoh.com/environment/management/concept.html>

3. Waste reduction

AkzoNobel

AkzoNobel is actively pursuing optimization of paint use and paint cans.

<http://www.theguardian.com/sustainable-business/recycling-reuse-fresh-approach-paint-waste>

Unilever

All 250 factories are operating on zero waste right now. Economic value is created by more productivity, less hazard, less costs. According Paul Polman in a BBC radio interview. Furthermore, water reduction initiatives are implemented in their product line. For example, introducing washing liquids that save water use. Reduction of packaging materials is a \$3trillion business for Unilever.

<http://www.bbc.co.uk/programmes/p02gyp65>

“Eliminating waste has avoided more than €200 million of cost and created hundreds of jobs. In Egypt, for example, the local team has launched a programme which gives disabled employees the opportunity to earn extra income by recycling waste material from production lines.”

<http://www.unilever.com/sustainable-living-2014/news-and-resources/sustainable-living-news/zero-waste.aspx>

4. Sharing platforms

Peerby

Sharing any kind of products and services with others. A platform that connects individuals.

www.peerby.nl

AirB&B

Renting your apartment, house or room to others.

www.airbnb.nl

ThredUp

Browse thousands of like-new clothing items, which we've hand-selected and certified for quality. You'll find all your favorite brands discounted up to 90% off, year-round.

And, when you're done with clothing, simply fill up a thredUP bag and put it on your doorstep. thredUP covers the shipping, and pays you for every item we can sell to other families.

Our goal is to make your life just a little bit easier.

- We eliminate the stress of deal hunting by offering consistent discounts every day.
 - We take the hassle out of bringing your kids into a store by allowing you to thredUP online.
 - We relieve that recycling guilt by helping you lighten your family's carbon-footprint with every order.
- Ready to give thredUP a try? We think you'll love what you find.

<http://www.thredup.com/mythredup>

FLOOW2

FLOOW2, World's Reset Button, is the business-to-business Sharing Marketplace where companies and institutions can share equipment and the skills & knowledge of personnel.

FLOOW2 unites supply and demand and creates transparency concerning who has what, and where and when it will be available.

www.floow2.com

Park fly Rent

When you park your car at Schiphol, Amsterdam International Airport the company provides you with parking and cleaning, but will also rent out your car to others. You receive a share of the rental fee while not having to pay any parking fees.

www.ParkFlyRent.nl

5. Progressive purchase

Simpa Networks

Sells distributed energy solutions on a “progressive purchase” basis to underserved consumers in emerging markets.

Currently operational in India, Simpa's goal is to transform the market for solar energy systems. Customers make a small initial down payment for a high-quality solar photovoltaic (PV) system and then pre-pay for the energy service, activating their systems in small user-defined increments using a mobile phone. Each payment for energy also contributes towards the final purchase price. Once fully paid, the system unlocks permanently and produces energy, free and clear.

<http://simpanetworks.com>

<http://www.sustainability.com/library/model-behavior#.VNIdU8Yre2U>

Category 2. Long cycle

6. Performance based contracting

Michelin

As of 2011, Michelin Fleet Solutions had 290,000 vehicles under contract in 23 countries, offering tire management (upgrades, maintenance, replacement) to optimize the performance of large truck fleets—in Europe, 50% of large truck fleets externalize their tire management. By maintaining control over the tires throughout their usage period, Michelin is able to easily collect them at end of the leases and extend their technical life as well as to ensure proper reintegration into the material cascade at end of life.

<http://www.ellenmacarthurfoundation.org/business/articles/snapshot-michelin.pdf>

Rolls Royce

'Power-by-the-Hour', a Rolls-Royce trademark, was invented in 1962 to support the Viper engine on the de Havilland/Hawker Siddeley 125 business jet. A complete engine and accessory replacement service was offered on a fixed-cost-per-flying-hour basis. This aligned the interests of the manufacturer and operator, who only paid for engines that performed well.

