

Rethinking finance in a circular economy

[Financial implications of circular business models]



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Foreword



To ING, the importance of sustainability is unquestioned. Our social and corporate responsibility agenda is an integral part of both our commercial and risk strategy. Through a combination of our values, ambitions and our vision of the future we strive to achieve economic growth in a sustainable manner.

New business opportunities

Recently, the international discussion about sustainability has taken a new course through the development of the concept of the circular economy. The circular economy goes beyond the intention of not harming the environment as the circular economy is restorative and regenerative by intention and design. It shifts the focus from a 'take, make and waste' way of production to a 'reduce, reuse and recycle' mentality. This shift spins off several commercial opportunities and business innovation. In that respect the circular economy is a very compelling business case of sustainability. Compelling because it materialises the financial, economic and environmental benefits and costs in an integrated way. And compelling because it is an appealing concept and easy to understand how all stakeholders, society and the environment can benefit from it.

Despite the opportunities the transition towards a circular economy won't be an easy one. It poses many questions and challenges for our clients and ourselves. To name just a few;

What is the circular economy precisely and is it a trend to stay or a well intended hype? Does it require different business models in order to be successful? And if so, can the financial system finance these models?

The purpose of the report is therefore threefold. First we want to identify the business opportunities of the circular economy. Secondly we want to explore differences in business models between traditional and circular businesses. If there are, the circular economy most likely also has an impact on finance. So the third goal is to explore its impact on banking activities. After all, as a forward thinking company we want to help and guide our clients to stay a step ahead in business.

Jointly think forward

This study has helped us to gain a deeper knowledge and a better understanding of the subject. This will help us to match our services as closely as possible to the wishes of our clients. In doing so we want to achieve ING's ambition of being a

strategic partner for our clients. By sharing this knowledge with you we invite you to jointly think forward. We greatly appreciate your feedback and are open to further discussion.

This report is an initiative of ING, but could not have been written without the help of and input from a great many companies and institutions in the sector. We would like to express our gratitude to everyone who took part in the interviews or who contributed in any other way to this publication. We are especially grateful for the help and input of BMA Ergonomics and TNO who supported this report wholeheartedly and provided us with invaluable information on circular business cases.

A handwritten signature in black ink, appearing to read 'Koos Timmermans', with a horizontal line extending to the right.

Koos Timmermans
Vice-chairman ING Bank

Introduction

From 'take, make and dispose'...

Since the start of the Industrial Revolution more than 250 years ago, the global economy has been on a steep growth trajectory initiated by a series of advances in technology. From steam engines that replaced water mills to electricity, telephones, automobiles, airplanes, transistors, computers, and the internet, each new wave of technology has brought about surges in productivity and economic growth. As a result consumption increased tremendously and technology created new possibilities for many people in the developed world.

Technological advances appeared within a context of seemingly unlimited natural resources. This resulted in a linear 'take, make and dispose' model of production. An economic model where the majority of feedstock ends in waste. A model also with many unsustainable side effects such as a loss of biodiversity, deforestation, air and water pollution as well as material depletion.

...to 'reduce, reuse and recycle'

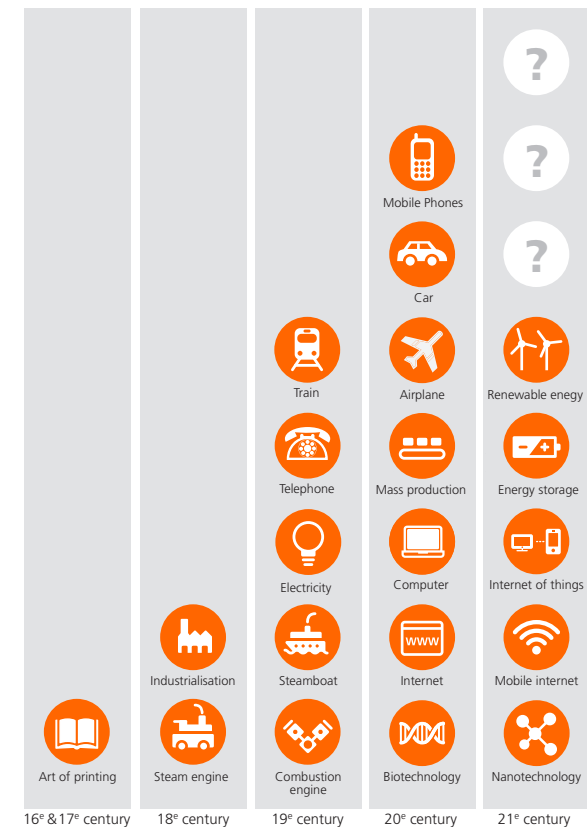
Businesses across the world face new challenges. On the one hand they have to deal with increasingly constrained resources – be it energy, land or materials – adding to price volatility of raw materials. On the other hand they are faced with increasingly demanding customers and markets when it comes to sustainability. This poses the challenge to decouple growth from resource use. A challenge that requires a new economic paradigm of 'reduce, reuse and recycle'. The concept of a

circular economy aims to present a solution to this challenge by combining revenue with social impact. It enables businesses to grow and prosper while keeping the environment and society intact, ensuring growth for themselves as well as future generations.

Fresh insights and inspiration empowers us all to stay a step ahead in business. This study will give readers insights into the opportunities of the circular economy and the business models enabling it. It will also provide a better understanding of how the circular economy changes the financial landscape. ING, as a large financial institution, plays a pivotal role in financing sustainable transitions. From past experience we already know that sustainability often goes hand in hand with increased business performance. Companies that are leading in sustainability are more innovative and show, on average, higher risk adjusted returns. If these clients further develop their circular business models we want to know whether our current product offering and services are suited to finance these business models. And if not, what changes are needed or which alternatives are at hand?

Sources: McKinsey, Maddison, Working Group Finance in a circular economy.

Technological progress across centuries

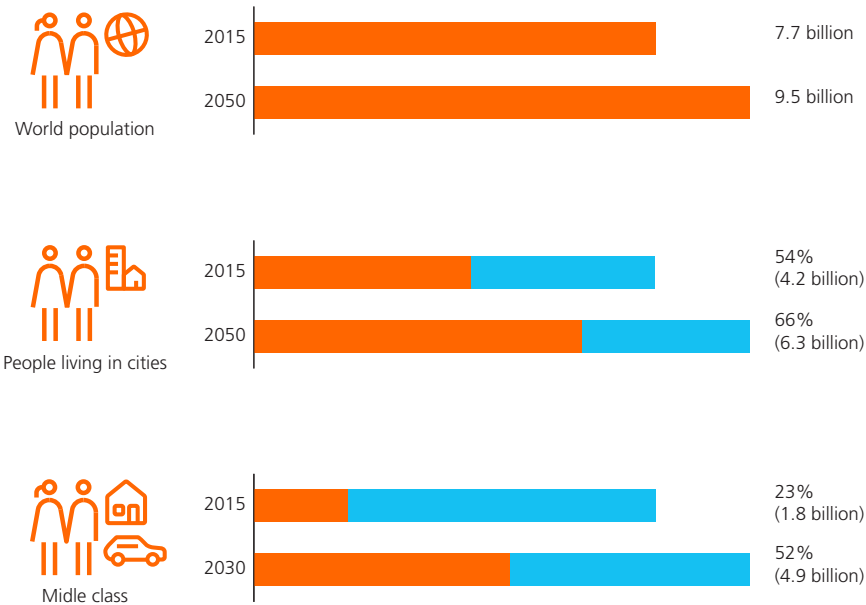


Source: ING Economics Department based on Lipsey, Carlaw & Bekar.

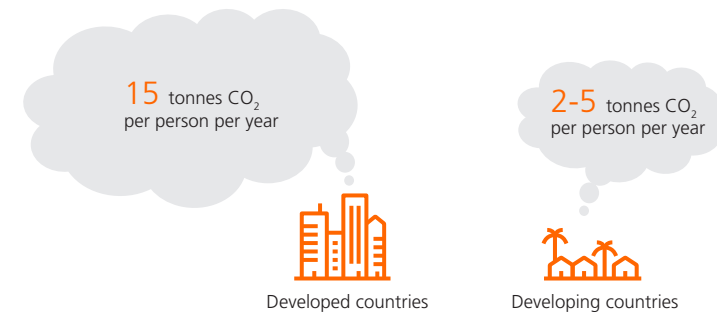
Executive summary (1/4)

Why: the need for a circular economy

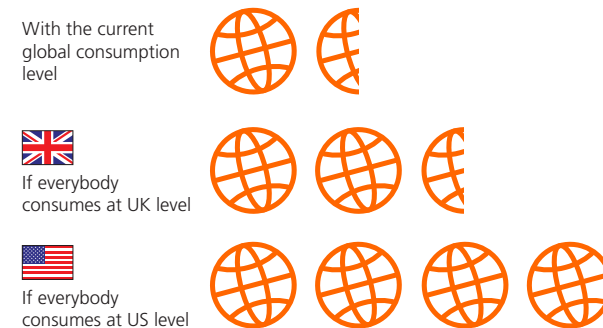
The world is inhabited by more and richer people...



...which leads to increased pressure on the environment.



- As developing countries become richer their CO₂ emissions converge to the higher levels seen in developed countries;
- Global consumption currently needs 1,5 planet earths to sustain itself and this will increase with the rising middle class. If everybody in the world consumes at US level the world needs 4 planet earths. Clearly, the 'take, make and dispose' model in its current form is not sustainable in the long run.



Executive summary (2/4)

How: the emergence of new business models

New technologies are available to address the challenges of the linear economy



Nanotechnology



Mobile internet



Internet of things



Renewable energy



As a result entrepreneurs develop new ways of production...

	Conventional business models	New business models
Principles for value creation	Business continuity and profit optimisation are the overriding principles	Circular business models open the way to incorporate multiple principles for value creation. Beyond financial values, environmental and social business values are also taken into account. Creating impact is a central theme in these models.
Co-operation	Traditional buyer supplier relationships in linear supply chains. The benefits of the product or service are limited to the buyer and seller (exclusive business models).	Companies in circular supply chains often co-operate beyond traditional buyer supplier relationships that characterize linear supply chains. Instead they operate in a network of companies and institutions that often involve a strong element of collaboration and co-creation.
Transaction	Transactions emerge in B2B or B2C markets with money as medium of exchange.	New market segments arise in which consumers interact with other consumers (C2C) and in which economic agents act both as manufacturer as well as consumer (C2B). Money is the main, but not necessarily the sole, medium of exchange as goods or services are for example exchanged against energy, time or waste.
Ownership	Ownership is central for the consumption of products and services.	Access to a service is more important than ownership of a product that delivers the service.
Success measurement	Success is measured in a financial cost benefit analyses for the parties involved in the transaction (seller and buyer).	Success is measured in a cost benefit analyses that incorporated financial and non-financial values for all the stakeholders involved as well as society at large.



...by applying new business models that:

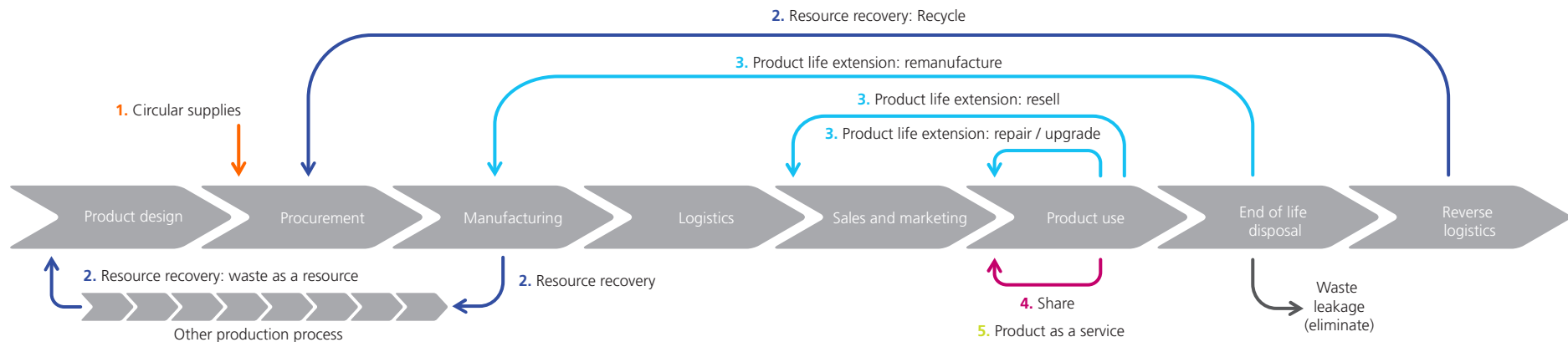
- use fully renewable, recyclable or biodegradable resource inputs;
- extend the product life cycle;
- offer a product as a service;
- promote collaborative consumption through sharing platforms;
- recover resources at the end of a product life cycle.

The illustration on the next page visualises these five new business models in a classic production process. Every business model is described in detail in chapter 3.

Executive summary (3/4)

The circular economy provides opportunities for financial institutions

Five business models driving the circular economy



Finance can be a major enabler of the transition towards a circular economy

Recently, the circular economy has attracted a lot of attention from a broad audience ranging from policy makers, scientist, NGO's and – often large – companies. It's impact on finance however, has attracted less attention. We hope to correct this as finance can be a major enabler of the transition towards a circular economy.

