CIRCULAR ECONOMY

DSGC companies on their journey of implementing circular business models

Foreword

‘DSGC companies on their journey of implementing circular business models’

As chairman of the program ‘Netherlands Circular Hotspot’, I realize only too well how crucial the role of leading Dutch corporations is when it comes to realizing a circular economy. They are the ‘eating’ in our ‘circular pudding’ so to speak. I was encouraged by this report, in which they take us by the hand in their ‘journey of implementing circular business models’.

The ‘storytelling’ value of this report is remarkable. Far too often, the circular economy is perceived mainly as a systemic change. This is unfortunate, because ‘the story’ has more value and meaning: it is an urgently needed new logic and attitude.

The new logic is based on the now general consensus that throwing away products, wasting natural resources and energy and wasting human capital and talents just doesn’t make sense. Not for people, not for planet, not for profits. To find the proper balance between people, planet and profit, the new, circular logic makes perfect sense.
The new attitude is based on the growing realization and conviction that this change will not happen by itself, but that we – individuals, businesses and governments – will have to take our responsibilities and actually put that new logic to good use in our short- and long-term decisions.

The various statements, stories and conclusions in this report show that the new circular logic and attitude are manifesting in the boardrooms and – perhaps even more importantly – in the business models and strategies of the Dutch companies AkzoNobel, FrieslandCampina, Heineken, KLM, Philips, DSM, Shell and Unilever.
It is also encouraging to see that they do not shy away from dialogues with governments on regulations and policies that undermine a circular economy; shifting taxes from labor to natural resource use and adjusting regulations on transport and treatment of waste are just two examples of opportunities for truly changing the rules of the game.

Reading the report, the conclusion can only be that the new logic of the circular economy is also basic common sense, which is a quality the Dutch have always been proud of.

H.R.H. Prince Carlos de Bourbon de Parme

Introduction

About this report

In our third report, 'Sustainable Innovation', the DSGC described their vision for the future: "The Netherlands as a sustainability and innovation valley, a breeding ground for science and innovation." We now add an important aspect to this vision, as we are convinced that the Netherlands have the potential of becoming the 'circular hotspot' of Europe.

Many organizations are working hard to contribute to the circular economy across various value chains. Also DSGC companies have either just started or have been working for some time on developing a more circular business model.

With this publication, DSGC aims to share practical experiences and encourage other business leaders, who might be wondering how or where to start. The report highlights benefits and challenges that you may encounter. Circular economy experts have been very open in sharing their experiences. We hope this can be helpful to others, to start or to accelerate their journey. The sooner more companies tap into the economic and ecological benefits resulting from going circular, the faster we can achieve the necessary tipping points to realize a change. This will not only enable us to sustain business but it may also secure our companies and the Dutch economy as a whole a leading international position, ahead of the curve. Let us start, co-create in partnerships and travel together, on this exciting journey towards a circular economy.

Paul Polman, CEO Unilever: *"The end of the era of abundance is a reality. We are putting enormous constraints on planetary boundaries, and are currently using materials at a rate of 1.5 times what the earth can sustain. It is, therefore, vital to look at ways to establish a circular economy."*

1 Manifesto

Vision Mission Actions

The world is facing complex challenges today in economic, social and environmental terms. These often interconnected challenges persistently require bold and innovative action from all involved: the private sector, the public sector, knowledge institutes and the general public. They call for collaboration in nonconformative multistakeholder partnerships to integrate diverse viewpoints and to create broadly adapted solutions.

According to DSGC, business is a force for good that plays a crucial role to contribute to resolving pressing issues in our global society. The DSGC strongly believes that sustainable growth business models are the business models of the future. For years they have been implementing sustainable growth business models themselves, integrating sustainability fully into their corporate mission, strategy, operations and company 'DNA'. The coalition aims to inspire the international business community to work on sustainable growth business models; linking financial and economic results with environmental and social returns.

Vision

Our future world needs to be sustainable. The world population will reach over nine billion people in 2050. Global challenges are manifold. The UN Sustainable Development Goals, addressing the most pressing human rights and sustainability issues, have been redefined and adopted in 2015. Solving these challenges will be of vital importance to safeguard the future well-being of people and planet.

The role of business in the globalized world is changing rapidly. Many companies are willing to contribute to the transformation of society in a sustainable direction. They bring forward products and services produced with respect for people, planet and profit. Also, they operate in a transparent way and in interaction with stakeholders (governmental and nongovernmental organizations and communities)to create solutions in partnerships, taking various interests into account.

Many of these companies realize that growth measured in purely financial terms has become too limited a concept. A new orientation is needed if we want to solve social and environmental issues that affect future generations. This calls for the integration of sustainable growth into the corporate strategy, operations and value chain, linking economic profitability with social and environmental progress.

Several Dutch multinational companies are already operating along these lines. They are convinced that sustainable growth business models will strengthen their competitive edge. For them, sustainability has become a driver of innovation and a stimulus for a new approach to doing business.

Eight Dutch companies have joined forces and founded the DSGC.

Founding of the DSGC

AkzoNobel, DSM, FrieslandCampina, Heineken, KLM, Philips, Shell and Unilever have joined forces in the Dutch Sustainable Growth Coalition. Its aim was to give further impetus to sustainable growth business models, linking economic results with environmental and social returns.

The coalition was officially founded at the World Economic Forum in January 2012.

1 Manifesto

Mission and actions

The DSGC has the objective to drive sustainable growth business models proactively along three lines of action: shape, share and stimulate.

Shape

DSGC member companies aim to connect economic profitability with environmental and social progress on the basis of integrated sustainable growth business models.

- DSGC members continue to optimize sustainable business strategies towards a sustainable growth business model in their own organization, meeting specific transparent and measurable targets. For this purpose, the members commit themselves to peer learning through sharing good practices.
- DSGC members will play a catalyst role in their respective sectors in order to ensure long-term integration of sustainability and to inspire the transition towards sustainable growth and creating shared value through their business model.

Share

DSGC member companies aim for joint advocacy of sustainable growth business models both internationally and nationally.

- DSGC companies share best practices on national and international platforms among businesses, government, consumers, investors and civil society organizations, including NGOs and knowledge institutes.

Stimulate

DSGC member companies aim to stimulate and influence the policy debate on enabling sustainable growth – with a view to finding solutions to the environmental and social challenges we face.

- The DSGC aspires to stimulate thought leadership. Through thematic publications, the coalition presents its views on material topics in relation to inclusive sustainable growth.
- The DSGC will develop policy recommendations to influence government and EU policies so as to create the right framework of enabling conditions for sustainable growth.

Through its publications, the DSGC wants to share its views on 'what is moving the boundaries' in relation to inclusive sustainable growth.

The publications include many examples of the different DSGC companies on how each of them is working on the various dimensions of implementing sustainable growth business models.

For more information, please visit the DSGC section on www.vno-ncw.nl/DSGC.

Towards Sustainable Growth Business Models (2012)

Leadership and Corporate Governance for Sustainable Growth Business Models (2013)

Sustainable Innovation - Game changing solutions for the world's grand challenges (2014)

2 Circular Economy & Sustainable Growth

This Chapter describes the definition and the guiding principles of the circular economy. The concept is linked to sustainable growth business models and potential benefits as calculated by various studies are indicated.

2.1 Need to change our linear System

The first DSGC publication, 'Towards Sustainable Growth Business Models', explains how the DSGC companies invest in the development of sustainable growth business models; business models based on long-term relevance and multiple value creation. Multiple value creation refers to the simultaneous creation of financial value (profit from products and services), ecological value (preservation of the planet earth), social value (human development), and intellectual value (knowledge).

The development of sustainable business models ensues from the realization that our current economic system, although highly successful, has noticeable drawbacks. Since 1880, when the Second Industrial Revolution unfolded, the globally averaged combined land and ocean surface temperature has indicated a rise of 0.85 degrees Celcius (IPCC, 2014).

Consequences of industrialization

The Industrial Revolution marked the beginning of unprecedented technological developments. In less than three centuries, these developments have changed our society and our economy beyond recognition.
Industry, agriculture, healthcare, mobility, housing, and the Internet are just a few examples. In many sectors, the endless possibilities have become leading paradigms. Never before in the history of mankind has such a large part of the world enjoyed such affluence.

Global warming has a dramatic impact on our natural environment. Biodiversity decreases rapidly, and food crops fail more and more often, leading to price volatility and increases. Food supply for the growing world population is under threat of being compromised even further. By 2050, the global population is expected to reach 9.6 billion. Whether we will be able to produce sufficient food by then to feed us all is the subject of serious debate.

Over the next few decades, natural resources, such as minerals and fossil fuels, as well as food crops, will become scarce or even exhausted. This scarcity contributes to an increasing extent to geopolitical instability in regions. "To strengthen their geopolitical position, countries have also reverted to measures that control access to economically important national resources or the prices of commodities over which they exert monopoly power to undermine other economies' performance" (Global Risks report 2015, World Economic Forum).

The DSGC member companies embrace the necessity to change the current economic system into a circular system. The essence of the current linear system of 'take – make – waste' is that raw materials and resources are consumed and that (finite) resources and fossil energy sources are used highly inefficiently. We are facing a 'consumption time bomb', already resulting in resource constraints and other major economic risks.