Rolls-Royce CorporateCare®, launched in 2002, added a range of additional features. These include Engine Health Monitoring, which tracks on-wing performance using onboard sensors; lease engine access to replace an operator's engine during off-wing maintenance, thereby minimizing downtime; and a global network of authorized maintenance centres to ensure that world-class support is readily available to customers whenever required.

http://www.rolls-royce.com/news/press_releases/2012/121030_the_Hour.jsp

Philips

Pay per lux – Philips provides light and the customer pays per lux.

http://www.lighting.philips.com/pwc_li/main/shared/assets/downloads/casestudy-rau-int.pdf

Interface

"In 2013, we made great strides in our mission of becoming a sustainable enterprise – which we refer to as Mission Zero®. We launched the Net Effect™ Collection of carpet tile products (one of which is featured on the cover of this report) with yarn that is partly made from recycled fishing nets collected by communities in the Philippines through our Net-Works™ project. This program is a big step in redesigning our supply chain from a linear take-make-waste process toward a closed loop system, and it advances our ultimate goal of becoming a restorative enterprise. Our plant in Europe reached a significant milestone, as it now uses 100% renewable energy from a combination of bio-gas and green electricity, with almost no water used or waste sent to a landfill. In addition, we created new programs to

strengthen employee connections to our sustainability goals, holding our first ever Mission Zero week celebrations at several locations worldwide, with activities that included legacy projects, biomimicry training workshops, enhanced communications and employee recognition programs.”

<http://www.interfaceglobal.com/Sustainability/Products /Manufacturing.aspx>

7.1 Take back management - Closed loop

Desso

Desso has their Take Back™ program in place to obtain used floor tiles and their Refinity® program to disassemble the tiles.

<http://www.desso.nl/c2c-corporate-responsibility/cradle-to-cradle-mijlpalen/>

Dell

Dell has a closed loop recycle program in place.

<http://www.dell.com/learn/us/en/uscorp1/corp-comm/closed-loop-recycled-content>

Interface

Interface has a take back system in place.

<http://www.interfaceglobal.com/Sustainability/Products/Manufacturing.aspx>

Cisco

<http://www.cisco.com/web/about/ac227/ac228/ac231/WEEE/netherlands.html>

7.2 Incentivized return – Variable resell price

Ikea Barendrecht

Return your product, and get credit for this particular Ikea store.

http://www.ikea.com/ms/nl_NL/img/local_store_info/barendrecht/beeldmateriaal_overig/Meubel%20in_ruilservice.pdf

7.3 Incentivized return – Guaranteed resell price

Mud Jeans

Upon returning your old pair, you receive a EUR30 voucher for a new pair. This can be termed a take back initiative.

<http://www.mudjeans.eu/lease-philosophy/>

7.4 Incentivized return – Disposal service

Auping

Auping has a program in place, the Auping Take Back System (ATBS), to take used mattresses upon delivering the customers new one. In cooperation with the Van Gansewinkel Groep these mattresses are taken apart and serve as resource for other products.

<http://www.auping.nl/web/over-auping/duurzaam-en-veilig/auping-take-back-system>

Nespresso

Cups taking back program and recycling.

<http://www.nespresso.com/ecolaboration/fr/en/article/9/2906/recycling-from-home.html>

H&M

H&M collects garments in their shops to be reused - reprocessed after collection.

<http://www.hm.com/nl/longlivefashion>

8. Next life sales

Tata Motors Assured

Tata resells their second hand cars including guarantee.

<http://www.tatamotorsassured.com>

Marktplaats & Ebay

Connecting individuals and businesses to trade second hand products.

Ikea

Creating a platform for second hand Ikea furniture.

<http://www.the9billion.com/2013/11/06/ikea-creates-online-flea-market-to-resell-reuse-2nd-hand-furniture/>

9. Refurbish & resell

HP

HP refurbishment department.

http://www.hp.com/sbso/buspurchase_refurbished.html

Dell

<http://www.dell.com/learn/us/en/uscorp1/corp-comm/closed-loop-recycled-content>

Caterpillar

Providing heavy machinery for mainly constructing companies, Caterpillar has a pay per unit system in place and intensive maintenance programs. Besides, used machinery is remanufactured and provided with a discount afterwards.

<http://www.caterpillar.com/nl/company/sustainability/remanufacturing.html>

Techreturns

Reusing electronic devices as well as recycling parts of electronic devices. Techreturns buys used electronic devices, refurbish them and resells, mostly in Africa again.