The circular economy provides opportunities for financial institutions

- First, it is a growing market which is estimated to generate 1% to 4% economic growth over a ten year period. This is net growth and accounts for the disruptive aspects which forces some (linear) business to reduce or stop production. In today's low growth environment this is quite an achievement.
- Secondly, it is a market that fits into the sustainability targets of many banks as these companies make the transition happen. The sustainability approach in the financial sector has evolved over time. Starting from

mitigating environmental and social risks (do no harm policies) to supporting sustainable business and integrating it into the core business and strategy (doing good policies). Banks are recognising the opportunities of sustainability more and more. There is now evidence which shows that clients who are leading in sustainability are more innovative, show better financial performance and have better credit ratings. Directing more assets and capital to sustainable businesses therefore creates a healthy portfolio for the banks and helps them to facilitate the transformation to a low carbon economy. As a result, sustainability now is a business opportunity for the financial industry.

Executive summary (4/4)

How: implications of circular business models on finance

Circular business models pose challenges to standard banking solutions

Despite these opportunities though, the financing of circular business models creates challenges. Main challenges are:

- The changing nature of the cash flow of the firm.
- Increased capital needs to prefinance clients.
- Legal issues surrounding collateral and its value.

From linear to circular banking wisdom...

Financial institutions can facilitate the transition towards a circular economy in many ways. Chapter 4 describes them in detail. The main enablers are:

- The bankability of circular business models in many cases requires the acceptance of 'contractual comfort' instead of the right of legal ownership over assets in case things go wrong. Secondly, it requires a more cash flow based approach to finance rather than an approach based on collateral values.
- Banks can enable the circular economy by developing valuation and risk models that suit the characteristics of circular business models. For example, assets are often written down to zero or a small scrap value over their economic life cycle. Capturing higher values in circular supply chains through upscaling or through second hand markets is pivotal to the circular economy, but currently this value is not fully captured in financial business cases.
- Exploration and development of leasing arrangements for products with circular potential.

- Exploration and development of new and innovative finance solutions for supply chains that go beyond the currently available working capital solutions.
- Advising clients on the financial incentives that make the end user choose for circular products and services over standard products. Currently many business models are financially sound for the client but they lack a strong financial incentive for the end user. As long as the financial benefits are not clear to the end user, circular business models are bound to face limited demand.
- Development of knowledge on and gaining experience with new pricing tools that incorporate environmental and social costs and benefits into the financial business case.
- Partnering with equity providers if the risk return profile of the circular business case does not match debt finance criteria
- Partnering with crowdfunding platforms if the circular business case involves the community and there is a strong case to include it financially.
- Last but not least banks can act as a launching customer with regard to circular sourcing and procurement. Financial institutions are large users of office buildings, IT hard- and software, office furniture, energy, et cetera. By adopting circular sourcing and procurement procedures financiers create demand for circular business models which is key in unlocking the potential of the circular economy.

...ultimately requires a change in culture

However, financing the circular economy ultimately requires more than simply adjusting existing financial products and risk models to the specifics of the circular economy. It is also much more than simply growing the leasing business of a bank. If banks want to play a leading role in the circular economy they have to embody the principles of the circular economy in their own thinking and way of doing business. If the circular principles to 'reduce, reuse and recycle' are embedded in the DNA of financiers, they can be a credible and valuable strategic partner for entrepreneurs in the circular economy.

WHAT

Characteristics and principles of a circular economy

1

- The linear 'take, make and waste' approach of production
- Main principles of a circular economy
- Characteristics of linearity and circularity
- Examples of circular businesses



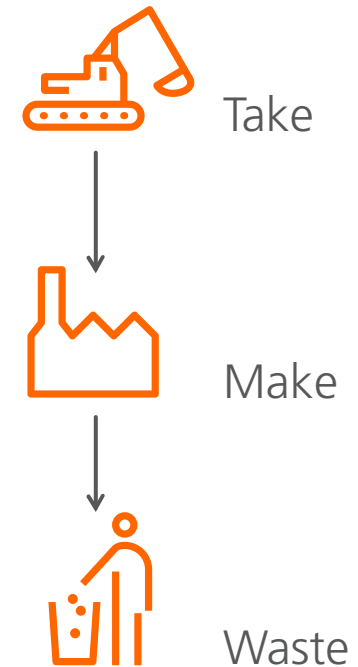
The linear 'take, make and waste' approach of production

WHAT

The concept of the circular economy is **inspired by nature** and its living systems. In nature waste does not exist, there is no landfill as materials flow constantly in circles. Things grow, die at some point and become nutrients for other life. This is however not a perpetuum mobile: a system that keeps functioning in itself and creates energy out of nothing. To keep this cycle going, it needs energy which is provided by the sun.

As humans however we have adopted a **linear approach** of production and consumption. We take, make and dispose materials. For example, we ditch our old mobile phone when a new one comes out or through away worn clothes as waste which are often burned in a combustion central. Each time we do this we tap into a finite amount of resources and leave behind toxic waste instead of nutrients for further life. This way of production and consumption does not work long term and will – at some point – put the limits of human activity to the test.

That's why this study **rethinks the linear economy** that we're used to and explores opportunities and barriers to a circular economy. As a large financial institution it particularly rethinks its implications for finance and banking.



Sources: Ellen MacArthur Foundation, Circular Economy and ING Economics Department

Characteristics of linearity and circularity

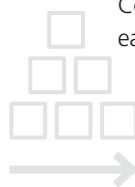
It's all about changing systems



- Attitude towards nature**
- Attitude towards production**
- Closing loops**
- Product life extension**
- Performance economy**
- Earnings model**
- Multiple values and principles**
- Supply chain**

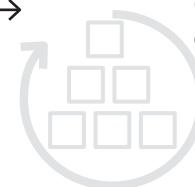
Characteristics of a linear economy

- Forcing nature to produce more
- Take, make and waste
- One lifetime use of products, components, materials and energy
- Products become obsolete while they are still usable
- Consumers buy goods
- Producers determine sales price of products
- Money is the dominant value in business models
- Companies improve efficiencies in isolation of each other



Characteristics of a circular economy

- Doing more with what nature can produce
- Reduce, reuse and recycle
- Materials and energy flow infinitely in cycles through the economy
- Product life is extended in new applications or products serve as valuable inputs for other products
- Accessibility and performance instead of ownership are leading in many consumption markets. Consumers increasingly share products
- Producers charge price for the use of the product
- Business models are based on multiple values (financial alongside environmental and social values)
- Companies work together to increase value along the supply chain. Risk and benefits are shared upstream and downstream



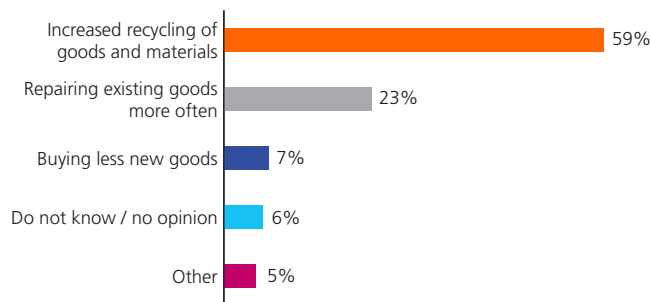
The circular economy is much more than just recycling



The public highly values recycling

People often view increasing recycling rates as the main way to achieve a circular economy. A survey among 71,821 Dutch retail clients of ING revealed that almost 60% believes increased recycling rates help the transition to a circular economy most. One out of four consumers believe that repairs of existing goods facilitate the transition most and 7% of the respondents share the opinion that buying less goods is the best way to bring the circular economy forward.

What helps the transition to a more circular economy most?



Source: ING Economics Department

But more can be done!

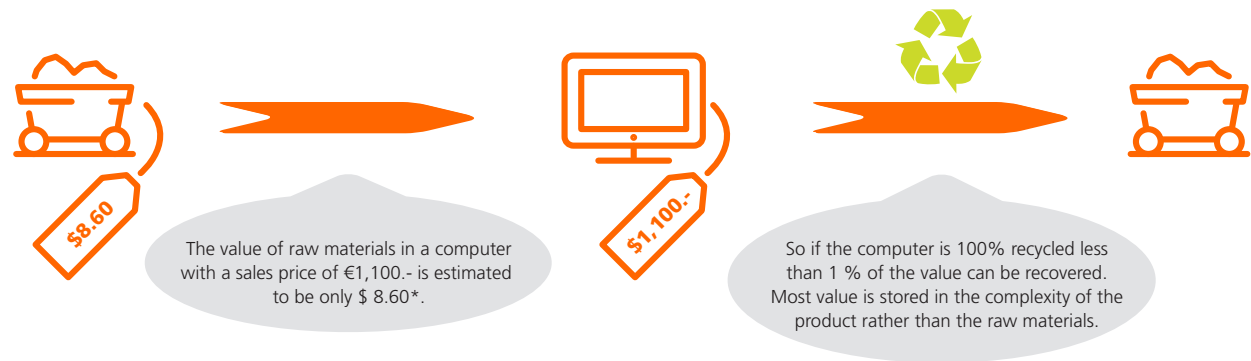
However, models of a circular economy point out that circularity is about much more than just recycling:

- Recycling often reduces the quality of materials which limits usability (downcycling).
- Recycling methods focus on regaining materials from used products. In the process valuable information such as product idea, product design and technical specifications are lost.
- The idea that recycling is always a good thing is firmly rooted in our society but does not hold up always in

practice. For example researchers found that toxic chemicals from recycled newspapers had contaminated food sold in cardboard cartons.

From a circular perspective, recycling should be the last option when aiming to close the loop. In that respect there is room to inform and educate the public on the circular economy and how they can contribute to it.

Recycling recovers a small fraction of the value



Source: UNEP

Examples of circular business (1/3)

WHAT



TurnToo is a circular concept for the build environment that applies the design for disassembly and access over ownership concepts on buildings. The philosophy is that all the materials remain the property of the main or sub contractors. TurnToo takes these concepts a step further by viewing buildings as temporary depots for raw materials. End-users pay for the performance only, so that manufacturers retain access to the raw materials. The suppliers have the obligation to take back the raw materials if the building loses its function. A landmark project of TurnToo is the renovation of the town-hall building in Brummen in the Netherlands.



BMA Ergonomics makes high quality office chairs since 1997. Since its start it has designed its chairs for easy disassembly and remanufacturing as the seats can be taken of the frame within seconds. The initial reasons were better service and hygiene but sustainability has entered the scene a few years ago and is now leading. It now actively incorporates pay per use models, product life extension through maintenance, remanufacturing as well as recollection through take back schemes. The BMA circular business case will be analysed in greater detail throughout this report.



Green Recycled Organics Holland (GRO-Holland in short) uses coffee residue as a growth substrate for oyster mushrooms. About 2,500 kilograms of coffee residue is collected weekly from around 100 La Place restaurants in the Netherlands. On this substance mushrooms are grown. Collaboration in the supply chain is strengthened further by selling the mushrooms to the La Place restaurants where they are used as ingredients. The project's system thinking approach exhibits strong symbiotic relationships. Gro-Holland implanted itself within La Place existing distribution network, in which coffee residue was already being separated. The distribution trucks are full in both directions, dropping off coffee grounds and picking up mushrooms.

Interface®

Interface is the world market leader in carpet tiles and listed on the Nasdaq stock Exchange and with a production facility in Scherpenzeel in the Netherlands. Sustainability is a major driver in the company and Interface is leading the Dow Jones Sustainability Index for several years now. The mission of Interface goes beyond "zero impact on nature" as it aims to be restorative to nature. This is visible in many aspects of the company such as production sites being run entirely on renewable energy, the use of biobased materials in their products, and a strong focus on product life extension over short term sales revenues. Interface also incorporates local communities in their ambition to be restorative to nature.

Examples of circular business (2/3)

WHAT

PHILIPS

sense and simplicity

Philips is a leading technology company in the market for healthcare appliances, consumer lifestyle and lighting. It's CEO Frans van Houten has made the circular economy one of the top priorities for Philips. Philips has introduced circularity programs in all three business lines.

In consumer electronics the following circular principles are now being introduced:

- Recycling: Philips aims to increase the use of recycled plastics in its products. This is not always possible. Regulation prevent Philips to use recycled plastics for parts that are in direct contact with food. And high design standards and consumer demands can often only be met with virgin plastics. The Senseo Up currently uses the most recycled plastics. Its baseplate contains 90% recycled plastic and the inner frame 40%. In total the product has 13% of recycled plastics but this already creates a 20% cost saving.
- Design for disassembly and easy maintenance. If products can be taken apart easily in modules they can be easily maintained and product life is increased. Ideally, the consumer does not have to return a defect product but can take apart the relevant module and sent it back. This can be facilitated by smart appliances that indicate which module is broken or the 'internet of things' through which Philips can monitor devices from a distance.
- Make products upgradable so consumers can use them longer. A regular iron device for example can be made upgradable to a steam facility. Consumers that want to use steam during ironing can simply upgrade instead of buying a new product and disposing the old one.
- Incorporate circular design rules in the targets for R&D, marketing and product development departments.
- Develop new business models in B2B markets. For example a five star hotel might buy 500 Philips iron devices from a retailer and wants to replace it by new ones after two years since a five star hotel wants its visitors to use the latest products. Philips could offer it in a lease for 2 years, take the products back and resell it to a two star hotel in which the products get a second life.