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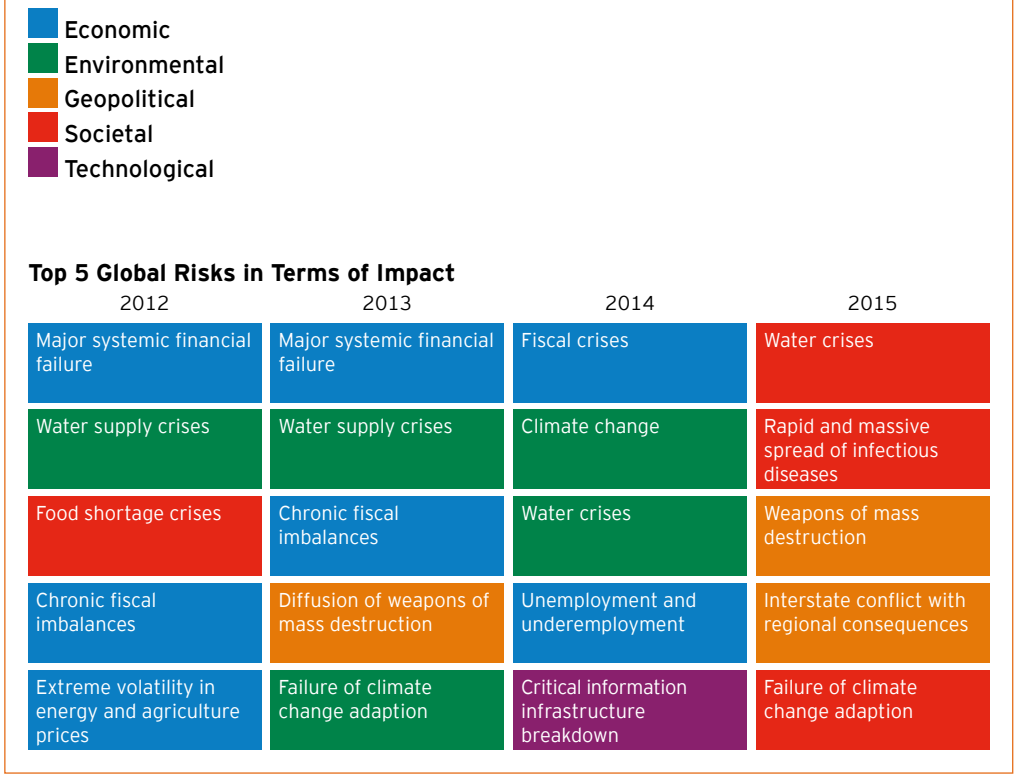
Global Risks report (World Economic Forum)

The table indicates a shift away from economic risks in general to environmental risks. "While this highlights a recognition of the importance of these slow-burning issues, strikingly little progress has been made to address them in light of their far-reaching and detrimental consequences for this and future generations" (World Economic Forum Global Risks report 2015).

Top 5 Global Risks in Terms of Likelihood

2012	2013	2014	2015
Severe income disparity	Severe income disparity	Income disparity	Interstate conflict with regional consequences
Chronic fiscal imbalances	Chronic fiscal imbalances	Extreme weather events	Extreme weather events
Rising greenhouse gas emissions	Rising greenhouse gas emissions	Unemployment and underemployment	Failure of national governance
Cyber attacks	Water supply crises	Climate change	State collapse or crisis
Water supply crises	Mismanagement of population ageing	Cyber attacks	High structural unemployment or underemployment



2.2 Sustainable growth and circular business models

Sustainable growth business models are the beginning of a solution – they aim to optimize the use of resources and fossil energy, and to reduce waste flows and emissions (eco-efficiency). Structuring a (more) circular business model is a logical next step. "A circular economy is the logical and more hands-on approach to sustainable thinking and acting. Besides a clear link to cost reduction, the principles of a circular economy have an even stronger link to value creation and innovations at system level" (NLCH, 2015).

For several decades, ideas have been developed about an economic system based on a radically different approach. Rather than eco-efficiency, eco-effectiveness would be the focus in such a system. Resources and energy are not consumed, but re-entered into a circular system to create value again and again: the circular economy.

The circular economy concept decouples growth and prosperity from the use of natural resources and ecosystems. This way, it can create a regenerative system with infinite reuse of resources, while fostering economic growth

All around the world, organizations, institutes, partnerships and think tanks are actively engaged in the field of the circular economy. Each initiative takes its own angle and puts emphasis on specific aspects. By consequence, the results vary from voluminous, often

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theoretical reports that provide food for thought to concrete, functional circular initiatives and partnerships.

Particularly in the Netherlands, various initiatives have been launched to accelerate the transition towards the circular economy.

Founding fathers of circularity

In his 1976 research report to the European Commission, 'The Potential for Substituting Manpower for Energy', Walter Stahel, architect and economist, sketched the vision of an economy in loops and its impact on job creation, economic competitiveness, resource savings, and waste prevention. In 1982, Stahel won a Mitchell Prize for his paper 'The Product-Life Factor', describing the closed-loop economy, now referred to as the circular economy. Michael Braungart and William McDonough launched the Cradle to Cradle concept in 2002 with their book: 'Cradle to Cradle: Remaking the Way We Make Things'. This became known as the design philosophy referring to the idea of 'waste equals food' – considering all material involved in industrial and commercial processes as technical or biological nutrients. The Cradle to Cradle framework focuses on design for effectiveness in terms of products with positive impact and on reducing the negative impacts of commerce through efficiency.

Examples of Dutch programs:

From Waste to Resource (VANG)

Based on the principles of the circular economy, the Dutch government developed the program entitled 'From Waste to Resource' (VANG) to stimulate the transition towards a circular, waste-free economy. The program covers a broad spectrum of waste-related themes and deploys a holistic approach to resource efficiency issues in the Netherlands.

Nederland Circulair!

MVO Nederland (CSR Netherlands), De Groene Zaak (Sustainable Business Association), Circle Economy, CLICKNL, Het Groene Brein (Network of sustainability scientists) and RVO (the Netherlands Enterprise Agency) have joined forces in the RACE coalition (Realization of Acceleration towards a Circular Economy). Together they execute the program Nederland Circulair!, aimed at accelerating circular economy with Dutch businesses. The program is supported by the Dutch Ministry of Infrastructure and the Environment.

Other associations and not-for-profit organizations

MVO Nederland has set up the 'Community of Practice Circular Economy'. The sustainability business association De Groene Zaak supports the transition towards a circular economy by lobbying in Brussels and The Hague. Circle Economy connects organizations and companies and assists them in joint efforts to develop new circular products and services. Finally, Platform BEE (Biodiversity, Ecosystems and Economy) invests in the preservation of biodiversity and ecosystems as a condition for a strong economy and a healthier environment. The platform is an initiative of VNO-NCW and nature conservation organization IUCN NL.

Financial institutes

In addition, a growing number of financial institutions, including ING and Rabobank, are developing a vision on the circular economy and work with their clients on this topic.

Netherlands Circular Hotspot

This campaign aims to position the Netherlands as an international hotspot for the circular economy. During the time leading up to the Dutch presidency of the EU in 2016, the program will compose a vision, organize an incoming trade mission and exhibit existing circular examples through a real circular economy exhibition near Schiphol (Park 20|20).

Green Deal Circular Procurement

With the Green Deal approach, the government paves the way for community-based innovative initiatives to accelerate the transition towards a sustainable economy. The Green Deal Circular Procurement (GDCI) is an initiative of MVO Nederland (CSR Netherlands), NEVI, the central government, Duurzame Leverancier (Sustainable Supplier), PIANOo, Kirkman Company and Circle Economy. Since May of 2013, these parties have made commendable efforts to place circular procurement on the agendas of companies and authorities.

2 Circular Economy & Sustainable Growth

2.3 Definition and principles

By far the most authoritative organization in this field is the Ellen MacArthur Foundation. Dame Ellen MacArthur developed the following definition of the circular economy:

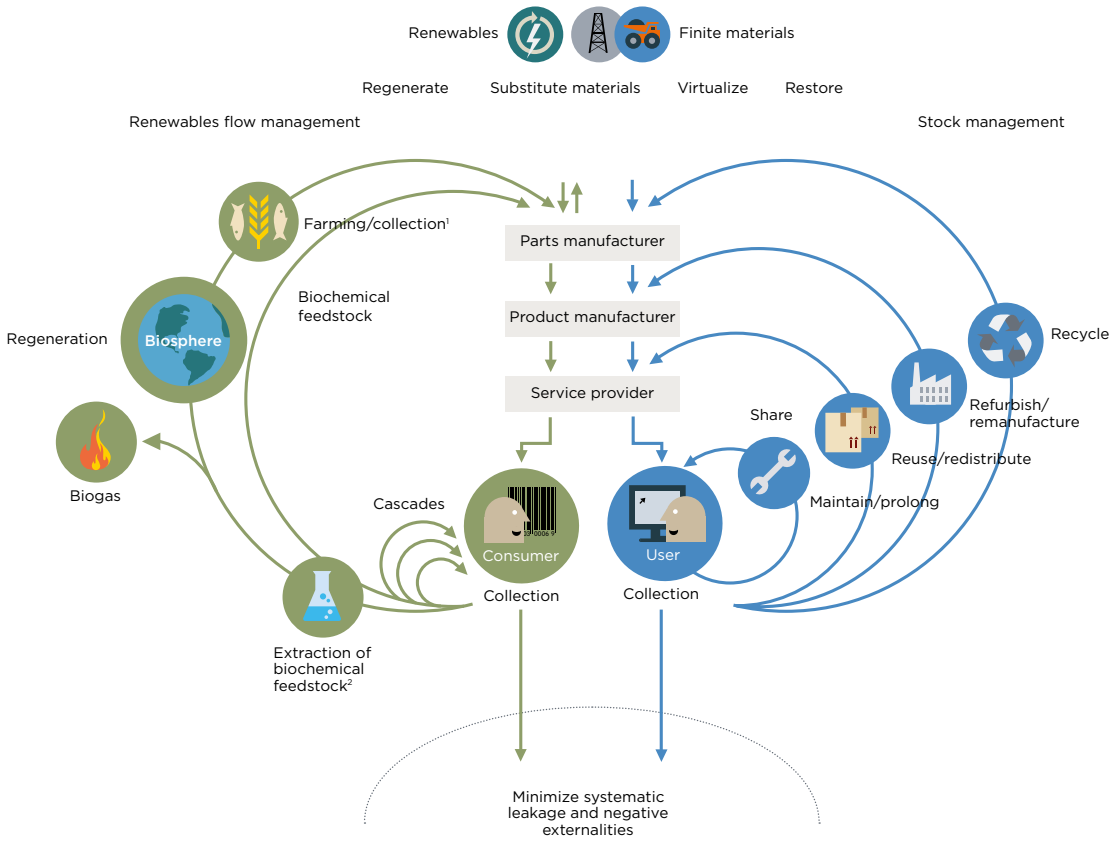
"A circular economy is an industrial system that is restorative and regenerative by design. It aims to enable effective flows of materials, energy, labor and information so that natural and social capital can be rebuilt. It seeks to reduce energy use per unit of output and accelerate the shift to renewable energy by design, treating everything in the economy as a valuable resource."

This shows that the circular economy is not a 'dogma' or an 'end state'. Rather, it is a process of thinking and acting that naturally ensues from the ambition to conduct sustainable business operations.

The concept of the circular economy is clearly described and visualized by the Ellen McArthur Foundation and McKinsey & Company (2012):

"In a true circular economy, consumption happens only in effective biocycles; elsewhere use replaces consumption. Resources are regenerated in the biocycle or recovered and restored in the technical cycle. In the biocycle, life processes regenerate disordered materials, despite or without human intervention. In the technical cycle, with sufficient energy available, human intervention recovers materials and recreates order, on any timescale considered. Maintaining or increasing capital has different characteristics in the two cycles."