<http://www.techreturns.com>

BMW

With the right design and remanufacturing capabilities, they can be put together to form new products. This is product transformation. For BMW, it can mean a 50% cost saving for customers buying remanufactured parts as compared to new ones. You get exactly the same quality specifications as a new BMW part subject to the same 24-month warranty.

<http://www.fastcoexist.com/1681904/5-business-models-that-are-driving-the-circular-economy>

Category 3. Cascades

10. Upcycle

Worn Again

Website: 'Business as usual is not an option. Radical and transformative business models and attitudes are required to turn the problem of textile waste into an opportunity and solution.'

It became clear there was a better way to design out textile waste and design in 'closed loop' solutions. The team is currently engaged in full time development of a closed loop recycling technology and resource model for the textile and clothing industry, working closely with its' development partners.

<http://wornagain.info>

Freitag.ch

'Giving used materials a new life is called "recontextualizing" at FREITAG. Whereas similar reincarnations do not reveal exactly how the transformation process happened and thus leave consumers in the dark, we want to lay our cards on the table.'

<http://www.freitag.ch/about/production>

Betterfuturefactory

Betterfuturefactory upcycles plastics by making plastic waste ready to be used for 3D printing with their perpetual plastic project.

<http://www.betterfuturefactory.com>

Upcycled.nl

A small business making bags by upcycling waste materials.

<http://www.upcycled.nl/index.html>

11. Recycling (waste handling & repurpose)

MBA Polymers

Company specified in recycling plastics. Recycling plastics is what they do and thus their business model. They state in their 2014-15 sustainability report that only 5% of materials processed by them is sent to landfill. (p. 17)

http://www.mbapolymers.com/home/images/PDF/mba_polymers-corporate_social_responsibility_report_2014-2015.pdf

Suez & SITA

‘... SUEZ ENVIRONNEMENT is making the circular economy the key point of its strategy, and is offering innovative solutions for recovering plastic via its SITA subsidiary, thanks to its nine specialized plants in Europe, which treat over 400,000 tonnes of plastic waste and recover 135,000 tonnes of new plastic resources every year.’

<http://www.suez-environnement.fr/wp-content/uploads/2014/09/CP-Matinée-Plastique-23 -09 -2014 VA1.pdf>

Rubies in the Rubble

Making jellies, compotes out of discarded fruits.

<http://www.rubiesintherubble.com/our-mission/>

12. Collaborative production

Carlsberg

Carlsberg has set up the Carlsberg Circular Community, together with selected suppliers. In cooperation with EPEA and MBDC they have create a Cradle2Cradle roadmap to optimize their packaging portfolio. This can be read in their sustainability report 2013.

<http://www.carlsberggroup.com/investor/news/Pages/Carlsbergmakesfurtherprogressonsustainability,environmentalefficiency.aspx#.VS0me8ZnW2V>

Steinbeis

Steinbeis is partnering with Océ, DestraData and Van Gansewinkel to create a closed loop system on white paper recycling.

www.stp.de/en/returnity-cycle/cradle-to-cradler/

Dutch aWEARness

‘The projects that we initiate are based on the principles of the circular economy. Our products are part of an endless cycle and our fabrics/materials can be re-used over and over. When the products are returned after use, their elements can be retrieved. The raw material that derives can be used to create new products, which brings the circle back to where it began.’

<http://dutchawareness.com/circulareconomy/circular-economy/>

Category 4. Pure cycle

13. Cradle to cradle

Desso

Desso is silver certified by Cradle to Cradle® for their floor carpet tiles.

<http://www.desso.nl/c2c-corporate-responsibility/cradle-to-cradle/>

Herman Miller

Making furniture pieces that are easy to dismantle, cradle to cradle certified.

<http://www.hermanmiller.com/about-us/who-is-herman-miller/our-story.html>

Van Houtum

Manufacturer of hygienic paper. Following a presentation of MVO Nederland from Michel Schuurman they cooperate with a local beer brewery from which they receive the used labels. They use this paper supply for manufacturing toilet paper. The larger 'paper grain' that isn't fine enough for toilet paper is passed on to the manufacturer of carton boxes in which the toilet paper eventually gets packaged. Van Houtum has a product line that is cradle to cradle certified.