Example: Senseo Up built from recycled plastics



Total: 13% recycled plastics / 20% cost savings

Examples of circular business (3/3)

WHAT



Van Scherpenzeel is a knowledge-based business that controls a wide range of raw material supply chains. The company extracts new materials from waste via destroying and recycling all types of waste, such as paper, plastic, glass or textile. Van Scherpenzeel analyses the waste flow and advises enterprises and municipalities on the correct approach to take. Van Scherpenzeel organises and executes its recycling process in such a way that as much value as possible is extracted out of waste. Since waste from businesses contains confidential information, confidential destruction is done discretely in house. Van Scherpenzeel helps companies in achieving the targets that are set by the Dutch Ministry of Infrastructure and Environment for increasing the reuse and recycling of packaging materials. In addition, Van Scherpenzeel uses its knowledge and network to introduce circular models to corporates.



Apple is selling refurbished apple products in its app stores now. Refurbished models come with full product warranties. Companies such as Leapp offer the same products and services but are independent from Apple.



Avantium is a leading technology firm that, among other things, develops PEF. PolyEthylene Furanoate (PEF) is a new ground breaking polymer, made with Avantium's YXY technology. It can be used in multiple applications, like bottles, fibers and film. PEF is 100% plant based and 100% renewable. It provides a lighter, thinner, smaller, stronger and more sustainable alternative for oil-based PET. Avantium is working on further development and commercialisation of PEF together with Coca-Cola, Danone and Alpla. The development of a 100% plant bottle for Coca-Cola is one of the striking examples of PEF-technology.



Through Dutch online platform 'www.deafvalmarkt.nl' consumers and businesses can match supply and demand for waste. For example, a logistics company has wooden pallets as waste which can be used by other businesses or consumers.



Consumers throw away vast amounts of stuff. They hardly repair things. Repair Cafés are free meeting places and are all about repairing things together. In a place where a Repair Café is located, you'll find tools and materials to help you make any repairs on clothes, furniture, electrical appliances, bicycles, crockery, appliances, toys, et cetera. You will also find repair specialists such as electricians, seamstresses, carpenters and bicycle mechanics. Visitors bring their broken items from home. Together with the specialists they start making their repairs in the Repair Café.

WHY

2

Rethinking the linear economy to:

1. take advantage of new business opportunities
2. find effective solutions to the challenges of a growing population...
3. ...as well as increased CO₂ emissions and waste production
4. anticipate new customer demand in the sharing economy
5. serve new markets (C2C and C2B markets)
6. utilise the latest technologies



The circular economy provides new business opportunities

WHY

The circular economy is here to stay...

Circular business models provide entrepreneurs with prospects to reinvent their existing business and to explore new activities. In doing so they can enter new markets, gain market share, create a competitive advantage and ultimately increase revenues. These business opportunities will be the main driver of the transition from a linear to a circular business model. As a result the circular economy is an irreversible trend.

...and has the potential to increase economic growth by 1% to 4% over a ten year period

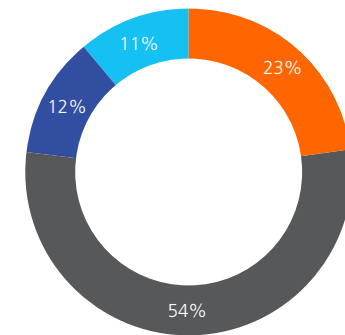
Obviously the circular economy offer new business opportunities which will increase economic growth. But there are negative effects as well. Increased recycling rates for example can raise costs in the economy and important principles of the circular economy such as sharing, product life extension as well as refurbishment of existing products can lower the sales of new products. On balance the potential benefits outweigh the costs. The Ellen Macarthur Foundation and TNO estimate the combined benefits to be around €500 billion over a ten year period for the European Union (3,6% growth cumulative) and around €7 billion for the Dutch economy (1,4% growth cumulative over a ten year period).

Reuse, maintenance and repair activities have the highest potential.

This growth potential does not come from increased recycling rates alone. Think of a large five star hotel in which every room needs an iron. After three years the hotel manager might decide to replace all its irons to keep up with the latest products. If the irons are recycled its materials can partly be used to make new ones. While this is far better than simply ditching the old irons even more value is created if the irons are reused. Think of a two star hotel that does not need its guests to use the latest models. If the five start hotel sells its irons to a two star hotel the product life is increased and much more value is created. The same applies to maintenance and repair activities. Through proper maintenance and repair products can be used longer. Therefore reuse, maintenance and repair activities have the highest circular potential in many supply chains.

Reuse is the most important driver of circularity in the supply chain of electronic devices

Value of circular production for electronic devices in the Netherlands.



- Maintenance & repair
- Reuse
- Remanufacturing & refurbishment
- Recycling

Source: TNO.

Solutions to address population growth, urbanisation and ageing

WHY

The world is inhabited by more people...

The global population is expected to grow considerably. In the most likely estimate by the United Nations the number of people on earth grows from 7 billion now to 9.5 billion in 2050. With more and more people inhabiting the earth the limitations of the 'take, make and waste' economy become more pressing.

Global population trends



...of which a higher share lives in cities...

The world population is not only growing, an increasingly large share is living in urban regions. This trend to urbanisation is especially strong in developing countries where people move into cities where income on average is higher. This creates new sustainability challenges as citizens on average produce more waste than their counterparts living in rural areas.



...and is older

Many countries see their population ageing. The share of world population aged 65+ years old is expected to rise from 8% now till 16% in 2050. As a result the world is hit by a double whammy in which it is not only inhabited by more people, they also live longer. This trend is particular pronounced in developed countries.



Source: Worldbank.

Solutions to CO₂ emissions, waste production and resource depletion (1/2)



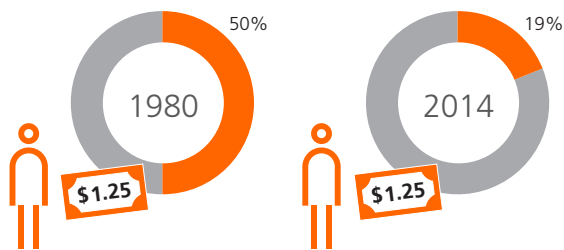
Wealth has increased globally...

Since the Industrial Revolution the world population has become richer on average, especially in the developed world. GDP per capita for example increased nine fold for the world population whereas it increased fifteen times in Europe. Also the number of people in extreme poverty has declined. In 1980 50% of the world population lived on less than \$1.25 per day in comparison to 19% in 2014.

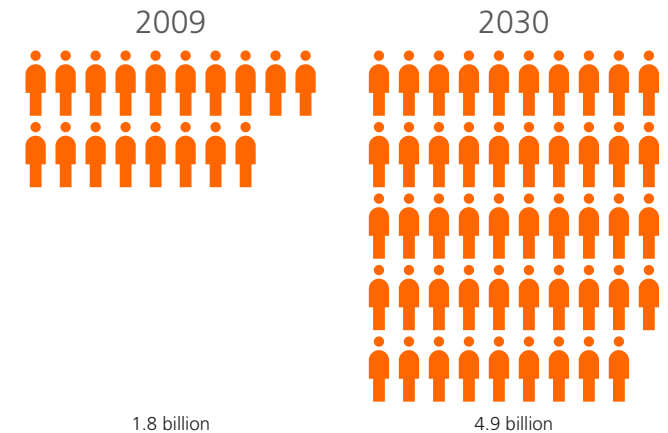
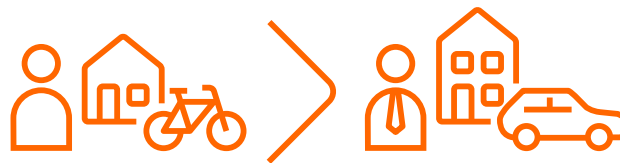
...creating a larger middle class...

As a result of these trends the size of the "middle class" will increase globally from 1.8 billion in 2009 to 3.2 billion by 2020 and 4.9 billion by 2030. Middle-class persons commonly have a comfortable standard of living, significant economic security, considerable work autonomy and rely on their expertise to sustain themselves. The bulk of this growth will come from Asia: by 2030 Asia will represent 66% of the global middle-class population and 59% of middle-class consumption, compared to 28% and 23%, respectively in 2009 (OECD, 2011).

Share of global population living in poverty



The rise of the middle class



Solutions to CO₂ emissions, waste production and resource depletion (2/2)



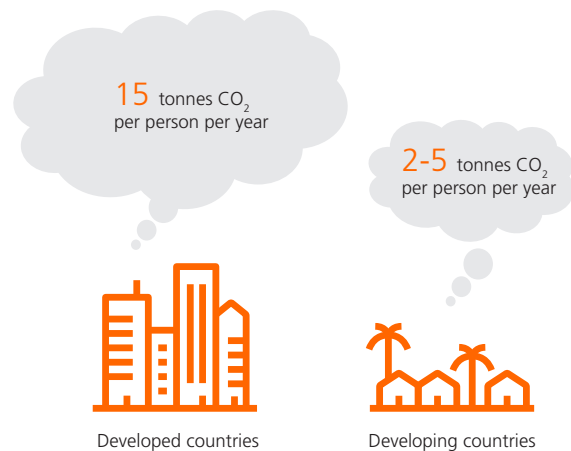
...which increases CO₂-footprints and waste production

This has important consequences as richer people have a higher ecological footprint. For example richer economies emit on average 15 tonnes of CO₂ per person per year in comparison to 2 to 5 tonnes of CO₂ in developing countries. People in high income countries also produce more waste (2,1 kilogram per person per day) in comparison to low income countries (0,6 kilogram per person per day).

As a result, global consumption currently goes beyond the earth's regenerative capacity

Global consumption currently needs 1.5 planet earths to sustain it. If everybody on earth consumes in the American way it will be 4 and for the UK style it will be 2,5 planet earths. This is clearly not a sustainable path and its negative impact on global warming, melting glaciers, rising sea levels and acidification of oceans is well documented. The concept of a circular economy provides us tools to support ecosystems and to put consumption on a path that is in line with the earths regenerative capacity.

CO₂ emission



Amount of planet earths needed to sustain global consumption



Servicing demand in the sharing economy



Motivation to take part in the sharing economy differs

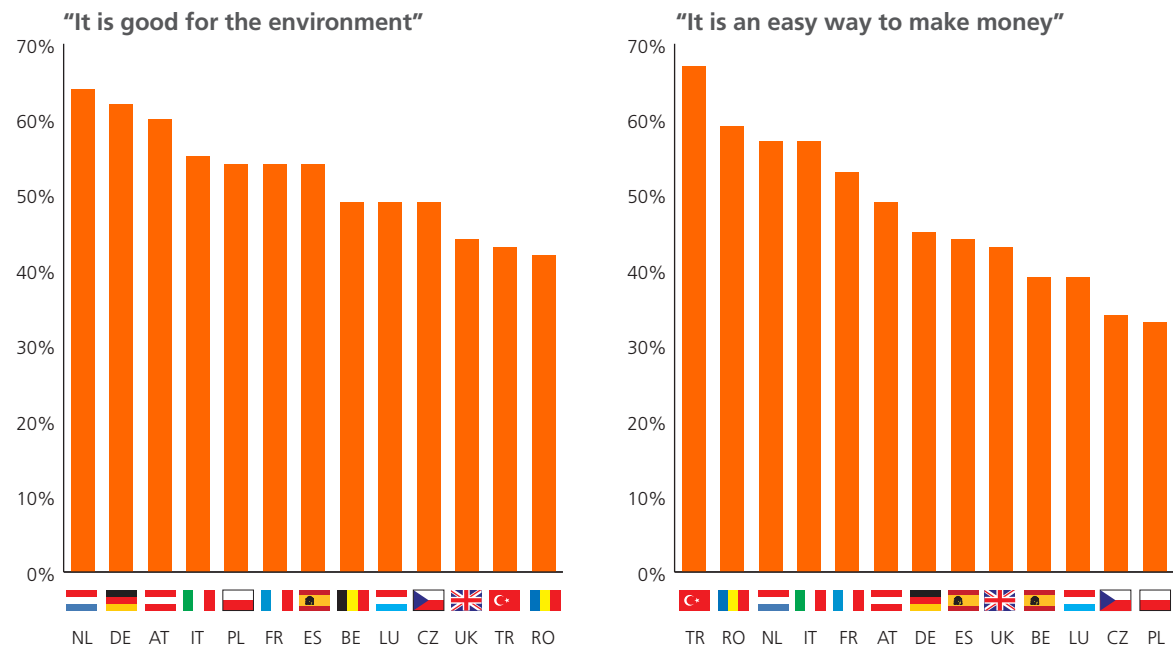
Spurred by the economic crisis as well as environmental challenges a new model of consumption is arising. Collaborative consumption focusses on renting, lending and sharing goods instead of buying and owning them. This new economic model is named by TIME as 'one of the 10 ideas that will change the world' and it describes the shift in consumer values from ownership to access. Reasons for consumers to take part in the sharing economy differ. Dutch and German consumers are attracted to sharing because of environmental reasons while consumers in Turkey and Romania are in it for the money.

Women and 'millennials' are more driven by environmental reasons

In general women are more motivated by sharing being good for the environment (57% on a European level) than men (50%). Participation in the sharing economy is highest among 'millennials' (aged 21-34). They have grown up in the digital age and can hardly imagine life without the quick-click and instant gratification that the internet offers which is a major enabler of the sharing economy.

Motivation to take part in the sharing economy:

% of respondents that agree or fully agree to following statement about the sharing economy.