Ellen MacArthur and
Jan Peter Balkenende



Source: Ellen MacArthur Foundation, SUN, and McKinsey Center for Business and Environment; Drawing from Braungart & McDonough, Cradle to Cradle (C2C).

1. Hunting and fishing
2. Can take both post-harvest and post-consumer waste as an input

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According to Ellen MacArthur, three basic principles of the circular economy can be derived from this diagram:

Principle 1: **Preserve and enhance natural capital,**
by controlling finite stocks and balancing renewable resource flows.

Firstly, it is relevant to look for possibilities for dematerialization. When resources are needed, renewable or better performing resources are chosen where possible.

Principle 2: **Optimize resource yields,**
by circulating products, components, and materials at the highest utility at all times in both technical and biological cycles.

This means designing for remanufacturing, refurbishing, and recycling to keep components and materials circulating in and contributing to the economy.

Products are designed and manufactured for easy disassembly at the end of their useful life, allowing for convenient separation of the material flows.

Value preservation is maximized firstly by looking into product reuse, subsequently by studying reuse of components, and finally by considering recycling of resources.

Principle 3: **Foster system effectiveness,**
by revealing and designing out negative externalities.

No harmful substances are released during the production, use and processing of the product. This includes reducing damage to human utility, such as food, mobility, shelter, education, health, and entertainment, and managing externalities, such as land use, air, water and noise pollution, release of toxic substances, and climate change.

The ideal circular business model
From the basic principles, we can derive what the ideal circular business model should be like. A business that meets all of the conditions of the circular economy:

1. Minimizes the use of primary resources, maximizes the use of secondary resources and manages the entire value chain accordingly
2. Designs products for easy repair or updating
3. Designs products for easy recycling (ecodesign)
4. Does not sell products but makes them available to customers under a lease agreement (performance as a service)
5. Manufactures products that cause little or no environmental damage or waste during the production phase, or ensures that the generated waste can be used by other companies as a resource
6. Maximizes the use of renewable energy in the production process
7. Encourages staff and management to adopt a 'circular' approach in their thinking and actions
8. Strives for an optimal balance between financial, social and ecological value

Taking the above principles into account, companies will need to rethink their current processes and operations and develop a new perspective on their future business model and the context in which they operate.

2.4 What's there to gain?

In the past few years, several studies have been conducted into the effects of a transition towards a circular economy. The results of these studies hardly allow for a direct comparison, as Rabobank pointed out in their report 'The potential of the circular economy' (2015).

What most researchers do agree on is that the greatest positive effects will be generated in three areas:

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Economic growth and forecast

Cost savings can be achieved by saving on materials and enhancing efficiency. Generating higher revenues from residual flows and new services or new markets will contribute to higher sales. In the recent 'Growth Within - A circular economy vision for a competitive Europe (2015)', Ellen MacArthur reaffirms the economic rationale of moving towards a circular economy by estimating the economic potential of € 1.8 trillion (for 2030).

Forecast economic growth

As revealed by Ellen MacArthur (2015), "A circular economy, enabled by the technology revolution, would allow Europe to grow resource productivity by up to 3 percent annually. This would generate a primary resource benefit of as much as € 0.6 trillion per year by 2030 to Europe's economies. In addition, it would generate € 1.2 trillion in nonresource and externality benefits, bringing the annual total benefits to around € 1.8 trillion compared with today. This would translate into a GDP increase of as much as 7 percentage points relative to the current development scenario, with an additional positive impact on employment."

"The study on modelling of the economic and environmental impacts of raw material consumption, EC (2014), states: This technical report provides a quantitative analysis of different resource productivity targets for Europe, using GDP per unit of raw material consumption. Improvement targets range from 1 percent to 3 percent a year (cumulative 15–30 percent by 2030). The modelling results suggest that improvements of 2–2.5 percent a year could have net positive impact on EU-28 GDP" (Growth Within: A circular economy vision for a competitive Europe, Ellen MacArthur Foundation 2015).

Opportunities for a circular economy in the Netherlands were estimated to result in an overall annual impact of € 7.3 billion. "The TNO report estimates an overall annual impact of the circular economy in the Netherlands of € 7.3 billion. The current value of the circular economy for 17 product categories in the metal and electrical sectors is € 3.3 billion, and the Netherlands could achieve additional annual market value of € 573 million. The use of the 34 most important waste streams already represents a value of € 3.5 billion. An estimated investment of € 4–8 billion in new technologies could create added value of € 1 billion a year for the circular economy in biorefining, biogas extraction, and sorting of household waste" (TNO, 2013).

Labor market growth

As a result of the circular economy, job growth is expected. This growth is generated by new services in the field of design, recycling and return logistics, as well as by exporting 'circular knowledge and skills'.
According to the Study on modelling of the economic and environmental impacts of raw material consumption of the EC (2014), an annual resource productivity improvement of 2 percent could create two million jobs (in Europe, eds.). For the Netherlands, Sweden and the United Kingdom, studies have been conducted into the effects on employment on a national level.

Forecast job growth

Several organizations have provided forecasts that underline positive effects on the labor market and potential job growth.

Opportunities for a circular economy in the Netherlands, according to TNO (2013): "The report estimates an overall annual impact of the circular economy in the Netherlands of € 7.3 billion, creating 54,000 jobs."

The potential of the circular economy, Rabobank (2015): "...In the most favorable scenario (radical shift to a circular economy, eds.), it will create as many as 80,000 jobs over the next fifteen years."

The Circular Economy and Benefits for Society, Club of Rome, Wijkman & Skånberg (2015): "The report finds that, (...), organizing manufacturing along the lines of a materially efficient circular/performance-based economy in Sweden would add 100,000 jobs (2–3 percent of the labor force)."

Employment and the circular economy: Job creation in a more resource-efficient Britain, WRAP (2015): "This report explores how to address the UK's use of labor and scarce natural resources. The report suggests that the circular economy could create 200,000–500,000 gross jobs, reduce unemployment by 50,000–100,000 and offset 7–22 percent of the expected decline in skilled employment by 2022, depending on whether the development of the circular economy followed its current trajectory or took a more transformative path."

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Reduced environmental burden

The development of the circular economy was directly prompted by the concern for our planet.

Recent studies confirm that a shift to the circular economy can lead to a significant reduction of the environmental burden, like CO_2 emissions, as a result of the broad use of renewable energy sources and the elimination of waste flows.

"The circular economy is truly sustainable in the sense that it provides economic, ecological and social benefits in a cross-cutting approach. It reduces waste volumes, GHG emissions and resource consumption, and at the same time creates local jobs at all skill levels."
Walter Stahel, 2015

GHG emission reduction

In their report 'The potential of the circular economy' (2015), Rabobank states: "Perhaps more importantly than the effects on economic growth and job creation, a more circular system of production, use of goods and treatment of waste could offer an efficient way of significantly reducing greenhouse gas emissions. In a scenario with a radical shift to a circular economy, greenhouse gas emissions in the Netherlands can be reduced by around 23 percent after 15 years."

Findings from the report 'The Circular Economy and Benefits for Society, Club of Rome', Wijkman & Skånberg (2015), are: combined with efforts to increase energy efficiency and the use of renewable energy, organizing manufacturing along the lines of a materially efficient circular/performance-based economy in Sweden would (...) reduce CO_2 emissions by 70 percent.

Feike Sijbesma, CEO DSM: "To secure a healthy, sustainable and equitable society for people today and generations to come, companies need to base their decisions on a responsible balance between social advancement, environmental progress and economic prosperity (People-Planet-Profit). We can only do so by switching to a circular economy that no longer takes, makes and disposes but instead ingrains sustainability into every facet of life."

3 Putting Theory into Practice

In Chapter 2, we described the theory and the 'ideal' circular business model. At this point, we will zoom in on the various circular business models and the experiences in practice of DSGC companies. We will address some major barriers often encountered, and provide leads as to how to deal with them in practice.

3.1 Variety in circular business models

New circular business models and circular products and services will differ from company to company. Much depends on the context in which a company operates, its customers and many other aspects that need to be taken into account. In addition, elements of various revenue models can be combined in developing a circular business model. Accenture (2015) clearly distinguishes five separate circular revenue models.

When looking at the DSGC companies, we see a lot of variety in circular business models as well. None of them is fully circular yet. However, we can state that all of them are moving ahead step by step on the pathway to developing a business model based on circularity principles.

Revenue models

1. Circular supplies

This business model is designed to provide fully recyclable and/or biodegradable inputs that can replace 'single-life' input materials. This forms the basis for circular production and consumption. Value is created through resolving the resource scarcity risks for companies and reducing their footprint.

DSGC company cases: FrieslandCampina, DSM, Shell*

2. Resource recovery

Recovering valuable resources and by-products to reuse or upcycle or to use them to produce energy. Recycling and upcycling thus play a crucial role, linked to the Cradle to Cradle approach. Value is achieved through the market for waste.

DSGC company cases: AkzoNobel, KLM, Heineken, Unilever*

3. Product life extension

Life-span extension can be achieved through repairing, remanufacturing or recommercing (capital-intensive) products. The lifetime and economic value of a product or equipment can be extended significantly. Recommercing has great potential if the product performance is still high, even when repaired or manufactured using second-hand parts.

DSGC company cases: Heineken*

4. Sharing Platform

Optimizing the utilization of products, services or tools by allowing consumers to share products or by offering lease services using existing goods (on-call and on-demand economy). Value can be created through an intermediary who creates the platform (enabling exchange, shared access, and supply and demand against a fee).

5. Product as a service model

Instead of selling products, companies retain ownership of the products. They provide the functionality or the service under a lease contract or at a rental fee. A growing number of companies increase the life span of their products in this manner. In this model, the residual value after economic use is higher and therefore depreciation is relatively low. This model therefore combines well with life-span models.

DSGC company cases: Philips*

* *The circular business models of DSGC companies are all in development. Therefore, this represents an indicative categorization, based on the primary cases that were discussed in the interviews.*

3 Putting Theory into Practice

3.3 Overcoming the 'linear lock-in'

Full implementation of a circular business model presents a major challenge. Today's global economy is still predominantly linear in nature. In the past decades, companies have structured their operations (from product design to marketing and sales) along linear lines for optimal efficiency. This can be referred to as the 'linear lock-in'.