<http://www.vanhoutum.nl/mvo/293/cradle-to-cradle.html>

Ahrend

Ahrend manufactures office furniture according cradle to cradle standards.

<http://www.ahrend.com/en/Royal-Ahrend/CSR/Cradle-to-Cradle-Company/>

14. Circular sourcing

Interface

Interface is its own supplier to the extent that they have a program in place that collect discarded and abandoned fishnets, all around the world. In this way they contribute to cleaner oceans as well as secure themselves with resources. <http://www.sustainability.com/library/model-behavior#.VNldU8Yre2U> p. 30

Category 5. Dematerialized services

15. Physical to virtual

Sungevity

This residential solar installation and financing company has streamlined the way solar panels are sold to individual consumers. Rather than relying on local retail outlets or representatives, Sungevity has developed a scalable online sales model where customers can get a price quote within 24 hours. A team of remote engineers designs the solar systems based on satellite imagery. Sungevity subcontracts the installation work to smaller, local operators. This capital-light model has enabled the company to streamline its processes and has resulted in quick expansion to new markets across the US and to countries around the world.

www.sungevity.com

<http://www.sustainability.com/library/model-behavior#.VNldU8Yre2U> p. 24

HelloFresh

Delivering groceries, fruits and vegetables, weekly to people's home that are subscribed.

www.hellofresh.nl

Capgemini

CapGemini amongst other ICT service providers: provision of software or infrastructure as a service (SaaS or IaaS), rather than the hardware or software on a disk focusing on the activity of the software such as payroll or logistics.

<http://www.capgemini.com/resources/saas-myths-and-realities>

Blendle

Blendle is a web application from which you can buy any news article currently published in Dutch media. Thus, you only pay for the articles you read, not for an entire newspaper.

www.blendle.com

16. Subscription based rental

Netflix

The physical-to-virtual model eliminates brick and mortar infrastructure to dramatically reduce the resources needed to supply a product to a consumer. It changes where and how a transaction happens.

www.netflix.com

Spotify

Replacing all physical music collections to an online music platform.

www.spotify.nl

Category 6. Produce on demand

17. Produce on order

Airbus and Boeing

Airplanes are only produced once ordered.

www.airbus.com or www.boeing.com

Zelf je boek uitgeven (publish your book yourself)

Via this webshop you can print on demand. For example a book you would like to publish. In this way you only have to produce when there is an order for your product.

<http://www.zelfjeboekuitgeven.nl/pod/>

18. 3D printing

Print 3D matter

Amsterdam based company that provides 3D printing solutions.

<http://www.print3dmatter.com>

3D systems

US company specialized in 3D printing.

<http://www.3dsystems.com/nl/node/3427>

General information on 3D printing & circular economy

<http://fr.slideshare.net/wiithaa/how-can-3d-printing-make-the-economy-more-circular>

<http://www.greatrecovery.org.uk/3d-printing-a-new-mindset-for-the-circular-economy/>

19. Customer vote / design

Threadless T-shirts

Threadless is a t-shirt company that invites artists to create designs, which users vote on; the most popular ones go into production, and designers receive monetary compensation by the company.

<http://www.sustainability.com/library/model-behavior#.VNldU8Yre2U> p. 25

LEGO Cuusoo

LEGO Cuusoo: This LEGO offshoot is an online platform, created through a partnership between the Japanese company Cuusoo and The LEGO Group in 2008, which allows users to submit ideas for LEGO products to be turned into potential sets available commercially, with the original designer receiving 1% of the royalties. LEGO Cuusoo engages consumers in a new way by including them in the design process and sharing revenue. The revenue sharing agreement incentivizes existing and new consumers to interact with the brand. While there is no sustainability intent behind this example, if scaled, it could streamline production and consumption.

<https://ideas.lego.com>

<http://www.sustainability.com/library/model-behavior#.VNldU8Yre2U> p. 25

ondertitel

[Datum]

11 Summary

Circular economy is developing rapidly ...

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12 Context

The concept of a Circular Economy (CE) was introduced in the Netherlands around 2010. In 2012 McKinsey and the Ellen MacArthur Foundation published their first report "Circular Economy, an European perspective". National reports by TNO (2013) and OPAi / MVO Nederland (2014) showed plenty of opportunities for circular business in the Netherlands. Since then, CE has become part of Dutch environmental government policy 'From Waste to Resource' (Van Afval Naar Grondstof), a coalition *NederlandCirculair!* has been formed of public private and organisations that are jointly working on the acceleration of CE, and many entrepreneurs are working hard to make circular business a reality. For an overview please see www.circulairondernemen.nl.