Source: ING International Survey (2015) which surveys a thousand consumers in each country.

Rethinking the linear economy to serve new market segments

WHY

The sharing economy adds the human touch to the circular economy...

The circular economy models do a great job in redefining production processes and supply chains in ways that generate economic and environmental efficiencies. They however are less successful in describing its impact on consumer behavior. The sharing economy adds the human touch to the circular economy and provides insights in how demand and supply meet in the market place in ways that are more recourse efficient and environmental friendly.

...and creates business opportunities in new market segments

- The sharing economy creates new forms of market transactions and segments. Traditionally markets are divided in Business to Business (B2B) or Business to Consumer (B2C) markets. Sharing however, becomes increasingly popular among consumers themselves which creates Consumer to Consumer (C2C) markets. This trend is accelerated by internet technology which enables the emergence of Peer to Peer (P2P) platforms through which consumers find the products and services in the local community that are available for sharing. Sometimes consumers become producers themselves and sell their products to business as well (so called prosumers). As a result a new Consumer to Business market segment arises

- (C2B). Think of consumers that generate solar power with solar panels and sell the electricity that they don't use to the grid operator.
- These new markets provide many circular business opportunities for entrepreneurs. They also threaten current business models in the B2C and B2B markets. Therefore it is key that businesses explore the impact of the circular economy on their business models and define appropriate strategies in response.



Sources: Collaborative Lab, Wikipedia, Jan Jonker

New C2C and C2B markets provide circular business opportunities for entrepreneurs.






New technologies bring the circular economy to a higher level

WHY

Green technology is a major enabler of the circular economy

Although technology is one of the main drivers of the sharp increase in CO₂ emissions since the industrial revolution, it also provides solutions. Energy saving technology help to reduce our energy intensity. Renewable energy provide alternatives for high carbon energy sources and all kind of product and process innovations make production more efficient and effective. On a consumer side, entire communities and cities around the world are using network technologies to do more with less by renting, lending, swapping, gifting and sharing products on a scale never before possible. Overall technology and the ability to innovate are important prerequisites and enablers for a circular economy. Green technology already provides many technologies for the circular economy, and there are many more to come as the trend has only just begun.

Sources: McKinsey and KPMG.

Technology	How it benefits the circular economy
 Mobile internet	Wireless web use is growing rapidly leading to omnipresent internet access and its virtual networks. This will, for example, foster further growth of the sharing economy.
 Internet of things	The embedding of sensors in machines and products to bring them into the connected world is spreading rapidly. As a result producers and consumers will have much more information on products available. The tracking and tracking abilities of products is also greatly improved which will spur innovation in the circular economy.
 Advanced materials	Scientists increasingly discover ways to produce materials with incredible attributes. Think of smart materials that are self healing or self-cleaning, materials that turn pressure into energy as well as nanomaterial. These innovations lead to better products (more efficient solar panels for example) and help to extend the technical lifecycle and improve maintenance capabilities. They also foster better product design which help to scale up circular products as consumers want fashionable products.
 Renewable energy	Renewable energy sources hold the promise of an inexhaustible energy supply with zero or very low carbon emissions. It therefore is a crucial element in the transition to a circular economy.
 Energy storage	Wind and solar energy are not always available. Therefore energy storage is technically at this moment the missing link in the transition to a circular economy fully based on renewable energy. But energy storage technologies like batteries and fuel cells are developing rapidly leading to increased performance and price reductions.

HOW

The emergence of circular business models

3

New business models arise that:

- are more future oriented instead of just providing solutions for today's problems
- maximise financial values alongside environmental and social values
- co-operate within complex social networks instead of linear buyer supplier relationships
- are active in new market segments such as C2C and C2B
- focus on accessibility rather than ownership
- incorporate social benefits and costs in their profit and loss calculation



How entrepreneurs can close loops in the biosphere

HOW

The following instruments can be used by entrepreneurs to design and close the biological loop in a circular economy

- Nature preservation to keep and increase the earth's natural restorative capacity.
- Behavioral change that limits the claim of human activity on biological materials by farming or fishing.
- Apply cascading methods. Cascading implies that biological materials are used first in products and processes with the highest value added. For example, plants can be used first in pharmaceuticals to produce medicine which has a high value added and a high impact on human welfare. The same applies for food, especially in areas where food is

scarce. Then we can apply biological materials as an input for industrial processes and the production of, for example, bioplastics. Finally, biomass can be used for renewable energy production.

- The order of a cascading model is not carved in stone and dependent on local circumstances. The point about the circular economy is that it deploys its biological resources in the most effective and welfare-enhancing way. So plants should not be burnt for heating or fermented into biofuels for transportation if they can be used to cure or feed people.
- Soil restoration is that stage in the biological cycle when materials are made available to plants and other organisms again.



The BMW i3 sets new standards in sustainability. Its engine is CO₂ neutral, its dashboard is made out of a fast-growing type of grass, and its lining is made from recycled plastic bottles. Besides road information, the car's satnav also contains all the information on public transport. In this way, BMW hopes to stimulate its clients to drive to public transport hubs and continue their journey by public transport. The car comes with an app for the mobile phone which allows the traveler to access all the information everywhere at every time.

Smurfit Kappa

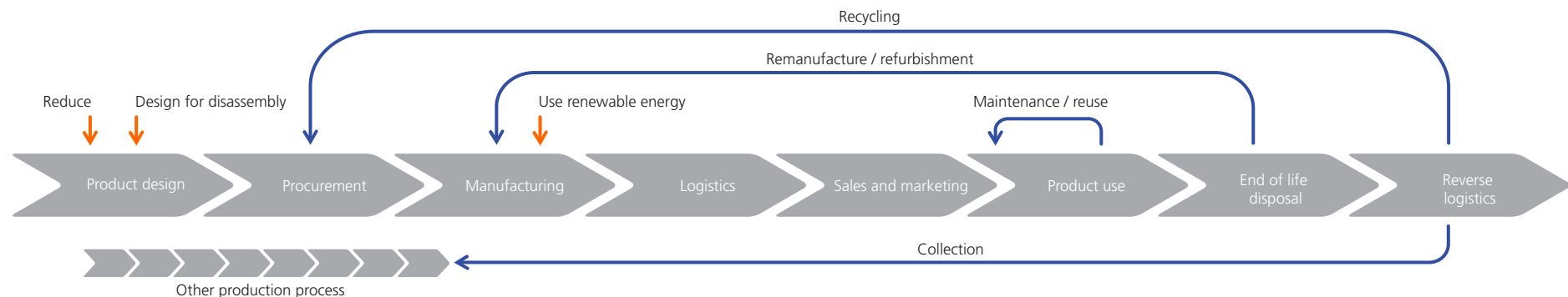
Smurfit Kappa is a paper and cardboard manufacturer that uses leaves from tomato plants to produce the pulp needed in paper production. The foliage is collected from tomato growers. At the end of every year, these growers dispose of the old plants in order to plant new ones in January. In the past, the foliage was burnt, but now its value is increased through upcycling.

Sources: ING Economics Department based on Ellen MacArthur Foundation

How entrepreneurs can close loops in the technical sphere

HOW

Closing the loop for technical products and materials



Technical or non-biobased materials cannot safely and readily pass through the biosphere. If they do they often leave toxic waste. Closing the loop of technical materials can evolve the following instruments:

- Reduce: behavioral change that limit the use of these materials in products.
- Make use of circular energy systems based on renewable energy.
- Design for disassembly: a cradle to cradle design philosophy that allows materials to continually flow in cycles. It acknowledges the need to disassembly for repair, refurbishment and recycling purposes.
- Collection is the process of bringing components or materials back into new cycles instead of landfilling or burning them. This collection process is critical in closing the loops in a circular economy.
- Maintenance: the process of keeping a product in good condition without changing its function or user.
- Reuse: the reuse of a product for the same purpose and in its original form, following minimal maintenance and cosmetic cleaning. Reuse can for example happen in second hand markets.
- Remanufacture: the process of disassembly and recovery at the component level. Functioning, reusable parts are taken out of a used product and rebuilt into a new one. This process includes quality assurance and potential enhancements or changes to the components.
- Refurbishment: the process of returning a product to good working condition by replacing or repairing major components that are faulty or close to failure and making cosmetic changes to update the appearance of a product, such as changing fabric or painting.
- Recycling: the process of recovering materials from products. The materials recovered feed back into the process of crude feedstock either for new products with the same purpose of the old ones or for totally different products. If this results in a reduction in the quality of the material it is called downcycling. If the quality is improved it is called upcycling.



Dutch airline operator KLM renewed 11,000 uniforms of its stewardesses in 2010. This corresponds with 90,000 kilograms of textile which previously was burned. Nowadays it is pulverised and upcycled to nylon. The nylon is upcycled further as it is used for lining in the business class seats.

Circular strategies for entrepreneurs

HOW

Design strategies

- Design for product durability
- Design for standardisations & compatibility
- Design for ease of maintenance and repair
- Design for upgradability and adaptability
- Design for dis- and reassembly
- Design for customer intimacy, trust and loyalty

Strategies for manufacturing

- Minimalise the impact of production on the environment.
- Look for waste resources in- and outside the supply chain that can serve as raw material, fuel or energy for your production process
- Make life cycle assessments of your products to assess the largest impact of your products in the supply chain. Look for cooperation in those parts of the chain where impact is highest

Procurement strategies

- Include economic and environmental costs in procurement
- Use the concept of total cost of ownership instead of lowest price only. This often requires an integrated approach on budgets for acquisition, maintenance and disposal
- Develop a circular procurement strategy
- Assess the circularity of suppliers
- Find suppliers that deliver products or services as a circular concept, for example as a pay per use service

Strategies to collect waste

- Analyze waste flows in your company as well as the supply chain
- Collaborate with waste and resource contractors as well as local governments

Sources: Het Groene Brein and Government of the Netherlands

New versus conventional business models



The end of business as usual

Business models are used to describe and classify businesses, especially in an entrepreneurial setting, and are used by managers to explore possibilities for future development. In previous sections we have seen that the circular economy in many respects is very different from the traditional linear way of producing. Conventional business models have relative short term horizons as they merely provide solutions for today's

problems. Circular business models are more future oriented as they provide solutions for the world's problems of tomorrow. In order to be successful major innovations in the business model of the enterprise are likely to be required. The next table shows main elements and differences between conventional business models in the linear economy and new business models that emerge in the circular economy.

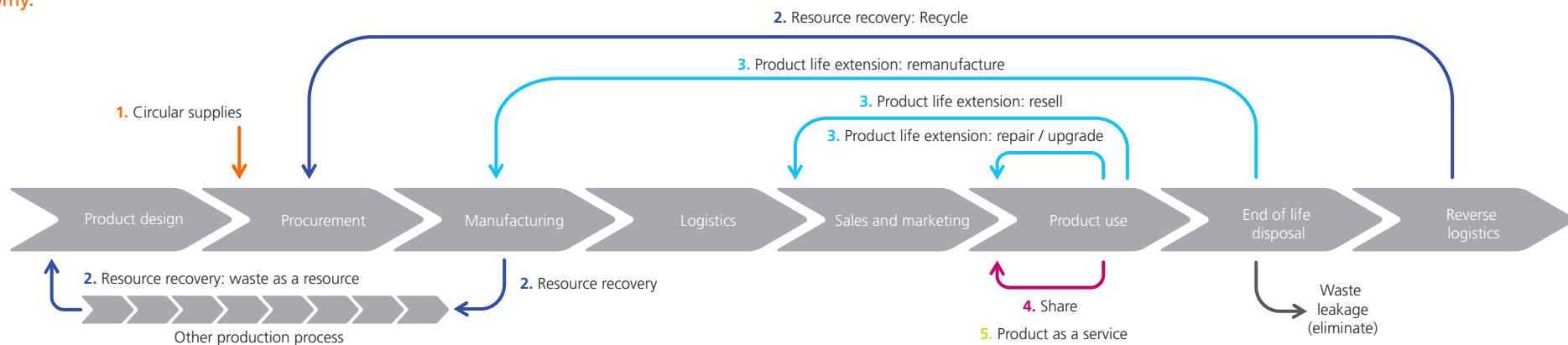
	Conventional business models	New business models
Principles for value creation	Business continuity and profit optimisation are the overriding principles	Circular business models open the way to incorporate multiple principles for value creation. Beyond financial values, environmental and social business values are also taken into account. Creating impact is a central theme in these models.
Co-operation	Traditional buyer supplier relationships in linear supply chains. The benefits of the product or service are limited to the buyer and seller (exclusive business models).	Companies in circular supply chains often co-operate beyond traditional buyer supplier relationships that characterize linear supply chains. Instead they operate in a network of companies and institutions that often involve a strong element of collaboration and co-creation.
Transaction	Transactions emerge in B2B or B2C markets with money as medium of exchange.	New market segments arise in which consumers interact with other consumers (C2C) and in which economic agents act both as manufacturer as well as consumer (C2B). Money is the main, but not necessarily the sole, medium of exchange as goods or services are for example exchanged against energy, time or waste.
Ownership	Ownership is central for the consumption of products and services.	Access to a service is more important than ownership of a product that delivers the service.
Success measurement	Success is measured in a financial cost benefit analyses for the parties involved in the transaction (seller and buyer).	Success is measured in a cost benefit analyses that incorporated financial and non-financial values for all the stakeholders involved as well as society at large.