"In the linear economy, external costs, like environmental damage, are excluded from the business case by most traditional companies. Because of this, there is an uneven playing field for companies that set up their business in a circular model. Also, the tax regime, in which labor is more heavily taxed than materials, presents a huge challenge for the circular economy. There are also specific lock-ins of a more financial nature, such as long-term revenue generation horizons, major upfront investments, limited access to funding and the short-term perspectives of many shareholders" (De Groene Zaak, 2015).

Linear system lock-ins or major obstacles like vested interests, laws and regulations, infrastructure, and the structure and funding of value chains, don't prevent the DSGC companies from starting or continuing to develop more circular business models. In addition, market demand for circularly manufactured products is still in its infancy.

DSGC members frequently mention linear lock-ins as barriers they need to overcome. AkzoNobel, for instance, talked about the plan to have residual flows of paint processed and marketed by a third party: GDB in the US.

This shows that the system is strongly focused on collection and incineration of materials that are considered harmful to the environment, instead of retrieving the value of these materials.

> *"Constructing the contract with GDB was an enormous task, as the contract needed to be valid in every part of the world. As paint is considered chemical waste, its disposal is subject to numerous rules and regulations that differ per country. It is all very complicated. It also presented a risk for the Board as we all knew it would really be much easier simply to hand over the paint to a government-approved waste disposal facility for incineration. It was forward thinking to take the more sustainable solution rather than the least risky."*
> Anne Garlich, AkzoNobel

Next to the system, 'linear lock-ins' may also occur in the internal organization.

Markus Laubscher and Nestor Coronado Palma, working on circular products and services at Philips, discussed the number of attempts made to develop more circular products.

They also spoke about the influence of (linear) sales margins and incentives.

> *"We used to strive to provide our customers and consumers with high-quality finished products only. In the circular economy, however, where products can be repurposed and recycled, we need to update our business models and channel our innovative thinking to reflect this new long-term focus."*
> Lukas Hoex, DSM

> *"We research options for quantifying circularity, but in practice, we are confronted with a dilemma: we have to balance the need to perform accurate measurements against the necessity to avoid too much complexity in the implementation. We cannot afford any interruption of business operations merely to conduct circularity measures on the thousands of products Philips has. In addition, the measured results have to be converted into operational processes. For years, we have developed linear processes. It is not easy to change that. The greatest obstacle is in our own heads. People think in a linear fashion, they want to sell."*
> Markus Laubscher, Philips

> *"The incentives for our sales force are yet another impediment. They consist of margins. In linear processes, these margins are larger and easier to achieve."*
> Nestor Coronado Palma, Philips

3 Putting Theory into Practice

3.4 Other frequently discussed dilemmas

Much has been written about current impediments to the transition to a circular economy. These impediments consist of financial, institutional, infrastructural, social and technological barriers.

At this point, we will discuss some obstacles often referred to by the DSGC companies. How do they perceive these barriers in practice? And how do they work around them towards a solution?

1. How to deal with financial implications of going circular.
2. How to deal with differences in (waste) infrastructures.
3. What role can governments play?
4. How to deal with different cultural mindsets.
5. To what extent do technological barriers hamper circular business models?

1. How to deal with financial implications

In many ways, financial institutions play a crucial role in facilitating the transition towards a circular economy. According to ING (2015), financing circular business models requires different solutions than standard banking solutions. Despite many opportunities, circular business models create three main challenges:

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

In general, it is important to establish cooperation with the financial sector in an early phase in order to assess the financial implications and to develop a feasible business case for all parties involved.

"Major upfront investment costs are a barrier to the development of circular business models in many cases. FrieslandCampina is building a business model involving anaerobic digestion of manure to turn it into green gas and biofertilizer. This requires about ten large anaerobic digesters and about 1,500 to 2,000 small anaerobic manure digesters to be installed at farmsteads. These digesters cost about € 8,000, which is an investment that is way beyond the budget of most smallholder farmers."
Jan Willem Straatsma, FrieslandCampina

For example, Philips developed its own solution to absorb cash flow changes. The company is not afraid of the circular economy trap of diminished cash flow as a result of selling performance rather than products.

As former CFO Wirahadiraksa stated: "Obviously, you have to create the right conditions. For instance, we have established Philips Capital, a business activity that facilitates financial solutions for customers who buy our products. This enables us to offer our customers funding without having it weigh on our balance sheet" (MCA August 2015, issue 4).

Many of the DSGC companies consider a longer pay-back period crucial to support the circular business model.

"Complex changes, such as the waste-to-energy process, often take longer than can be covered by grants. If the initial phase fails to produce a good, sufficiently scalable solution, the entire plan is abandoned."
Herbert Aalbers, KLM

"The middle managers of companies should be encouraged to focus on the long term. They need support in building the business case for circular initiatives that consider externalities like EPR (Extended Producer Responsibility) and even longer pay-back periods."
Gavin Warner, Unilever

2. How to deal with differences in (waste) infrastructure

Closing the loop is in many cases not a one-dimensional challenge, especially when operating as a multinational. Country-specific approaches are necessary. For example, return systems for e-waste (WEEE) in the Western world leads to a recycling rate of over 90 percent. Other parts of the world lack these systems. The same goes for recyclable plastics standardization and normalization, end-of-waste protocols for entrepreneurs and national policy for waste collection for out-of-home channels.

3 Putting Theory into Practice

In the Netherlands, for instance, Heineken managed to achieve a recycling rate of 97 percent as a result of a well-managed return system at retail stores. The return system functions properly also in Central Europe as well as in many countries on the African continent. On a global level, however, the recycling rate is just under 50 percent.

"Unilever globally employs around eight hundred packaging engineers. We develop most of our products and packages at group level and they are rolled out at a local level. The lack of technology or infrastructure in some countries requires Unilever to set up projects to promote waste collection and recycling."
Louis Lindenberg, Unilever

"In export markets such as the US and the Caribbean region, it is more difficult at times, particularly in areas with a less effective infrastructure for collection and processing. In those markets, we gather information about the waste treatment flows and link up with local initiatives. In France, we have installed crushers in catering establishments to pulverize the bottles so that the glass can be recycled. This is a real opportunity for our on-trade customers as it reduces their volume of waste and, by consequence, the amount of waste levy they have to pay."
Michael Dickstein, Heineken

3. What role can governments play?

In the shift towards a circular economy, governments play an important role. Policies and regulations can change the rules of the game, facilitating and accelerating the transition towards the circular economy. A variety of policy interventions is required, on a global, European and national level.

For multinationals operating in global markets and product chains, a cross-border governmental approach is of crucial importance to accelerate circular business. This should safeguard a level playing field and bring about overarching policies for fair competition.
De Groene Zaak performed a global scan of existing government regulations.

No government in the world has yet developed or implemented a comprehensive approach to put the transition to circularity in motion. However, there are promising examples, like in Japan and China.
In Europe, the focus lies on the European Commission, to guide national governments to harmonize their policies. Their 'Circular Economy Package' will comprise a set of coherent measures and a policy scheme to stimulate the circular economy in Europe.

In the Netherlands, many policies and interventions are considered. Demand is increased by the Dutch 'circular public procurement' program. To support market entrance and consumer purchasing, projects on differentiation of VAT are initiated (e.g., analysis on shifting tax from labor to resource use by ExTax). Finally, concepts like extended producers' responsibility are being analyzed.

Governments going circular
In their report 'Governments going circular' De Groene Zaak presented a global scan of existing government regulations related to the circular economy. Japan is taking steps with respect to their own industries, and China, the world's largest economy, discovered the potential of the circular economy several years ago. The Chinese developed a Circular Economy Development Strategy and Action Plan (2010-2015), including a system of 'Circular economy evaluation indicators', which enables them to analyze operational processes in terms of energy consumption, recycling and reuse of resources, pollution and social development on a regional and municipal level.

See www.govsgocircular.com for more information.

3 Putting Theory into Practice

EU Circular Economy Package

"Our planet and our economy cannot survive if we continue with the 'take, make, use and throw away' approach. We need to retain precious resources and fully exploit all the economic value within them. The circular economy is about reducing waste and protecting the environment, but it is also about a profound transformation of the way our entire economy works. By rethinking the way we produce, work and buy we can generate new opportunities and create new jobs. With today's package, we are delivering the comprehensive framework that will truly enable this change to happen. It sets a credible and ambitious path for better waste management in Europe with supportive actions that cover the full product cycle. This mix of smart regulation and incentives at EU level will help businesses and consumers, as well as national and local authorities, to drive this transformation."
Frans Timmermans, first Vice President, European Commission.

National laws and regulations are insufficient or even counterproductive to enabling the circular economy. A well-known example is the EU Waste Framework directive, which focuses on waste and waste treatment and not on the principle that there is no waste but only valuable resources. The whole system of regulation and special licenses for transport and treatment of waste doesn't stimulate circularity.

Discussions with DSGC companies reveal that a few of the examples mentioned actually occur in practice. For example, according the REACH directive (Registration, Evaluation, Authorization and Restriction of Chemicals), all recycled manure has to re-enter the REACH registration system, which creates complexity when trying to apply a circular model for manure recycling.

"It would help if legislation would contribute to the goals. Current law classifies manure as waste, the disposal of which is subject to charges. Raw materials extracted from manure are likewise treated as waste products and are subject to the trade restrictions of the Environmental Management Act."
Jan Willem Straatsma, FrieslandCampina

"Cabin and catering waste from our EU flights can be used for many purposes. However, we hardly have any legal options to recycle catering waste from international flights. The possible risk of transmission of pathogens has led to strict regulations, forcing us to have the largest share of the residual waste flows of intercontinental flights incinerated within 24 hours. KLM therefore follows the efforts of the International Air Transport Association to exert influence for more flexible EU regulations. It would help if the government would introduce exceptions for particular cases or reconsider certain provisions."
Herbert Aalbers, KLM

4. How to deal with different cultural mindsets?

Many circular notions – such as reusing parts and materials and extending the life of existing equipment by repairing and upgrading – are not necessarily in line with the prevailing 'premium quality culture' in a country. In many countries, people perceive 'new' as 'better'. This certainly stands in the way of entering the market with circular products and services.

According to DSGC, changing deep-rooted consumer habits will be crucial in the forthcoming years to effectuate the circular economy. For companies like AkzoNobel, Unilever and Heineken, a material part of the company's carbon footprint is generated in the homes of consumers using their products.