The Coop ARC partners were promoters of several of these activities and publications. The publication 'Circular Business Models' (2015) was published by Ten Wolde and Joustra, then working for IMSA (now transferred to Coop ARC). Therein they give a detailed description of 19 different circular business models in 6 types, with examples.

13 Project specifics and Coop ARC deliverables

1. Kick-off team meeting

2.

Figure 1. Schematic view of the structure of the Roadmap Eneco Circular!

5. Deliverables

Coop ARC will deliver:

- A brief

14 Team, budget and planning

Coop ARC offers its core team of Circular Economy experts for this project:

- Arthur ten Wolde, member, owner of Circular Future ([profile](#))
- Douwe Jan Joustra, chairman, owner of Implement Circular Economy Amsterdam ([profile](#))

Both are widely acknowledged senior advisors on circular economy in both the private and the public domain. Their fee is € 1.250,= per day excluding 21% VAT.

The total project costs for the period xxx amount to € xxx,= , exclusive of 21% VAT, but including travel expenses in the Netherlands. Our budget and planning are summarized as follows:

...

Within the given budget and planning, we work performance based: our goal is to deliver the best result that you may expect. This implies that we do not do any time registration but will deliver as promised in this proposal. We want clients to be content with the result.

For a smooth process organization we also rely on support by the ... team. This includes finding the right people to participate in interviews and the end presentation, providing company and product data, organizing the needed facilities and internal planning.

The planning is based on the assumption that the project will start In this planning, the project will be completed in When the above-mentioned pre-conditions cannot be met, Coop ARC will need to revise the planning and budget.

The full amount will be billed in 3 terms: 50% within 1 month after approval of the project by ..., 40% after delivering ..., and 10% as soon as the project has been completed.

Any change in the terms of this proposal needs the explicit consent of both parties.

This offer remains valid for one month from the date of its formal presentation.

15 Coop ARC Policy

Coop ARC has a clear process in policies and approach. The basic principles are:

- The customer, the customer demand is key and customer satisfaction as well. This requires a relationship of trust between client and Coop ARC;
- Solutions contribute to sustainable development: the Coop ARC principled approach focuses on enhancing quality of life, conservation of resources and use of clean energy. Our client is aware of this and know that this is the basis for the implementation of projects;
- Performance based: the result counts, that is Coop ARC's focus;
- Property: Coop ARC uses the principles of 'creative commons', which actually means that we share the knowledge that has been built during the project, to the public since we see our work as part of the learning society. Exception is the analysis of business cases and other company-specific data, given the market-sensitive nature;
- Intellectual property: Intellectual property of our own ideas and concepts remain in Coop ARC, the customer acquires the right to use the results of the project. Coop ARC will respect the intellectual property of the clients input in master classes and interviews (non-public sources). Other agreements must be stipulated by contract;

- Rights: Coop ARC respects the rights of partners, customers and others to the highest possible level.
- Delivery: Coop ARC provides for the agreed deadline, within budget and to the required quality level or better;
- Lead time: Coop ARC will show in its offer to the client the indicated performance and also clearly indicate the timing of the project and which people are involved. Clear agreements on end dates are desired.

16 Details Coop ARC

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KvK-number 63905620

IBAN NL73TRIO 03901000292

Oudezijds Achterburgwal 188 1, Amsterdam

www.coop-arc.nl

Members include Circular Future and Implement Circular Economy Amsterdam

Circular Future

KvK-number 63561026

Owner and founder: Arthur ten Wolde

Meeuwenstraat 5, 2025 ZA Haarlem

www.circular-future.eu

Implement Circular Economy Amsterdam (ICE Amsterdam)

KvK-number 62738976

Oudezijds Achterburgwal 188 1, Amsterdam

Owner and founder: Douwe Jan Joustra

¹ <http://www.ellenmacarthurfoundation.org>

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²¹ Ellen MacArthur (2013). Towards the Circular Economy 2, p.33-36

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