Source: ING Economics Department based on ideas from Jonker (2014) and Accenture (2014)

Five business models driving the circular economy

HOW

There are five underlying business models in the circular economy.



1 Circular supplies

This business model is based on supplying fully renewable, recyclable or biodegradable resource inputs that underpin circular production and consumption systems. Through it companies replace linear resource approaches and phase out the use of scarce resources while cutting waste and removing inefficiencies.

2 Resource recovery

This business model recovers embedded value at the end of a product life cycle to feed into another one. This business model promotes return flows and transforms waste into value through innovative recycling and upcycling services.

3 Product life extension

This business model allows companies to extend the lifecycle of products and assets. Values that would normally be lost at the end of the life cycle are maintained or improved by repairing, upgrading, remanufacturing or the remarketing of products. And additional revenue is generated thanks to extended usage.

4 Sharing platforms

This business model promotes a platform for collaboration among product users, either individuals or organisations. These facilitate the sharing of overcapacity or underutilisation, increasing productivity and user value creation.

5 Product as a service

This business model provides an alternative to the traditional model of “buy and own”. Products are used by one or many customers through a lease or pay-for-use arrangement. With a ‘product as a service’ business model product longevity, reusability and sharing are no longer seen as cannibalisation risks, but instead drivers of revenues and costs reduction.

Note: product as a service can be applied at any level in the supply chain and therefore is indicated in the graph.

Source: Accenture (2014, page 12-14)

Examples of new business models: Interface

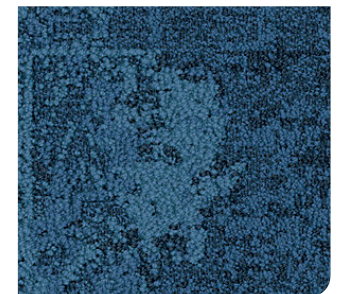
Strong focus on resource recovery

HOW

Interface is the world market leader in carpet tiles and listed on the Nasdaq stock exchange. For years it leads the Dow Jones Sustainability Index. It applies many of the circular principles in its business such as design for reassembly, product life extension and recycling of materials. Interface, together with the Zoological Society of London, has been dedicated to designing and proving an inclusive business model called Net-Works.

Net-Works provides a source of income for small fishing villages in the Philippines while cleaning up their beaches and waters of discarded fishing nets that threaten their livelihood and the very precious double barrier reef off their shore. Discarded fishing nets are collected and sold to Interface's trusted yarn supplier and partner, Aquafil. Since 2011 they've been re-purposing waste nylon from discarded fishing nets and other sources, including yarn reclaimed through Interface take back program of used carpet tiles, to provide recycled content nylon for the production of new tiles.

Net Works	
Business models	Resource Recovery and Product as a Service.
Value creation	Financial values (stable inflow of raw materials that produce a sustainable carpet tile that people highly value) alongside environmental and social values.
Co-operation	Through close cooperation with local partners and fishermen communities in the Philippines are strengthened.
Transaction	Fishermen get a fair price for the nets they collect. Users that return old carpet tiles can get a voucher for new ones.
Ownership	Not applicable in this particular case.
Inclusiveness of success	Success is not limited to sourcing benefits (constant stream raw materials at stable prices). The social and ecological benefits are obvious and highly valued.



Examples of new business models: Mud Jeans

HOW

Strong focus on product as a service

Mud Jeans is a Dutch Fashion House that produces jeans based on circular principles. It uses biological materials that are produced without the use of pesticides and fertilizer. It makes use of ecological friendly and recycled materials and its production is climate neutral. It is the earnings model, however, that is most revolutionary in fashion and most supportive to a circular economy. Mud Jeans offers its jeans

through a lease arrangement to its clients. Clients can lease a jeans for a year by paying an initial fee of € 20 and a monthly fee of € 5.95. After a year the client has the option to own the product by extending the monthly fee for another 4 months, switch to a new model by paying € 10 or return the jeans to Mud Jeans where its life is extended in a second hand market or recycled depending on the quality of the jeans.



Mud Jeans	
Business models	Product as a Service, Resource Recovery and Product Life Extension.
Value creation	Financial values alongside environmental and social values. Mud Jeans for example applies the Fairtrade principle in which suppliers earn a fair price on their product and no child labour is used during production. Mud Jeans banned health damaging production techniques such as sand blasting which has a negative health impact.
Transaction	Cooperation throughout the whole value chain from producers to retailers and clients to financial institutions.
Co-operation	Suppliers get a fair price for their products and are offered safe and healthy working conditions and clients have access to the latest style of jeans fashion.
Ownership	Mud Jeans provide users access to the 'service jeans' while it remains the owner.
Inclusiveness of success	Improved working conditions for employees in the value chain and the building of long term relationships with clients and suppliers.

Examples of new business models: Van Scherpenzeel

Strong focus on circular supplies

HOW

Van Scherpenzeel is a Dutch company that is engaged in the recycling and destroying of diverse types of waste (paper, plastics, textile, glass) and converting them into (recycled) raw materials. The principles of a circular economy are central in its business model. For Van Scherpenzeel waste does not exist, but is a source of new raw materials and an alternative for virgin materials. The company uses its specialised knowledge and network to advise businesses and municipalities about how

they could manage their waste effectively. Reducing, recycling and sustainable processing of waste are key themes. Van Scherpenzeel has a fully closed loop destruction facility, where it can destroy business waste confidentially. Van Scherpenzeel helps companies in achieving the targets that are set by the Dutch Ministry of Infrastructure and Environment for increasing the reuse and recycling of packaging materials.

Van Scherpenzeel	
Business models	Circular Supplies and Resource Recovery.
Value creation	Creating value from waste. Financial values (cost savings in waste treatment) alongside environmental and social values (recycled materials have lower impact on environment compared to virgin materials).
Co-operation	Co-operation with municipalities, producers and retailers in collecting, separating and recycling waste.
Transaction	Clients can dispose their waste at the lowest cost after which it is confidentially destroyed and recycled by Van Scherpenzeel in the most efficient and sustainable manner.
Ownership	Throughout the whole supply chain, i.e. from the collection of waste until the granulates are re-used in a new production process, Van Scherpenzeel owns the materials.
Inclusiveness of success	Success is measured by the amount of recycled materials extracted from waste.



Examples of new business models: Prorail

HOW

Assessing the circular potential of a business case

The significance of large numbers

In the Netherlands Prorail is responsible for the railroad system. Recently it has developed a circular strategy as the vast amounts of copper, steel, aluminium and concrete in the railroad system provide huge potential for reuse and recycling. Through its circular strategy Prorail expects to save 15 to 35 million euro every year, reduce its use of virgin materials by 20% and to reduce life cycle costs by 10%. But before it could even think about quantifying these circular benefits it had to make an inventory of all the materials that make up the current system. While this was easier said than done, it is the necessary first step for a lot of companies that want to assess the circular

potential of their business. For Prorail the analyses provided an impressive enumeration of vast amounts of materials on which a circular strategy was developed:

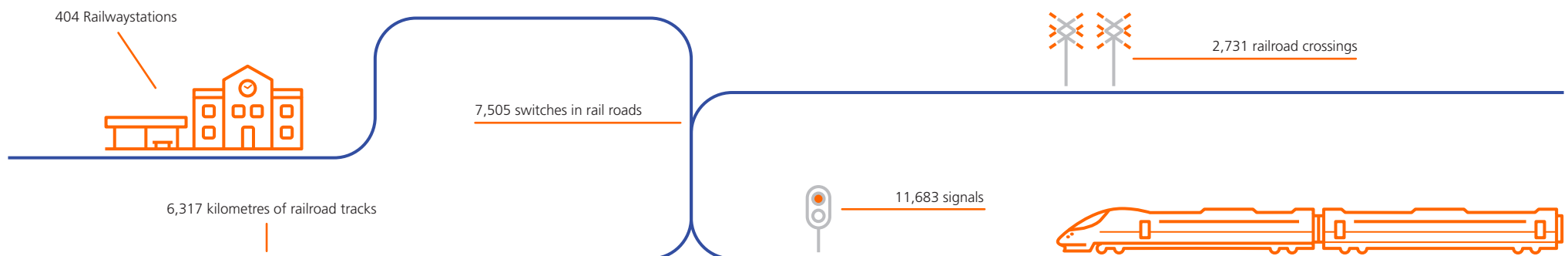
- Every kilometre of railway track is held in place by 8.850 tons of ballast, mostly gravel. The total railway system contains 37 million tons of gravel. Currently only a small portion is reused. Prorail is developing strategies to increase the amount of reuse.
- With 6,317 kilometres of railroads the system contains 12,634 kilometres of rail. Every kilometre contains 54 tons of iron so in total 682,236 tons of iron is used on the tracks.
- The railroad system contains 7,505 switches. Every switch

is made out of 27 metres of rail. With a weight of 54 kilogrammes per meter this equals 10,942 tons of iron.

- The vast majority of the railway system is electrified (96%). In total 6,069 kilometres of high voltage cables hang above the tracks. Every kilometre contains 1,79 tons of copper which results in a total of 10,864 tons.
- Cycling is a popular form of transport in the Netherlands. As a result, 400,000 bicycles can be stalled at railway stations. These facilities contain 6,112 tons of iron, 451 tons of zinc, 266 tons of stainless steel, 25 tons of plastics, 22 tons of rubber, 1,755 tons of glass, 823 tons of aluminium and 7,843 tons of concrete.

The first step: analysing the current stock of materials

The Dutch railway system consists of:



Source: Prorail and TNO (2014).

HOW

Financing the circular economy

4

Implications for banking:

- circular business models often require multiple forms of capital
- cash flow optimisation and value creation in second hand markets can increase financeability
- legal contracts become pivotal in financing circular business cases
- creditworthiness deserves more attention
- design for disassembly can increase the residual value of products
- supply chain finance unlocks untapped financial resources in the supply chain



Financing the circular economy: its implications for financial institutions

HOW

The circular economy provides opportunities for financial institutions...

- First, it is a growing market which is estimated to generate 1% to 4% economic growth over a ten year period. This is net growth and accounts for the disruptive aspects which forces some (linear) business to reduce or stop production. In today's low growth environment this is quite an achievement.
- Secondly, it is a market that fits into the sustainability targets of many banks as these companies make the transition happen. The sustainability approach in the financial sector has evolved over time. Starting from mitigating environmental and social risks (do no harm policies) to supporting sustainable business and integrating it into the core business and strategy (doing good policies). Banks are recognising the opportunities of sustainability more and more. There is now evidence which shows that clients who are leading in sustainability are more innovative, show better financial performance and have better credit ratings. Directing more assets and capital to sustainable businesses therefore creates a healthy portfolio for the banks and helps them to facilitate the transformation to a low carbon economy. As a result, sustainability now is a business opportunity for the financial industry.

...but is the current business environment conducive to the specifics of the circular economy?

The previous chapter showed that business models in the circular economy can be quite different from traditional business models. As a result it could well be that the legal and financial systems that support the current business environment may not be very conducive to the new setting that the circular economy requires. For example, the circular economy is based on the principle that waste does not exist and is a valuable resource in (perhaps another company's) production. But the circular economy faces a lot of legal barriers that limit the use of waste as an input. For example waste from food production cannot always be transported and used in other processes due to hygiene issues. These laws clearly limit the development of the circular economy.

Implications for banking

In this chapter we will explore the implications of circular business models for finance and look for ways to increase financeability. It is concluded that:

1. Circular business models require multiple forms of capital
2. Cash flow optimisation increases the financeability of circular business models
3. The underlying legal contract becomes pivotal in financing circular business cases

4. Creditworthiness deserves more attention as pay per use models run the risk of attracting less creditworthy users
5. Value creation in second hand markets can increase financeability
6. Design for disassembly can increase the residual value of products
7. Supply chain finance unlocks untapped financial resources in the supply chain
8. Financial implications can be manifold ranging from increased working capital demand to balance sheet extension. There is no one size fits all solution and circular business models require an integral financial approach as a result.

Back to the basics of bank finance

HOW

In order to explain the implications of circular business models on financial institutions in general and banks in particular, we first go back to the basics.



Banks transfer money from savers to borrowers...

Households and businesses differ quite a lot in their financial situation. Some businesses or households spend less than their income and are able to save, while others are in need of cash. The prevailing business model of the financial system is to transfer money from savers to borrowers. Banks for example collect money from savers and issue credit to borrowers. In this process banks not only create money they also adjust and match:

- Size of money flows. For example, a one million loan could be funded by the deposits of multiple savers.
- Duration of money flows. For example, the duration of loans is often longer than the duration of savings as loans are repaid over several years but savings can be withdrawn anytime.
- Risk. The risk profile of collected savings is different than the risk profile of the loans disbursed.
- Location: money from Dutch clients might be used to provide a loan to a Dutch company in order to finance international activities.

...which requires prudence on:

Banks must be prudent in their lending since in many cases it is the savers money that is being lent out. That's why the following aspects are so important in banking:

- Cash flow. The cash flow of a recipient of financial services determines the ability to pay back a loan. As a

result bankers put a lot of effort in analysing a company's expected cash flow scheme.

- The amount of capital and reserves of a borrower. Capital and reserves reserves act as a cushion before a borrower is unable to repay its loan. It also determines the capacity of the borrower to attract additional loans.
- Credit history or track record of the borrower in the past. If a borrower has proven to repay its loans in the past it is more likely that he will do so in the future.
- Collateral. Collateral forms a security in case a borrower is not able to repay its loan. As a result, the value of an asset that serves as collateral is very important in banking.