"In Asia, Africa and China, where the notion of refurbishing is not yet sufficiently endorsed, this will present a huge challenge. As materials are relatively expensive in developing countries and labor is relatively cheap, people tend to repair everything, but the quality of the repairs is often insufficient to provide quality assurance. Based on this perspective, it is hard for them to understand that Philips products containing used parts are, nevertheless, premium products."
Nestor Coronado Palma, Philips

3 Putting Theory into Practice

"Unless consumers are responsible for discarding used packaging, the effect of our efforts will be limited. Behavior change remains a major challenge."
Bas Stok, Heineken Nederland

5. To what extent do technological barriers hamper circular business models?
Although technological hurdles can always be overcome, it is apparent that the unavailability of proper separation techniques or suitable alternative materials for critical raw materials can indeed be an obstacle in the successful development of circular business models.

For example, Shell has deployed advanced biofuel teams and research agreements with experts in leading institutions across the world. Nevertheless, the company doesn't know the answers and continues to invest in new ways of producing biofuels from sustainable feedstocks and building pilot plants.

According to AkzoNobel, a technical obstacle had to be overcome in order to make the circular process financially profitable.

"We can get the ball rolling faster if we know what the right solutions are. How can we use the peaks of renewable energy? How can we store it? What is the right direction?"
Michelle Morton, Shell International

"We are investigating, for instance, the option of reblending white paint, which could produce a paint with anything up to 80 percent recycled content, with a high quality. (…) Colored paint is a different story, and one that involves as much as 70 percent of the paint returned by UK consumers, unfortunately. The technology that allows us to mix this paint with new paint has not yet been invented. You could turn it into a fashionable designer paint and sell it at a premium price, but that is a small niche market at best."
David Cornish, AkzoNobel

3.5 Developing a circular 'ecosystem'

In the third DSGC publication on Sustainable Innovation, DSGC argues that in order to bring forward successful (social) innovations, an 'innovation infrastructure' is essential. Without such an infrastructure – turning technological inventions into viable business solutions – innovations are much less likely to succeed. Parallel to this, we can say that in order to achieve the necessary circular transformation, the organization, in all its facets, needs to be conducive to the circular business model. We like to refer to this as fostering the circular infrastructure or 'ecosystem'.

Systems thinking
This starts with the development of a holistic (outside-in) systems-thinking capability at all levels of the organization. Circular business is, indeed, a holistic concept. It will only become reality if management and employees together fully realize that the company is part of a larger system with many different relevant actors.

Therefore, going circular influences the entire organization. To make it successful, all disciplines will have to develop the same perspective or circular mindset.

The DSGC companies all indicate that this is a huge challenge that should not be taken too lightly. For example, circular (ecodesign) production requirements often 'compete' with other product qualifications and requirements that safeguard premium quality and branding aspects. It is, therefore, important to ensure that R&D, business development and marketing are engaged and work together in an early stage on circular product development to prevent that a circular product is not in line with the corporate brand.

Joint performance indicators or targets regarding circular product development can stimulate organization-wide circular thinking and acting; a key requirement to foster a successful 'circular ecosystem'.

Transformational Leadership
To develop the circular mindset and embed systems thinking and acting in the organization, leadership is essential. In the DSGC publication Leadership and Corporate Governance for Sustainable Growth Business Models, the coalition describes 'transformational leadership' as leadership that unleashes creativity and innovative ideas, inspiring employees to work together towards sustainable growth.

3 Putting Theory into Practice

And although leadership makes it possible, employees can make it happen. According to DSGC companies, particularly the ability to build trust within the enterprise is essential. Therefore, the 'tone at the top' needs to be fully conducive to spreading the circular philosophy.

Leadership must openly acknowledge the importance of a circular business model and highlight the circular principles repeatedly and in a comprehensible way. Much depends on telling the story convincingly, by bringing forward credible examples and good practices. Employees need to be able to integrate the circularity principles in their own day-to-day tasks. Secondly, timing is an important factor to consider. Companies have often built optimally efficient linear business models over a period of decades. Now, they need to start changing internal processes, knowledge, culture and systems – without knowing exactly where this journey will lead and when milestones will be achieved. Therefore, this change should not be pursued rashly as this would disrupt the journey, jeopardizing current business goals.

Transformational companies & leadership

The UN Global Compact-Accenture CEO Study (2014) mentions 'transformational' companies. These companies outperform their rivals in sustainability performance, and are capable of monetizing sustainability and linking action directly with a business case. This way, they turn sustainability into competitive advantage through potentially transformational new approaches.

The CEO study also highlights common beliefs and attributes of 'transformational leaders' of these companies.

They are more likely to:

- Regard environmental and social issues as important to the success of their business
- Reject traditional perceptions of sustainability as philanthropy
- Engage the commitment of investors on sustainability
- Believe in the transformational potential of partnerships with NGOs and others
- Measure and reward sustainability in employee performance assessments and remuneration

Ton Büchner, CEO AkzoNobel: *"We support the aspirations, ethos and good business sense behind the circular economy. AkzoNobel is involved in many initiatives that are driven by circular thinking such as the development of chemical raw materials from household waste. We have established several strategic partnerships, focused on replacing nonrenewable raw materials. Undoubtedly, there are opportunities for the chemical industry to play a key role within this new economic model. If you want to reuse materials effectively, you will need chemicals to do that."*

4 Managing Circular Change

We will take a sidestep and present several change management concepts. One approach focuses on three interlinked dimensions: the rational mind, the emotional mind and the situation. All three need to be taken into account in order to embed circularity in the organization's DNA successfully.

4.1 Managing the journey

Putting the seemingly simple circular principles into practice means dealing with a complex set of interlinked changes that impact the entire business model. It affects the dimensions of corporate strategy, finance, product design, marketing and sales, not to mention the complete human capital dimension of learning and developing comprehensive leadership competences.

Managing complex change, such as developing a circular business model and the set of interlinked changes related to it, requires a well thought-out transition or journey management approach.
According to Accenture (2015), "Journey management, successfully planned and implemented, has been shown to increase the certainty of reaching desired business goals at the right pace and with fewer risks" (Accenture, 2015). Jonker (2014) underlines the importance of formulating a bold ambition when starting a transition. This means using a compass for guidance but no detailed blueprint or road-map dictating the outcome in advance. This transition towards circularity is a journey that unfolds as we go along. Inevitably, mistakes will be made and dilemmas encountered.

4.2 Change management concepts

When you start implementing circular business models, it is of great importance to consider the appropriate change approach thoroughly. In order to provide starting points for a change management approach that can help to manage the transition towards the circular business model, this section will present 4 leading change theories:

1. Lewin: 3-stage process of change (unfreeze, transition and refreeze)

2. McKinsey 7-S framework: addressing 7 interlinked elements that need to be aligned and mutually reinforcing before and after the change

3. Kotter 8-Step Process for Leading Change: stepwise approach for successful organizational transformation

4. Prosci ADKAR Model: presenting 5 building blocks of successful (personal) change

Much has been written about approaches to implement successful change programs. Theories draw on many disciplines, ranging from psychology and behavioral science to systems thinking.

A common underlying principle is that change does not happen in isolation: the whole organization, and all the people in it are affected by it and need to be engaged.

4 Managing Circular Change

The table presents four frequently used change management models:

Lewin - Change management model (created in the 1950s)	McKinsey - 7-S framework (developed in the 1980s)	Kotter - 8-Step Process for Leading change (1996)	Prosci - ADKAR model (1998)
1. Unfreeze Most people make an active effort to resist change. In order to overcome this tendency, a period of unfreezing must be initiated through motivation.	**1. Shared values:** The core values of the company that are evidenced in the corporate culture and the general work ethic	1. Establish a sense of urgency	**Awareness** of the need for change
	2. Strategy: The plan to build and maintain a competitive advantage over the competition	2. Form a powerful guiding coalition	**Desire** to support and participate in the change
2. Transition Once change has been initiated, the company moves into the transition phase. Adequate leadership and reassurance are necessary for the process to be successful.	**3. Structure:** The way the organization is structured	3. Create a vision	**Knowledge** of how to change and what the change looks like
	4. Systems: The daily activities and procedures performed by staff	4. Communicate the vision	**Ability** to implement changes (day to day) and required skills and behavior
3. Refreeze After change has been accepted and successfully implemented, the business becomes stable again, and as a result, staff refreezes as they operate under the newly initiated guidelines.	**5. Style:** The style of leadership adopted	5. Empower others to act on the vision	**Reinforcement** to sustain the change
	6. Staff: The employees and their general capabilities	6. Plan and create short-term wins	
	7. Skills: The skills and competences of the employees working for the organization	7. Consolidate improvements and keep the momentum for change moving	
		8. Institutionalize new approaches	

Lewin discovered that people tend to prefer and operate within zones of safety. He recognized three stages of change: unfreeze, transition and refreeze. According to Lewin, "Motivation for change must be generated before change can occur. One must be helped to re-examine many cherished assumptions about oneself and one's relations to others. This is the unfreezing stage from which change begins." The model is widely used, but it requires a significant time to implement.

The McKinsey 7-S framework is highly useful as an effective method for diagnosing and understanding organizations and will provide guidance to the change based on both softer and harder elements. The model is rather complex though, due to the interdependencies of the aspects; when one changes, all are affected.

Kotter's model is especially useful in preparing for change, since it provides an easy, step-by-step model. The main drawback, however, is the fact that steps must be followed and cannot be skipped. This can be difficult for organizations that want to accelerate change and use a more agile approach.

Prosci's ADKAR model is both useful as an effective method to drive change in a person's personal life or in that of an organization. The ADKAR model provides, in fact, a useful checklist of the required phases in such a transition.

4.3 Change approach for a circular business model

As mentioned before, transforming a company into circularity calls for a well thought-out change program, considering the implications both internally and in the external context in which the company operates. One of the key characteristics of circular business models is cooperation with various (unconventional) partners, stakeholders and even competitors.

"Companies developing circular business models and supply chains often cooperate beyond their traditional buyer-supplier relationships that characterize linear supply chains. Instead, these companies operate in a network of companies and organizations that involve a strong element of both co-creation and collaboration" (ING, 2015).

Despite interesting elements, the models of Lewin, McKinsey, ADKAR and Kotter leave little room for co-creation or other forms of true participation in change processes. In addition, the models tend to lean towards a structured stepwise approach to change management. The question is to what extent such an approach is actually beneficial for a complex circular process.

4 Managing Circular Change

Many changes don't persist. One of the most cited reasons for change failures is the people or human capital dimension.

Therefore, a final change concept of Chip and Dan Heath (2011) is presented that unites three interlinked aspects related to the people dimension:

- The rational mind (Rider)
- The emotional mind (Elephant)
- The situation (Path)

It is not enough for people just to have the rational notion that an organization must start moving in a different direction. People also need to feel motivated and personally engaged along the process, which can be achieved by showing them a clear path.

In the more successful change efforts, change leaders have paid attention to all three dimensions to catalyze change more effectively. If the change is directed by leaders who are capable of adopting a holistic perspective and addressing all three at once, dramatic change can happen.

Direct the Rider (Ratio)	Motivate the Elephant (Emotion)	Shape the Path (Situation)
1. **Follow the bright spots.** Investigate what's working and clone it. 2. **Explain how to act.** Script the critical moves. Think in terms of specific behaviors, by providing people with a script so that they know what to do. 3. **Create a vision and common direction.** Change is easier when you know where you are going and why it's worth it. A leader should be able, despite the short-term demand, to develop a long-term vision (Schuurmans, 2012).	1. **Find the feeling.** Make people feel something. Create a sense of urgency. 2. **Shrink the change and celebrate the short-term wins.** Small targets lead to small victories, and small victories can often trigger a positive spiral of behavior. 3. **Grow your people.** Cultivate a sense of identity and instill the growth mindset. Your employees (and possibly affected stakeholders) have to believe that they are capable of conquering the change.	1. **Tweak the environment.** When the situation changes, the behavior changes. Simple tweaks of the path can lead to dramatic changes in behavior. 2. **Build habits.** Look for ways to encourage habits. Leaders who can instill habits that reinforce their teams' goals are essentially making progress for free. 3. **Rally the herd.** Behavior is contagious. Large-scale change is much more likely to occur when relatively many employees amass under a common vision and 'drive' in the same direction. These so-called 'tiger teams' or 'champions' are very important to involve external stakeholders (suppliers, customers) (Spaan, 2012).

Figure - Modified circular change approach, based on Chip & Dan Heath

The core elements 'Ratio', 'Emotion' and 'Path' are described in a modified way, in order to adapt them more to the context of circularity. Combined with the individual company experiences and context, the model can provide appropriate starting points for managing circular change. It can be used by different businesses and applied in various stages of maturity going through the change process.

4.4 Circular change in practice

In this section, we will highlight three illustrative examples of DSGC companies and their perceptions of the change process: FrieslandCampina, DSM and Unilever. They seem to match well in terms of the dimensions of change according to Chip and Dan Heath.

Directing the Rider (Ratio): FrieslandCampina

The case of DSGC member FrieslandCampina clearly shows how the company directs the Rider (Ratio) by scripting the critical moves of the dairy farmers. In order to realize the circular business model of fermenting manure and improving energy efficiency of their farmers, FrieslandCampina explains to the dairy farmers what they should do to retain their position as suppliers of FrieslandCampina. The following quote illustrates how the company directs the Rider in its circular change process.

Straatsma explained: "The term 'circular' does not mean a lot to farmers, but 'closing loops' certainly does. Farmers are required to achieve targets in order to retain their position as suppliers of FrieslandCampina. We also provide financial incentives. Farmers who keep their cows on pasture are paid one cent more for every liter of milk. In addition, they receive a bonus if they manage to save energy, for instance, or if they use an anaerobic digester. This may add up to thousands of euros every year per farmer. The members of the cooperative bring this money in themselves."

Jan Willem Straatsma
Development Manager of Sustainable Livestock Farming Chain Program

4 Managing Circular Change

Motivating the Elephant (emotion): Unilever
Unilever shows how the company motivates the Elephant (Emotion) by both educating their people and creating a sense of urgency.
Unilever trains its employees to adopt a different way of thinking and instills a new, more 'circular' mindset. Furthermore, Unilever educates its consumers to become aware of the value of waste. Education and creating awareness are considered the second main condition for developing a circular economy.
Relative to other multinationals, Unilever invests heavily in these aspects, both internally and externally. Director of Sustainable Business at Unilever Gavin Warner is responsible for the 'internal paradigm shift' within the company. He has developed a three-year program that was launched in 2014.

"The principles of the circular economy are being included in the management training programs, with key design principles already integrated into training for R&D pack designers. They are actively promoted by our managers and directors and they inspire employees to adopt a new way of thinking. Unilever is a global partner of the Ellen MacArthur Foundation. I use the educational materials of the foundation in the training programs for our researchers, product designers and marketers. Moreover, these three departments themselves are actively involved in the partnership."

Gavin Warner
Director of Sustainable Business

Shaping the Path (situation): DSM
The case of DSM illustrates how the company shapes the Path towards a more circular economy. DSM is 'rallying the herd' and gaining public support for its circular solutions, especially by seeking collaboration with different stakeholders.

"In world cities such as Shanghai and Cape Town, waste and smog still constitute a problem that affects the quality of life and society as a whole, and that presents a huge concern particularly to the authorities. We want to address these problems by involving both conventional and unconventional parties who, like us, are deeply concerned about these problems and committed to solving them. This means that we take things one step further than traditional stakeholder management. Rather than managing interests, this is all about advancing together, showing equal consideration for equal interests. This is a prime opportunity for companies that can contribute concrete solutions to real societal challenges. In fact, it is quite similar to the 'polder model' we used to apply in the Netherlands, in which regardless of background, people would all join in to build a dike to keep their feet dry."

Lukas Hoex
Manager Circular Economy

5 Company Cases

5 Company Cases

ABOUT THE COMPANY

AkzoNobel is a global company that develops high-quality coatings and paints and produces specialty chemicals. The company operates in over 80 countries and employs 46,000 people globally.

AkzoNobel is committed to reducing its impact on the planet and delivering more sustainable solutions and products to customers.

The company's Planet Possible sustainability strategy is built upon 3 key elements: sustainable business, resource efficiency and capable, engaged people.

Sustainability strategy Planet Possible

Planet Possible has 3 key elements:

Sustainable Business

Working together with customers and suppliers to develop leading solutions that create more value from fewer resources. Target: 20 percent of revenue by 2020 from products that are more sustainable for customers than those of AkzoNobel's competitors. Building on a strong track record for integrating financial and nonfinancial information, AkzoNobel has developed a new indicator measuring how efficiently the company generates value, expressed as gross margin divided by cradle-to-grave carbon footprint.

Resource efficiency

Increasing resource efficiency across the value chain, including the use of renewable materials, to reduce the company's environmental footprint and to create more value from fewer resources.
Target: 25-30 percent more efficient resource and energy use across the entire value chain by 2020, measured by cradle-to-grave carbon footprint reduction.

Capable, engaged people

Developing employees, working with suppliers and customers and forming partnerships to create more value from fewer resources.

CIRCULAR BUSINESS MODEL

Preventing obsolete paint

High-quality paint is primarily not a circular product but designed for durability and longevity. When painting a wall or window frame, you want the paint to last as long as possible. This is especially true, of course, for outdoor coatings.

Minimizing obsolete paint throughout the complete production and sales value chain has become a key ambition. Paint may become 'obsolete' due to damaged or restyled packaging, unpopular colors or changes in legislation. Preventing paint loss has become the key driver to developing a more circular business model.

AkzoNobel

Turning waste paint into new paint
AkzoNobel is also investing in a project to collect waste paint from consumers and professional users, turning old paint into new and recycling the old containers. Some of this paint can be used as a new raw material and the rest will be remanufactured by social enterprises for community use. This idea is being trialled in the UK, where about 100 million paint cans and 10 percent of all paint sold go to waste every year. If it works, it will be rolled out across other countries in Europe.

BUSINESS CASE

AkzoNobel built a business case based upon a relationship with GDB. This company is based in the US and specialized in processing both obsolete paint and waste paint, and selling this on to developing markets.

Rather than paying for the incineration of surplus paint, or risking paying government levies to clear up waste paint, AkzoNobel can actually make money from selling this unwanted paint to companies like GDB and, perhaps ultimately, reusing it themselves.

By adopting this creative approach, it is estimated that in 2013, AkzoNobel prevented wasting 11,000 tons of paint, saving the company 4.5 million euros.

DILEMMAS AND CHALLENGES

Durability versus biodegradability
To what extent is it responsible to change the recipe of paint, making it fully biodegradable but creating a paint that is less protective and durable? For AkzoNobel, premium quality is the fundamental goal. Especially for outdoor and industrial purposes, the ultimate goal is a product designed for both maximum durability and sustainability.

Changing deep-rooted consumer habits
People usually store leftover paint in their shed and then get rid of it in inappropriate ways instead of donating it to the household waste and recycling center. To retrieve paint from people's homes is a huge challenge.

Consistent quality
How can you speed up R&D innovations that allow more obsolete paint to be recycled to a consistent quality? Once retrieved, the paint consists of many different types and compositions, and its value varies. Moreover, reblending colored paint is much more difficult than white paint.

INTERVIEW: The greatest challenge is changing people's behavior

David Cornish, Global Sustainability Manager, and Anne Garlich, Global Procurement Manager at AkzoNobel, answered the question without a moment's hesitation. "Raw materials come in and paint of the finest quality leaves. Our industrial processes are efficient. A circular model would cause a serious disruption."

Anne Garlich
Global Procurement Manager

David Cornish
Global Sustainability Manager

The UK alone stockpiles an annual mountain of a hundred million empty paint cans. Only they aren't all empty; about ten percent of the paint people buy is eventually thrown out. This is common across Northwestern Europe. "You can imagine what this means on a global level," Cornish outlined the waste problem that AkzoNobel intends to tackle. "Let us start by saying that AkzoNobel strives to produce paint that will last for all eternity," Garlich emphasized before explaining how this is all but an easy task. "Our basic tenet is that paint must be durable to the extent that once you have painted something, you will never have to do it again. That is what our customers want. Today, twelve-year-old cars still look like new, whereas only recently, cars would rust away after five years. Once our paint is on the wall, it will never come off – but the ten percent that never got used and was thrown away can be recovered."

Key driver
Cornish and Garlich are developing circular processes for paint recycling. Cornish targets the consumer market, the paint residues in cans and plastic buckets, while Garlich

supports the recycling of excess paint in AkzoNobel's approximately fifty plants around the globe. The greatest challenge according to Garlich is to change people's habits and behavior. "Success will depend on our ability to align the new model with existing processes," Garlich said, "because they are very good and effective from an operational perspective. The use of old paint as a raw material is new to our production staff. They fear bacterial contamination in the machines. Moreover, they are responsible for reduction of CO_2 and solvents, not for implementing circular processes."