The financial sector has to mobilise different forms of capital

In this chapter we explore the financial implications for entrepreneurs and financial institutions that transform their linear business case into a circular one. It is important to realise that a wide range of circular business models exist. They all involve different levels of risk and require different forms of capital as a result. Equity finance by shareholders is for example more appropriate than a traditional bank loan if a circular business model involves unproven – and therefore risky – technology. And crowd funding might be a suitable source of finance if the business model has a strong community aspect. The financial system has to mobilise different forms of capital to finance the transition to a circular economy.

Conclusion 1

Multiple forms of capital are needed to finance circular business models

HOW

Need to finance circular business models

Bank finance	Corporate debt	Traditional corporate lending to finance circular businesses with guarantees at corporate level.
	Lease	Can fit pay per use earning models. Applicable to clients that are creditworthy and products with predictable residual values in second hand markets.
	Factoring & supply chain Finance	Can solve the prefinancing issue of pay per use earning models by selling uncertain future cash flows to a financial institution.
	Structured finance	Can be a financing option for large stand alone circular projects
	Balance sheet reduction through off balance finance	Can solve the issue of balance sheet extension.
Capital Markets	Equity finance: Initial Public Offering	Valuable sources of finance for mostly larger and mature circular businesses that meet the scale and requirements of the capital markets.
	Debt finance: Green Bonds	
Foundations and Impact investors		Most circular businesses are still at their pilot stage, are not profitable yet or are lacking a track record. Non-commercial finance can bridge the gap from pilot stage to growth stage as they are less concerned with being fully compensated for the financial risk.
Venture Capital, Private equity, Family Offices		Finance source for the many startup businesses in the circular economy. However, their requirement for high growth and relatively fast payback horizons might limit suitability for circular businesses.
Near banks like Google, Apple, Amazon, etc		Offer new payment facilities and possibly working capital solutions.
Crowd funding	Peer2Peer lending	Finance source for circular businesses that involve the (local) community or those based upon ideas that appeal to the crowd.
	Equity investment	

Conclusion 2

HOW

Pay per use earnings models require more emphasis on the timing of cash flows

Pay per use models create a longer lasting financial relation

As described in previous chapters circular business models more often make use of pay per use earnings models. The whole nature of the cash flow changes from the handing over a sum of money at the time of the sales moment into a series of frequent payments during the lifespan of the product. In doing so, pay per use business models create a longer lasting financial relationship between the organisation and the customer.

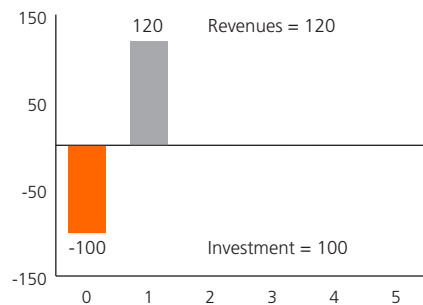
The contract and its underlying cash flows become the principle value driver

With pay per use models value is first and of all created in the continuation of the contract instead of a one time sales value in the linear business model. The cash flows from the contract become more important than the underlying asset value. Good circular business model contracts incorporate incentives for all parties involved to continue doing business instead of terminating the contract.

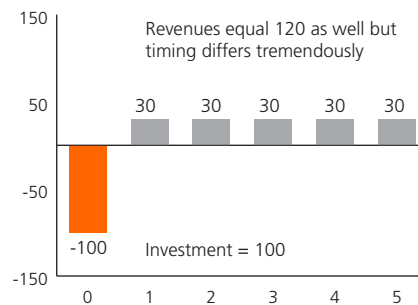
Shortening the pay back period increases financeability

Since cash flows are spread out over time, the pay back period of an investment becomes very relevant in terms of riskiness for the bank. A contract with a pay back period of three years is of less risk to the client and the bank in comparison to a longer pay back period. In this way cash flow optimisation becomes an integral part of financing circular business models. As a result the earnings model becomes an important tool for entrepreneurs to assess the riskiness and bankability of their business models. Entrepreneurs might charge higher fees in the first year(s) of the service to shorten the pay back period.

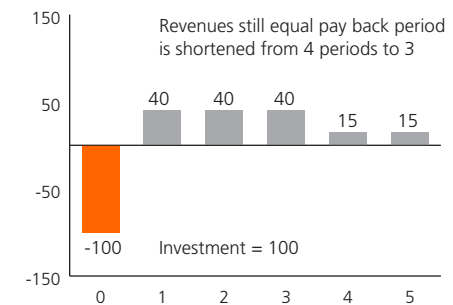
1. Direct sales model



2. Pay per use



3. Shortening the pay back period



Conclusion 3

Contracts are pivotal in financing circular business models

HOW

Asset security requires more attention in circular business models

There are legal issues that might restrict the financeability of circular business models. Accession is a point in case and implies that parts of a larger good could automatically belong to the owner of the larger good. Although this applies to all types of goods we'll explain it in terms of real estate. In legal terms products are movable or non movable. Typical 'movables' within buildings are desks, office chairs, plants, paintings and the like. They can simply be moved out of the building without changing or damaging it as they are not part of the building structure. So called 'inmovables' are part of the superstructure of the building and cannot be removed easily without damaging the structure and value of the building. Think of items like heating or air conditioning.

Ownership might be lost through legal accession...

Legal accession (in Dutch: natrekking) means that the owner of property becomes entitled to all the components of the building. When lighting for example is integrated in the ceiling of an office it becomes part of the superstructure of the building and therefore by law is owned by the landlord. A building without lighting facilities is after all commonly viewed as incomplete. Lighting is therefore part of the superstructure of the building.

So although Philips wants to keep ownership over the lamps in a Pay per Lux model and take responsibility for end of life disposal of the armatures and lamps, ownership is automatically transferred to the real estate owner.

...which limits the value of asset security

At first hand this raises barriers for entrepreneurs to develop circular business models, especially in real estate. It is a perceived barrier for financiers as well since the client no longer owns assets that can serve as collateral. A discrepancy arises between the security of the asset and the fact that the asset no longer belongs to the borrower. As a result the financier can no longer claim ownership in case things go wrong. Traditionally the option to claim assets is valued highly by financiers.

Contracts, however, can serve as alternative...

There are practical workarounds available. Although legal ownership could be lost through accession parties can remain the economic owner of the goods through binding agreements. Parties can sign a contract that not only specifies the payment structure to use the service, but they can also agree upon what should be done in case things go wrong. And legally agreements must always be kept! In legal terminology: pacta sunt servanda. This might give both the supplier and financier enough comfort to close a deal.

...and become pivotal in financing circular business models

So although legal ownership can be lost, supplier and consumer can sign an agreement that specifies the terms of a circular business model. This works as long as the parties involved stay in business. So as long as the consumer of the service does not go bankrupt the barrier of accession is merely a perceived barrier.

But contracts don't bring security in case of bankruptcy of the client

Contracts can work well as long as all parties stick to it. This does not hold up in case of bankruptcy of a client. Since ownership is lost there is no security and the provider of the service is left empty handed. In essence the provider of the service issues an unsecured loan to the client. As such the circular business must yield a high enough return to compensate for the additional risk.

Source: Allen & Overy (2014) and Circle Economy (2015).

Conclusion 4

Creditworthiness becomes even more important as pay per use models might attract less creditworthy clients

HOW

Bankruptcy and credit risk in circular business models

With pay per use models the cash flow to the supplier is spread out over several periods. Over this period suppliers and financiers using circular business models run the risk of bankruptcy of the consumer of the service. As durable products often have a lifespan of several years, this risk should not be neglected.

Adverse selection requires special attention

The risk of non payment is reflected in the creditworthiness of the consumer. Ideally suppliers and financiers want the circular business models to be used by creditworthy consumers in order to minimise the risk of bankruptcy. But suppliers run the risk of attracting less creditworthy consumers as these might not be able to afford the purchase of the product in the first place. They lack the financial means for the initial purchase and can only make use of it in a pay per use model that require 'small' amount of cash periodically in relation to the purchase value. It is therefore highly recommended that suppliers screen their new customer base thoroughly to address the problem what economists call adverse selection.

Even if suppliers manage to attract creditworthy customers for their circular business model, things can always go wrong

for a customer. In a pay per use circular business model the supplier takes on a credit risk towards its customers. Therefore it is recommended that suppliers and their financiers perform a bankruptcy test on the circular business model.

Supplier and liquidator might have different incentives...

In case of bankruptcy a liquidator takes over. The liquidator makes an overview of the company's possessions and judges if the claim of the supplier – among others – can be met with the remaining value of the company and its assets. In case of bankruptcy the value could be less than all the claims on the company and the supplier makes a loss.

The liquidator also has the freedom to decide which contracts he will terminate and which he will continue. For example, in case of real estate, he might decide to terminate the contract with the window cleaner but to continue to pay the energy bill since an office without electricity has a lower value. If for example Philips provides lighting on a pay per use base to the building, the liquidator might decide to terminate the lighting contract because as long as there is electricity in the building the lights can be switched on. Especially since it is not certain if Philips will be able to make a legal claim on its lighting assets (see accession on the previous page).

...that can be aligned through a bankruptcy test

Through a bankruptcy test the circular business case can be modelled in such a way that the interests of the liquidator and supplier are aligned, so the risk that the liquidator will terminate the pay per use contract is limited. For example Philips can build in a technical feature that allows them to turn off the service (lighting) remotely. With such a 'red button option' the liquidator has a strong incentive to continue the contract because otherwise the suppliers turns off the service and the property is less worth. However, such technical solutions are not always available or could raise legal issues. The possibility to cut off lighting in public places such as hospitals or airports is highly undesirable. Nevertheless, a bankruptcy test can help to design risk mitigating strategies such as:

- Differentiation of risk premium in the pay per use contract for highly and less creditworthy consumers of the service.
- A deposit might give sufficient comfort against the possibility of bankruptcy.
- "Don't put all your eggs into one basket" strategies. By building a portfolio of pay per use contracts the risk of bankruptcy on portfolio level is minimised and it becomes less likely that all contracts loose value at the same time.

Source: Allen & Overy (2014) as well as Circle Economy (2015).

Conclusion 5

HOW

Value creation in second hand markets can increase financeability of circular business models

Second hand markets objectify value...

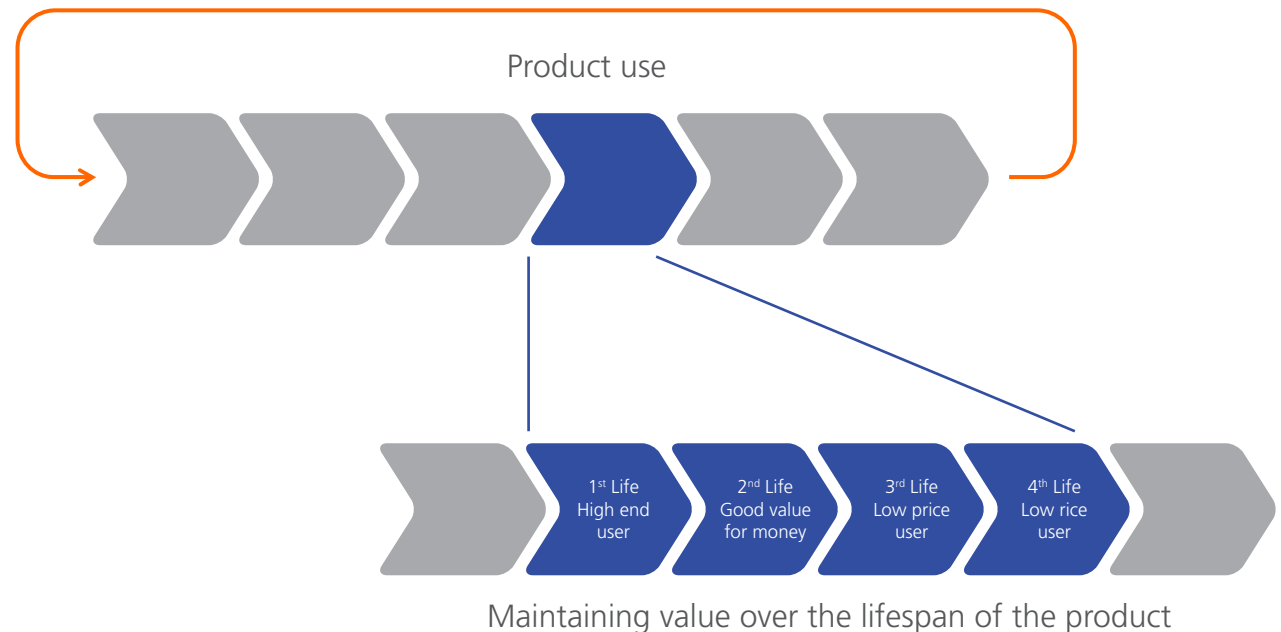
Increasing the lifespan of a product through a second hand market is an important principle of the circular economy (see slide 25). Second hand markets can also increase the solidity and bankability of the circular business case. In a second hand market the value of a good is objectified and determines the residual value of a product. When products have a positive residual value they don't have to be written off to zero in accounting terms which improves the financials of the circular business case and its bankability.

...but need to fulfil requirements to increase financeability

In terms of bankability it is important that second hand markets:

- are large enough and liquid / made up of several sellers and buyers
- find transparent ways to match supply and demand, for example through online platforms, auctions or intermediaries
- gave relative stable prices
- determine effective and efficient ways to handle take back flows, for example on corporate or industry level.