The circular processes are a central part of AkzoNobel's sustainability strategy, Planet Possible, which aims to generate more value from fewer resources. "In the past four years, AkzoNobel has ranked number one on the Dow Jones Sustainability Index within the Materials Industry Group. We are the frontrunner. We continuously implement improvements to reduce energy consumption and, by consequence, CO_2 emissions. In addition, we continuously improve the alternatives to solvent-borne paint. Currently at least two thirds of AkzoNobel's research and development efforts are focused on sustainability."

Unsold

Garlich is the first to volunteer an explanation of his circular case. "Yes, it is true that despite the efficient industrial processes, we produce paint that is left unsold. This involves an average of two percent of the production volume." Paint redundancy in AkzoNobel's factories can be attributed to various causes. Colors may go out of style. Legislation may change, as in the case of the restrictions on the use of white spirit. Paint may be left on the shelf for too long, making it impossible for AkzoNobel to guarantee its high quality. Rebranding may cause redundancy, or errors during the production process, for instance when machines are not properly cleaned so that the color of the paint deviates from the standard.

GDB

Since 2012, AkzoNobel has sold excess paint as a raw material to the American paint processing company GDB. GDB subsequently sells this paint, which although old to AkzoNobel, is really almost as good as new to developing countries in Africa, China and South America. Garlich stated: "The price is reduced by about 90 percent, but so is the quality, obviously. The shelf life is reduced, and colors may deviate slightly per bin. This confronts us with a dilemma, for according to our sustainability principle, the paint should be as durable as possible. On the other hand, people in developing countries do not mind to repaint their house after three years. After all, labor is cheap in these countries, and a lower price for paint is much more important."

The fact that he had a business case allowed Garlich to implement the new approach within AkzoNobel smoothly. Moreover, the fact that paint now qualifies as a raw material under European legislation is an additional advantage, as this lines up perfectly with AkzoNobel's ambition to become a zero-waste company.

Reputation

Garlich underscored the point that as soon as the paint is sold, all ties with AkzoNobel are cut. Second-life paint is usable but does not meet the quality standards that AkzoNobel guarantees. "It may not be sold under our brand, because we do not want to jeopardize our reputation. Constructing the contract with GDB was an enormous task, as the contract needed to be valid in every part of the world. As paint is considered chemical waste, its disposal is subject to numerous rules and regulations that differ per country. It is all very complicated." It also presented a risk for the Board as we all knew it would really be much easier simply to hand over the paint to a government-approved waste disposal facility for incineration. It was forward thinking of them to take the more sustainable solution rather than the least risky.

Greece

Apart from recycling, the circular process focuses on reduction of the quantity of excess paint. AkzoNobel makes a point of instructing its marketers that the label or brand name of a specific paint product cannot be changed until its stock runs out. We can also prevent the paint from reaching its expiration date. Debt-stricken Greece, of all examples, is a case in point in this respect. Garlich explained: "Under pressure, everything will turn to liquid. Normally, shopkeepers and wholesalers can return their unsold cans of paint to AkzoNobel. Our people in Greece, however, have agreed with retailers that they will refrain from returning unsold paint in exchange for a purchase discount. As a result, Greek buyers are more careful in their purchasing and make a profit by being so judicious. At the same time, AkzoNobel saves on shipping costs, and in the case of Greece, with its myriad of islands, these can run up considerably. You see, the economic crisis produced at least one good thing."

United Kingdom

The circular case of Cornish is even more complex than Garlich's case. He focuses initially on the consumer market of the UK and faces four hundred local government agencies, each with their own waste management policy and legislation. The experimental phase is

not over yet, but he does believe that the process will return a profit in the long run. We have the Canadian government to thank for the fact that he turned to thinking in terms of circular processes. "It all started in 2012," he recounted. "The paint industry sector in Canada was confronted with a substantial levy on waste paint and I realized that if AkzoNobel could convert this into raw material, we would have an excellent business case on our hands." Currently, Cornish is conducting experiments in approximately 17 regions in the UK. Consumers are encouraged to hand in their paint containers to Household Waste Recycling Centers, which are operated by professional waste management companies. These companies will work with AkzoNobel to examine the possibilities of recycling the paint residue left inside the cans. AkzoNobel collects this 'second-life' paint from these waste treatment firms to donate it to nonprofit organizations that use it to refurbish various social or community projects, such as youth clubhouses. By the end of this year, Cornish also wants to start up a pilot project for a commercial application. "As soon as we find that we can sell the paint at a profit, this circular process combining commercial and social end uses will soon be replicated in the Netherlands, Belgium, and France," he predicted with great enthusiasm. In 2014, AkzoNobel collected as many as two hundred thousand liters, and their target is two million liters in five years' time. In the US, GDP is combining consumer paint residues with redundant paint from AkzoNobel's factories.

Complex

Cornish is satisfied with the basic infrastructure for the collection of waste paint in Western countries. There are, however, other obstacles that stand in the way of recycling. Consumers have to be convinced that old paint can be put to good use before they will make the effort to recycle it. We have to tell them about where to take it and what will then happen to it if we want them to participate. However, the sustainability manager understands that it is more than just consumer behavior that stands in the way of this ideal picture. Although household chemicals are required to be separated from normal household waste in many Western European countries, this is not always the case, notably in the UK. There, local authorities will also need to be convinced of the case for the extra costs of separating out the paint waste. Cornish: "In the ideal situation, the local authorities will understand the benefits of recycling rather than just incineration, but in times of austerity, it will be a tough argument."Also, the regulations regarding turning waste into new products are very complex and demanding. Licenses are required to transport and handle the waste, it has to be proved that it is going into new products and then it has to comply with more rules to ensure that as a 'new' raw material, it is perfectly safe and uncontaminated.

Research

In the meantime, the chemical industry group invests heavily in research into new technology that will turn circular processes into money makers. They are investigating, for instance, the option of reblending white paint, which could produce a paint with anything up to eighty percent recycled content, with a high quality. "White paint can yield a profit," Cornish claimed without a doubt. Colored paint is a different story, and one that involves as much as seventy percent of the paint returned by UK consumers, unfortunately. "The technology that allows us to mix this paint with new paint has not yet been invented. You could turn it into a fashionable designer paint and sell it at a premium price, but that is a small niche market at best." So this is the paint likely to go to social projects and community use.

End of story

Together with other partners, they have also researched mechanical engineering and some new machines that have the capacity to remove paint residues from the cans faster and more effectively. Furthermore, more market research into the views of both consumers and professional users is being conducted. "You have to be realistic," Cornish explained. "If customers do not want to buy the product, then that is the end of the story." Garlich added: "Many people are not interested in paint because it was produced in a circular process; they simply want paint that is easy to apply and will last for a very long time. In large-scale bidding procedures, such as the one that invited tenders to paint a major international airport, sustainability is a factor in the negotiations, but even large clients ultimately want a good price-quality ratio."

No turning back

AkzoNobel is able to influence consumer behavior at the time of buying paint. Recycled paint can be promoted, but AkzoNobel will not launch a campaign until the circular processes are fully in place. Cornish stated: "We hope that people will embrace the idea of recycled paint on large public buildings, and that it will encourage them to apply these products in their personal lives as well." Garlich said: "In the Netherlands, we have a platform of the Netherlands Chemical Industry Association (Vereniging Nederlandse Chemische Industrie, VNCI), where chain partners meet to discuss and reflect on possibilities to overcome all of these obstacles. The Netherlands has the opportunity to lead the way, and so does AkzoNobel. We are very ambitious. Our consumers expect us to be ambitious. We have long since stopped referring to redundant paint as waste – to us, it is raw material. Sustainability is business. There is no turning back."

DSM

ABOUT THE COMPANY

DSM is a global science-based company active in health, nutrition and materials. By connecting its competences in life sciences and materials sciences, DSM is driving economic prosperity, environmental progress and social advances to create sustainable value for all stakeholders.

DSM focuses on developing solutions with better ecological performance over the life cycle and a more positive impact on people than competing products. DSM empowers its innovation capability focusing on products with a higher sustainability performance.

CIRCULAR BUSINESS MODEL

DSM continuously aims to use fewer resources while delivering a higher contribution to the economy and society. The company operates in the earlier phase of product value chains, and can, therefore, contribute to the composition of materials and ingredients.

DSM aims to secure future availability of natural resources, and to unlock more value from resources in use. In case of food, this means efficient production and preventing food waste by developing solutions that extend shelf life. In case of materials, DSM develops nontoxic materials that can easily be recovered and safely used and reused.

Four focus areas of DSM's circular business models

1. Replace finite and polluting resources by safe and renewable ones
Examples include lightweight bio-based plastics for the automotive industry or paints based on water and renewable resources.

2. Increase the lifetime of products
DSM develops circular products that extend product life. DSM's Dyneema®, for example, is used in a range of applications such as offshore, maritime, and workplace safety applications. In addition, the properties of Dyneema offer limitless potential for applications in the apparel industry. In collaboration with Levi's, Dyneema is now used in jeans to improve durability.

3. Enable recovery of valuable materials
One example is DSM's Niaga® technology. Niaga enables carpet producers to recycle their materials to the highest value by using a material that can be fully reused at the end of its life – or enables separation in case more materials are used. Due to its simplicity and pure materials in material design, the energy used in production has been reduced by 95 percent compared to a traditional process, and the manufacturing process is water-free.

4. Valorization of waste streams
The renewable energy field serves as an example. Project LIBERTY is a cellulosic biofuel plant that uses crop residue – corncobs, leaves, husk, and some stalk – to produce 20 million gallons of bioethanol per year, later to be ramped up to 25 million gallons per year. POET-DSM Advanced Biofuels intends globally to license an integrated technology package that converts corn crop residue into cellulosic bioethanol for third parties.

BUSINESS CASE

Circular economy is often defined as decoupling growth from resource use. This implies the need to decouple resources from cost and revenue. DSM, therefore, analyzes the added value to resources in manufacturing as well as consumption. When innovations enable the recovery of resources, DSM adds more potential value, and has to capture this value.

DSM

When fewer resources are used, especially critical resources like water, DSM reduces hidden costs to local economies, and can capture this societal benefit in the business model. By doing so, DSM is able to secure commercial success of a circular solution. Furthermore, it helps to find leverage points to set a broader systemic change in motion.