Scrap value for another product life cycle



Source: C2CBizz and De Lage Landen (2013).

Examples of value creation in second hand markets

HOW

Interface®

- Interface is worldwide market leader in the market for carpet tiles and offers its clients a buy back scheme for used tiles.
- Interface cleans the tiles in their factory and sorts the tiles according to quality. Used tiles are sold in second hand markets for 6 to 8 times their recycling value. As such much value is retained from the used tiles and the moment of recycling is postponed.
- In the Netherlands Interface explores the possibilities to set up a warehouse for used carpet tiles through which supply and demand can be matched, either on company or industry level.

PHILIPS

sense and simplicity

Philips Medical Systems makes appliances such as MRI-scans. Philips has an active policy to retain used products and sell them in the second hand market after remanufacturing and refurbishment. This allows them to not only earn from products in the second hand market but also to guarantee product quality and therefore manage its corporate brand and reputation. If second hand products are lost out of sight and not maintained properly, Philips cannot guarantee it's quality. And if something goes wrong with a medical device it impacts Philips reputation negatively, even if Philips is formally not responsible because the client did not maintain the device properly.

Conclusion 6

Increasing financeability by taking into account the end of life value

HOW

Design for disassembly can increase residual value

At a certain point in time, products reach the end of their life span. In an economy based on linear production the value of waste is not factored into business models. Financial models often write off assets completely although many products still represent a 'scrap value'. Manufacturers can increase the residual value in their circular business case by designing their products for easy disassembly so that disassembly costs are low and most of the valuable resources can be retrieved.

Financers can develop forecasting models and hedging tools

Financers can improve the financeability of circular business cases by taking into account the 'end of life value' in the financial business case. This is problematic for products with negative 'end of life value' for example because collection and dismantling costs are higher than the value of recycled materials. But for many products the business case of recycling yields a positive return. Especially if one considers that prices

of many raw materials are likely to increase over the years. Financers can further aid in developing more accurate models that forecast price developments for recycled materials, especially the ones that have proven to be very volatile in the past years such as price developments of Rare Earth Metals. Hedging products can also reduce the risk profile of a circular business case.



Conclusion 7

Supply chain finance can facilitate the circularity of supply chains...



Improving the logistics, quality, innovation or environmental footprint have all been major arguments for companies to take the lead in transforming the supply chain. Despite these developments they have not yet determined what role they can or should play in financing the supply chain. But as the physical supply chain grows in sophistication and circularity, there are emerging demands on the financial supply chain. As parties in the supply chain cooperate to close loops financiers have to take a supply chain approach as well. Since the outbreak of the financial crisis in 2008 this topic is more relevant than

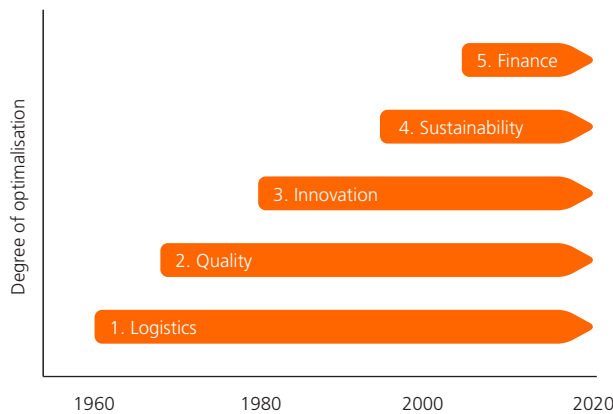
ever. Pressures on working capital, long term finance and the need to reduce risk all let to a take-up of Supply Chain Finance initiatives.

Currently these initiatives often focus on working capital solutions such as:

- Factoring: the seller of a product or service sells its accounts receivables to a financial institution to mitigate the risk of non payment by shortening the DSO (Days Sales Outstanding).

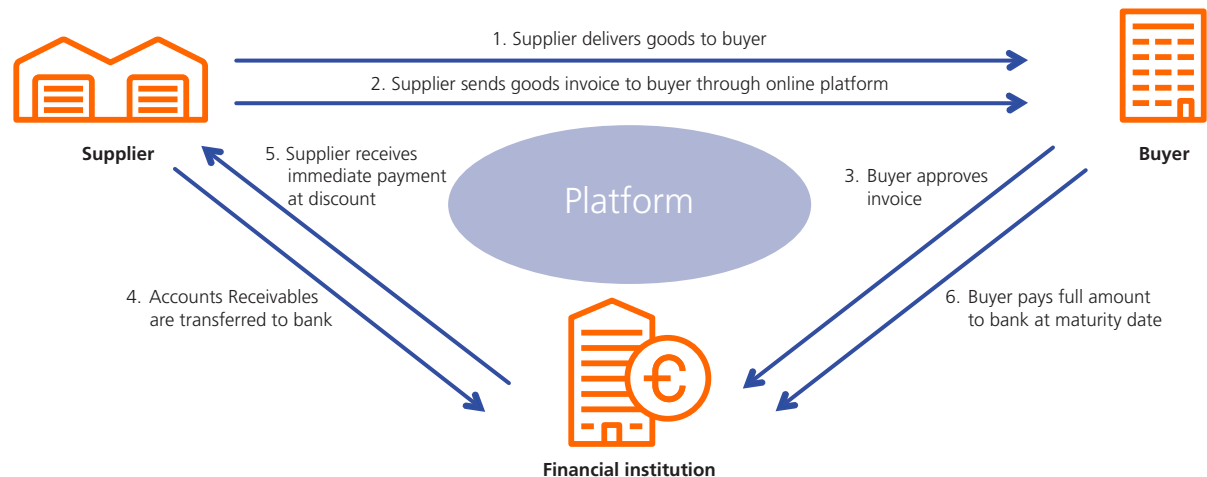
- Supply chain finance or Reversed Factoring takes care of outgoing payments from a large and creditworthy buyer to its suppliers with the possibility to advance those payments based on the buyer's credit rating which is usually better than the suppliers rating. The supplier gains from lower financing costs based on the creditworthiness of the buyer. The buyer gains from an extension in his Days Payable Outstanding (DPO). As a result reversed factoring frees up trapped liquidity for both buyers and suppliers.

Finance starts a new wave of supply chain optimisation



Source: ING, several supply chain finance publications

Buyer led supply chain finance for working capital



Conclusion 7 (continued)

HOW

... and is expected to evolve towards earlier stages of the supply chain

Supply chain finance has multiple benefits...

Supply chain finance is another means to ease the financing conditions in the supply chain, especially for SMEs. That's why the UK and Dutch government push buyers to use supply chain finance as a means to ease the financial strain for the supplier. Supply chain finance however improves not only the financing conditions in the supply chain. It also helps to increase transparency and address inefficiencies in the supply chain. It could also lead to stronger relationships between buyers and suppliers which might reduce the vulnerability of resource scarcity.

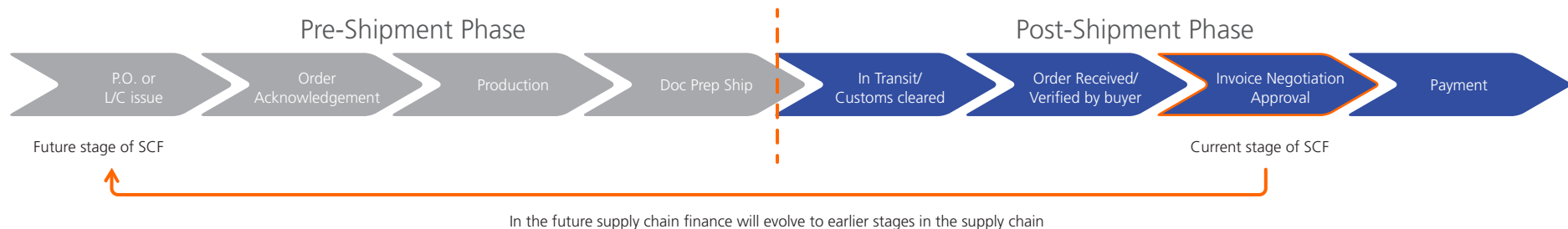
...but in its current form is limited to invoice finance

Supply chain finance currently takes place in the post shipment phase of goods manufacturing in the supply chain. It is invoice based finance: as soon as the buyer approves an invoice, the supplier can choose for direct payment by the financial service provider at a discount or to receive full payment from the buyer at the end of the payment term. While this form of finance can be useful it covers only a very small part of the financial supply chain.

In the future it might involve purchase order finance as well

In the future supply chain finance is expected to evolve towards the earlier stages of the supply chain. For example a purchase order (P.O.) might act as a legal commitment for finance. In that case the financing of the supplier by the buyer is extended and could include financing inventory, production, shipping and billing costs.

This will strengthen the ties between buyer and supplier further at their mutual benefit. From thereon it is likely that buyers and suppliers will increase corporation further, for example in designing circular production chains.



Conclusion 8

The transition to a circular business model has different financial implications

Finding solutions to the financial challenges...

The overall financial outcome of a circular business model is not easy to predict as there are many levers that entrepreneurs can pull. The main financial challenges of circular business models are balance sheet extension, increased working capital needs and possibly increased credit risk on the users of pay per use services.

...requires an Integrated Financial Approach

Offering financial solutions for circular business models is certainly not a one size fits all solution. It requires an Integrated Client Approach. Such an approach identifies the clients' business and needs, analyses the clients' financial supply chain and balance sheet and creates solutions that add value.

Circular aspect	Conventional business models	New business models
Value added	Circular business models could produce products or services that customers value higher.	Increased pricing power, revenues or competitive advantage.
Pay per use	Implementing a pay per use scheme increases the demand for working capital in comparison to a 'sell after production' business model.	Increased working capital demand, spreading of cash flows over time, increased costs for receivables management and possibly increased credit risk on clients.
Cost of materials / production	Increased return flows of used products or materials can lower production costs and the need for working capital if virgin materials are more expensive to source.	Possible lower working capital demand and lower production costs can boost profit margins.
Ownership	If producers remain ownership of products during their life cycle it provides them with strong incentives to look after these products, maintain them well and make them valuable at the end of life. From a circular point of view this has strong advantages but it comes with increased financial obligations.	Balance sheet extension increases capital demand. Ownership also raises the question how to value goods on the balance sheet (valuation).
Asset tracking	Tracking sold products and services in order to perform maintenance over the life span or take them back at the end of the lifecycle requires knowledge about the whereabouts and conditions of the so called 'installed base'. Innovations like the 'internet of things' make easy tracking possible but require investments.	Increased R&D costs or investments in tracking and tracing devices.
Return flow	The return flow of products might be costly to handle.	Increased transportation and handling costs.
Supply Chain Finance	Supply chain finance lowers working capital costs in the supply chain.	Lower working capital costs and better cash flow management

Case study

BMA Ergonomics (1/3)

HOW



Company profile

BMA Ergonomics (“BMA”), for more than 25 years, is making chairs, using ergonomic principles. The company has grown into a major specialist market player in the Netherlands, Belgium and Germany, with nearly 1 million people using their (office) chairs. BMA’s head office is based in the Netherlands.

Sustainability, both social and environmental

BMA has a strong commitment to sustainability which has both a social and environmental purpose. Social means that BMA wants its chairs to improve the productivity of people by reducing fatigue and discomfort. Environmental focus translates into the company being strongly committed to reducing its environmental footprint. From the start of the company chairs have been designed for easy disassembly. Initially as a means to facilitate cleaning and maintenance, nowadays also as a means to improve the efficient use of resources and the circularity of the business model.

Characteristics of the new circular business model

With the increasing focus of clients on sustainability and circular products, BMA is further developing its circular business model. BMA is incorporating the following aspects in a circular product offering:

- 1) Pay per use. The service ‘sitting’ or the use of the chairs.
- 2) Circle the chair. Chairs have to return to BMA after the client’s use of them to enable re-using them.
- 3) Value for all. Customers should benefit in flexibility, high

ergonomics and high quality chairs, BMA makes a good business while the impact on the environment is reduced.

BMA has translated this into a model offering chairs for use (rental) for a 10 year period. Customers pay a fixed fee for the first five years and a fee of nearly 50% lower for years 6 tot 10. In year 5, BMA will visit the client for maintenance and basic repairs to the chairs at no costs, ensuring high quality. To close the loops on chairs and its parts, at the start of the contract the customer pays a deposit per chair, which is refunded when the chairs are returned, whether this is during or at the end of the contract. In addition, if the customer wants to decrease (or increase) the amount of chairs rented, up to 10% decrease is done at no extra costs , giving flexibility and value to the customer.

Benefits for clients

Customers get flexibility in their working places as chairs are not owned but effectively rented. The quality of the chairs and the ergonomic performance remains high, as it comes with maintenance and service. Furthermore, after usage, the customer is not left with a bunch of unused chairs, as they are returned to BMA. And ultimately, the customer knows that the products will be reused, refurbished or disposed of responsibly.

Benefits to the environment

The main environmental impact is created during the extraction of raw materials and production of components (figure ?).

Case study

BMA Ergonomics (2/3)

HOW

To reduce the footprint in these lifecycle phases BMA aims to use as much recycled materials as possible. Its main brand chair (Axia) for example, contains 65% of recycled materials (figure ?).

Benefits for BMA

To BMA, the circular model offers several opportunities. There is near certainty that chairs will be returned, which can be made ready for reuse in new contracts at relatively little additional costs. This will lower the cost of goods sold. Also, the relationship with the client is ongoing and long term, which strengthens customer intimacy and creates the opportunity for recurring income. Some of the major financial consequences are described below.

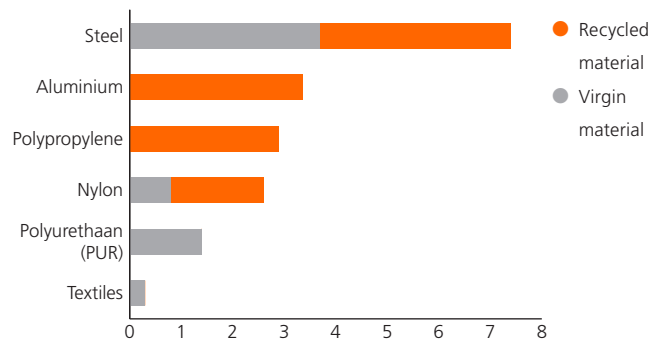
Financial consequences of the circular business model

ING has developed a model to see what would happen to the financials of BMA when the company starts to implement the circular model. The model compares a situation in which 100% of the sales is realised by selling the chairs (linear business model) with a situation in which 50% or 100% of sales come from the circular model. There are two major financial implications to be highlighted.

1. Gross margin. The shift from selling to renting has a big impact on the gross margin (defined as revenues minus the direct costs per chair). In the linear model the margin is steady, while in the circular model the gross margin starts low and recuperates as time goes by. At first,

Recycled and virgin materials in AXIA chair

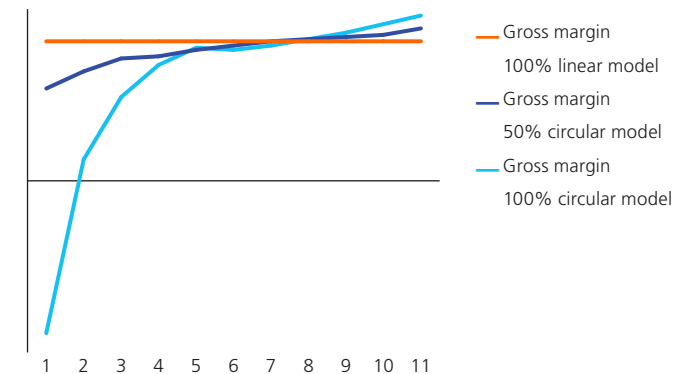
Amount of material in kilogrammes



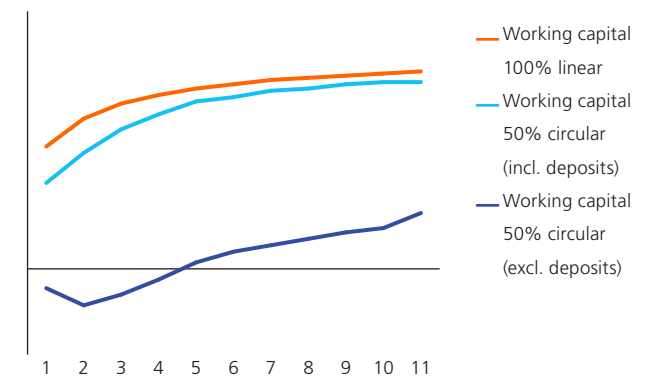
CO₂ footprint BMA in value chain

Raw materials	55,6%
Manufacturing of components	38,1%
Chair assembly	2,6%
Use of chair	1,0%
Collection of used chairs & transport	2,7%

Gross margin (%)



Working capital (% of total assets)



Case study

BMA Ergonomics (3/3)

HOW

the production costs are not covered by the first rental payment. But eventually, the gross margin of the circular business model is higher than the linear one. This is to be expected as keeping control over the chairs and having them returned, allows BMA to refurbish and sell them again, decreasing the production costs.

- Working capital.** Pre-financing the production and purchase of chairs in the circular model increases working capital demand. As we see in the gross margin figure the working capital position is negative for the first years of 50% circular sales, indicating a financing need for working capital. However, when we include the deposits that BMA receives, there are more current assets than liabilities and no need for financing occurs. As these deposits have to be paid back to customers when returning chairs, the questions arises if this money can be used by BMA to finance its working capital, or if this money is reserved for customers and therefore 'trapped' and not at BMA's disposal? This question requires an analysis of the actual return rate of chairs, to see if it is prudent for BMA to put deposits to work or not.

Financial consequence for customers

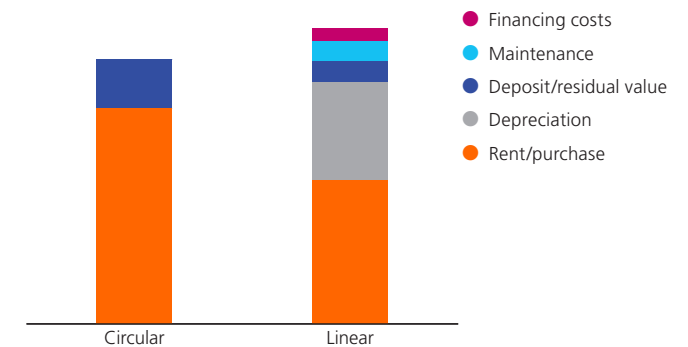
If designed well, not only BMA will benefit from this circular model, but also their customers. For this, we looked at the total cost of ownership of a chair (figure ?) during the 10 years. In the circular model, the customer pays an annual fee and the deposit, which is returned at the end of the contract. When the customer buys the chair, many more costs come into play, that may not be recognized immediately. Think of depreciation, maintenance and financing costs. Taken all costs into account, the circular chair is not only cheaper, it also decreases the amount of work and time spent by the customer to take care of high seating quality.

Financial things to consider when implementing a circular business model

In general companies have to ask themselves the following questions:

- Do I have the capital to address the balance sheet extension that pay per use models create?
- How do I bridge the period that I prefinance my clients? Do I have other cash generating activities or do I have to attract external finance?

Circular business model can reduce total cost of ownership

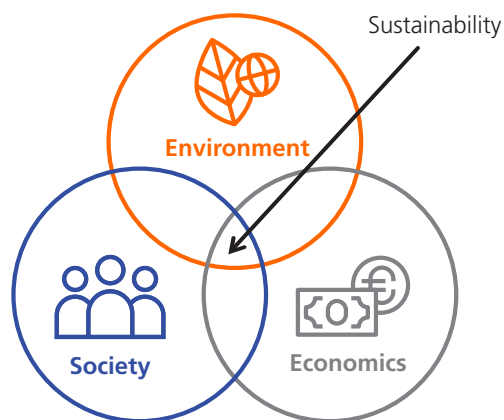


From linear to circular financial wisdom

HOW

Financiers can contribute to the circular economy in many ways

Financiers can facilitate the transition towards a circular economy in many ways.



Get familiar with circular business models and their financial implications

Experience tells us that this requires more detailed information on the client. Apart from financial data there is an increasing need for social and environmental data to assess the viability of the business case. Clients need to be willing to share this type of data and financiers need to acquire skills and experience to interpret the data.

Put the right incentives in place

By designing financial incentives into circular business models that benefit all parties involved. From a financial perspective circular business models often 'work' for the client of the bank (i.e. the manufacturer of circular products and services). However, the financial incentives for the 'client of the client' are often less sound. The circular economy won't succeed if the end-user does not benefit from it, both financially as well as in terms of customer experience or from a sustainability angle. Financiers can help clients to build business models that provide the (financial) incentives for all parties to take part.

Cash flow should be top of mind

Financiers can aid circular business models by putting greater emphasis on the cash flow of these models instead of creditworthiness of the client or collateral values that are major criteria in standard financial business cases. This is already very common in structured finance models where finance is provided to a project for which the borrower is not personally

liable. The challenge will be to apply the insights large structured finance loans in a more standardised way to much smaller loans.

Incorporate 'circular value' of resources in the financial business case

Nowadays assets are often written down to zero or a small scrap value over their economic life cycle in a financial business case. In case of second hand markets a resell values can be incorporated if the assets are liquid and can be sold easily. Capturing higher values in circular supply chains through upscaling or through second hand markets is pivotal to the circular economy, but currently this value is not fully captured in financial business cases. Financiers need to develop models and practices that capture the full circular values of resources. In practice this could also mean that financiers help to develop second hand markets by partnering with key players in the supply chain.

From linear to circular financial wisdom

HOW

Financiers can contribute to the circular economy in many ways (continued)

Develop leasing arrangements for products with circular potential

Lease provides off balance finance primarily based on the collateral value of assets. As such it can be a solution to the problem of balance sheet extension by circular business models. However, traditional leasing models are structured for manufacturers or vendors of 'hard assets' such as cars, trucks, trailers, copiers or medical equipment. These assets can be repossessed and remarketed in case of default or bankruptcy which makes it 'true asset backed finance'. The circular economy however is not limited to these 'hard assets' with well developed second hand markets. Developing leasing models for 'softer assets' first requires acceptance by financiers of contractual comfort instead of legal ownership over assets. Secondly it requires a more cash flow based approach to leasing rather than an collateral value based approach.

The end user must have an incentive to participate

Circular business models often lack proper incentives for clients to actually return products to the manufacturer if they don't use them anymore. Financiers can help entrepreneurs to put in place the right financial incentives to manage the return flow of products in a circular economy. Think of trade-in mechanisms when clients buy new items, a (guaranteed) take back price, calculation of the future scrap value, etc.

Incorporate the characteristics of circularity in risk and pricing models

Financiers can develop risk and pricing models that are tailored to the specifics of the circular economy in terms of price volatility of raw materials, credit risk, asset valuation and management of the installed asset base.

Offer services that help clients build circular business models

Pay per use earnings models might attract less credit worthy clients. Assessing the creditworthiness of companies is one of the core competences of financiers. Financiers could offer this strength as a service to entrepreneurs with pay per use earnings models. For example by as a service that analysing the creditworthiness of the entrepreneurs portfolio of clients.

Furthermore, financiers can facilitate the transition towards a circular economy in more indirect ways.

- By developing knowledge on and gaining experience with new pricing tools that incorporates environmental and social costs and benefits in the profit and loss statement of a business. In doing so the 'total cost' of the goods and services to the society become visible. This stimulates entrepreneurs and financiers to find solutions for cost reduction based on circular principles.

- By partnering with equity providers if the risk return profile of the circular business case does not match debt finance.
- By partnering with crowdfunding platforms if the circular business case involves the community.
- By acting as a launching customer with regard to circular sourcing and procurement. Financial institutions are large users of office buildings, IT hard- and software, office furniture, energy, et cetera. By adopting circular sourcing and procurement procedures financiers create demand for circular business models which is key in unlocking the potential for a circular economy.

From linear to circular financial wisdom

HOW

Ultimately financiers have to master circular principles themselves

Embody circularity in the financial industry...

Financing the circular economy ultimately requires more than simply adjusting existing financial products and risk models to the specifics of the circular economy. It also means much more than simply growing the leasing business. If financial institutions want to play a leading role in the circular economy they have to embody circularity in their own thinking and way of doing business.

...and incorporate it in the DNA of employees

Relationship managers can only be strategic partners of circular businesses if they take a longer time horizon, think in terms of product life extension, design for disassembly, end of life use of assets and performance based business models. They have to get familiar with the circular principles themselves. Circular thinking needs to be part of the DNA of employees in the financial industry. This works best if bank employees are motivated to improve and finance circular business cases. Together with clients they can look for solutions that effectively address the financial and legal challenges that the circular economy poses. Such cooperation will help to strengthen the financial business case by reducing cash flow uncertainty.

Keep a close look at the disruptive power of the circular economy as well

In practice we have experienced high enthusiasm among financiers to share their knowledge and bring the appealing concept of the circular economy to life. We see one caveat though. Ultimately the circular economy is about doing more with less. The adagio 'reduce, reuse and recycle' in the end implies that certain activities or businesses will lose from the transition to a circular economy. Financiers should not only focus on the winning side of the circular economy but also on the disruptive side of it and its impact on the existing loan or investment portfolio (the so called risk of stranded assets).

We hope that this study was useful in identifying some of the major financial challenges and that it will inspire both clients as well as the financial industry in their joint transition towards a more circular economy.



Appendix 1

List of interviewees

Freek van Eijk
Werner Runge
Frank Roerink
Jan Kempkens
Harmen Leskens
Ellen van Toledo
Guido Braam & Mark de Wit
Paul Boeding & Mattheus vd Pol
Geanne van Arkel & Mark Haverlach
Bart Goetzee
Thijs Cloosterman
Van der Heijden
Elmer Rietveld, Ton Bastein & Jacco Verstraeten-Jochemsen

Acceleratio
Allen & Overy
Avantium
BAM Utiliteitsbouw
BMA Ergonomics
BMA Ergonomics
Circle Economy
EZ
Interface
Philips
Pro Rail
Sims Recycling
TNO

Appendix 2

Colophon

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Jeroen Plag	ING Corporate Clients		
Saskia Potma	ING Marketing		
Mirande van Rossen	ING Global Marketing		
Leonie Schreve	ING Sustainable Lending		
Oscar Scheeper	ING Credit Risk Management		
Olaf Weeda	ING Marketing Domestic Bank		
Jurjen Witteveen	ING Economics Department		
Rikjan van Zalingen	ING Corporate Responsibility		

Appendix 3

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