DILEMMAS AND CHALLENGES

The main challenge for DSM is to become part of the circular business models that the company develops for its customers. If, for example, the residual value of a certain end product is increased, DSM is not the one to extract this value in the end-of-use phase. However, their knowledge can be instrumental for companies closing nontoxic loops of the future.

INTERVIEW: 'We want to tackle the waste problem'

"DSM has the scientific knowledge to develop new products that will contribute to solving the challenges of today's society," according to Lukas Hoex, Manager Circular Economy of this multinational manufacturer of materials and food products. "We have a long history of creating value, not just for the customer but for a broader public, the government or society as a whole. This role in society requires a new type of partnership and new business models."

Lukas Hoex
Manager Circular Economy

A large problem society faces today is the growing mountain of waste around the world. DSM has the knowledge to help tackle this problem. "DSM is at the front end of the production chains, close to the resources," as Hoex explained. "We have known for a long time that these resources are nearing depletion. Efficiency in resource use has been a paramount focus for us for years, and we have built up a lot of knowledge on the subject. What we see now is a growing awareness among consumers that throwing away products, emitting gases and dumping toxic waste is far from smart, and not even necessary. In fact, people are borrowing and lending products or selling used products to an increasing extent. The speed at which the Sharing Economy is spreading has taken me by surprise. This opens up opportunities for us to implement new business models. Besides cautious use of resources in production, we now need to focus on keeping resources in the economy for as long as possible and at the highest possible value, simply because that will improve the bottom line." If companies such as DSM can successfully contribute to driving this change, this could have an impact on volume in the materials cluster. "This is exciting, obviously, and it provides an extra boost to new business models, for if we add more value while at the same time reducing the environmental burden, I do not think that it would affect our performance," according to Hoex.

Adhesives and paint

For the circular economy, DSM targets its research at minimizing the use of critical resources, replacing scarce and toxic materials and substances, and facilitating product reuse and life expansion. This is in line with the ambition DSM had adopted much earlier concerning the bio-based economy. Where materials are concerned, this means that DSM invests in materials that are easy to recover and can be used for a wide range of purposes. "Conditions for success are reduction of the diversity of materials used to manufacture products and a radical phase-out of toxic ingredients. The latter implies that the plastic used in laptops, for instance, must be so safe that in its second or third life, it can even be used to manufacture toys for children. These conditions offer not only an interesting innovation agenda for materials, but also for packaging products, paints and adhesives." DSM is conducting research into ingredients for adhesives, for example, that ensure that there are no obstacles to material separation in waste treatment. "We do need strong adhesives, of course, in order to extend the life of our products, but apart from this, we aim to ensure that the adhesives and paints form no impediment to the second life of the materials."

Carpet

Their ambition is clearly reflected in DSM's innovative carpet technology. "Carpeting is a serious factor in today's waste problem as well as in the consumption of scarce local resources, such as water. Recycling is difficult as most carpets consist of a multitude of different materials that are interwoven. As a result, separation would be a costly

affair, even though several market parties have already taken significant steps in the right direction where certain carpet ingredients and elements are concerned. However, some of the materials are of such a low grade that they can hardly be reused, if at all. Together with a start-up from the industry, DSM has developed a technology that enables the manufacturing of high-quality carpets from one single material or two at most. In the event that two materials are used, they can easily be separated as a result of an innovative interlayer. This makes the materials fully recyclable so that they can be used to manufacture new carpets, for example, or for different purposes. DSM is furthermore conducting a range of experiments with bio-based plastics. Hoex stated: "We do not know yet which type of plastic will prevail in the future: biodegradable plastics made from natural materials; biodurables, which are also derived from organic flows and that are not degradable but are recyclable together with traditional plastics; or the current plastics made from petroleum. Large plastic buyers increasingly demand bio-based plastics."

Challenges

Now that the technology is available, DSM faces two challenges where carpets are concerned: a business model with the largest possible impact and the application of the technology in other products. "We see many unexpected positive side effects. Our carpets are much lighter than traditional carpets, for instance. This is an important advantage in aircraft as well as for the people who have to install or transport the carpets. Yet another side effect is that in contact with fire, there is hardly any smoke development. The circular economy as a starting point for innovation therefore seems to guide us to a path that leads to great benefits for individuals, the environment as well as the bottom line."

'We see many unexpected positive side effects'

Sometimes NGOs or governments can provide support to drive business change, as Hoex explained by referring to another product example. "Electronic waste still largely ends up in India or Africa, where it is burned to recover valuable resources. PVC in electronics causes a lot of damage to the environment and human health, and parties such as Greenpeace have a clear agenda to phase out PVC. DSM has an alternative material to replace PVC, but electronics manufacturers could be reluctant to some degree as this invisible investment in the environment entails additional adjustments. To a certain extent, the success of our solutions depends on whether we can transform a market. We want our customers to be rewarded for the social and environmental value that we enable them to create. NGOs, national governments and other organizations can play a fundamental role in this process."

Renewable energy

Besides waste, the world is faced with an energy and material challenge. DSM also invests in broad application of renewable energy and biomass. Examples that contribute to the shift away from fossil fuels include anti-reflective coatings for solar panels and the production of bioethanol from agricultural waste. For the latter purpose, King Willem-Alexander opened a second-generation cellulosic ethanol plant in Emmetsburg, Iowa (US) in 2014. "It is remarkable that we have returned to energy," Hoex smiled, referring to the early history of DSM as a state-owned coal mine company. "This is a joint venture with the American ethanol producer Poet, in which DSM's yeasts and enzymes convert corn residues into cellulosic ethanol, an advanced biofuel."

Scale up

For the development towards a circular economy, Hoex thinks it is important that multinational companies leverage their ability to scale up. "DSM has several technologies that have every potential to move from a conceptual success to a scalable breakthrough technology. However, we cannot afford to think that a brilliant technology or invention will sell itself. Opinions in society are often not science-based. It is our task to explain to our stakeholders what we do. For example, in the case of cellulosic ethanol production, we need to explain how the partners we work with take care of soil quality by means of techniques including leaving sufficient corn residues on the field."

Alliances

The company generates support by seeking alliances. Hoex explained: "In world cities such as Shanghai and Cape Town, waste and smog still constitute a problem that affects the quality of life and society as a whole, and that presents a huge concern particularly to the authorities. We want to address these problems by involving parties – both conventional and unconventional – who, like us, are deeply concerned about solving them. This means that we take things one step further than traditional stakeholder management. Rather than managing interests, this is all about advancing together, showing equal consideration for equal interests. This is a prime opportunity for companies that can contribute concrete solutions to real societal challenges. In fact, it is quite similar to the 'polder model' we used to apply in the Netherlands, in which regardless of background, people would all join in to build a dike to keep their feet dry."

FrieslandCampina

ABOUT THE COMPANY

FrieslandCampina is one of the largest dairy cooperatives in the world with over 22,000 employees in its dairy operations in 32 countries and 19,000 member farmers in the Netherlands, Germany and Belgium. Together, they produce about 10 billion liters of milk per year.

CIRCULAR BUSINESS MODEL

For FrieslandCampina, both process and product innovations are of strategic importance. One of the latest circular R&D projects focuses on finding a process solution to digest or refine cows' manure into valuable end products such as biogas, recycled minerals and compost. In this program, FrieslandCampina closely collaborates with many different actors within and outside the dairy value chain: other businesses, technology providers, knowledge institutes and the (local) government.

In 2010, the company committed itself to climate-neutral growth. Currently, FrieslandCampina is building the first dairy plant that will partly run on biogas from manure from its own farmers. A pipeline will connect the manure digester of Groot Zevert in Beltrum with the dairy plant in Borculo to provide the plant with biogas, closing the loop.

Advantages of digesting and refining manure

1. Biogas substantially reduces the carbon footprint within the total dairy supply chain.
2. Reuse of phosphate, a scarce mineral and an important component of fertilizer.
3. Compost can be used as an alternative to fertilizer, saving fossil fuels needed to produce fertilizer – an extra reduction of greenhouse gas emissions in the value chain.

BUSINESS CASE

The total volume of manure produced annually by all livestock sectors in the Netherlands is 74 million tons. Wasted manure is a significant cost factor for farmers. A potentially sound business case can be made for 'fractionating' manure into valuable components that can be brought back into the agricultural process, for example as a source of renewable energy. Collaborating with the right partners on manure digestion will help to develop the market for circular products like minerals, compost and biogas.

- **Collaboration -** A successful breakthrough in the upscaling of this circular process of manure valorization depends on the fruitful multistakeholder cooperation between farmers, utility and waste management companies, dairy producers, technology providers, financial institutes and government bodies on a national and regional level. Such a multidisciplinary partnership approach goes beyond the 'regular' skills, expertise and reach of the actors involved.
- **Long-term commitment -** Currently, contracts are basically renewed every year. However, turning this major circular business model – including the investments – into a success will require the partners involved to make a long-term commitment (for 10 years or more).
- **More financing options -** There is a need for financing options that cover upfront investments and enable upscaling, like subsidies made available and off-balance sheet financing options.
- **Harmonized regulation -** On an EU level, harmonized regulation is needed to support the market for fertilizer replacement products within EU countries.

FrieslandCampina

INTERVIEW: Production of biogas moves beyond pilot phase

In July 2015, State Secretary for Economic Affairs Sharon Dijksma gave an interview on Radio 1. She announced her plan to fine a large number of livestock farmers whose cattle produce excessive amounts of phosphate. She has to be strict, because the Netherlands exceeds the European phosphate ceiling of 172.9 million kilograms. "Our farmers are unaware of how fast their production has increased," Jan Willem Straatsma said in apology for the dairy farmers associated with the largest Dutch dairy cooperative FrieslandCampina. "Every entrepreneur aims for growth, and farmers are entrepreneurs. So in actual fact, the sector is flourishing. Marketing high-quality and safe products, they anticipate growing global demand."

Jan Willem Straatsma
Development Manager of Sustainable Livestock Farming Chain Program

Dijksma is about to introduce phosphate rights. This measure would impose a maximum of annual phosphate emissions from the dairy cattle on every dairy farm, including the ones associated with FrieslandCampina. LTO Nederland, the Dutch Federation of Agricultural and Horticultural Organizations, deems such a phosphate cap inevitable, as manure that is dispersed over the land in large quantities greatly affects plant and animal life: biodiversity disappears, ecosystems are disrupted and the groundwater is contaminated. These effects will benefit neither farmers nor anyone else.
A phosphate cap need not necessarily limit the number of cows nor, by consequence, the milk production, according to Straatsma. "Buoyed by innovation, talent and entrepreneurship, we can now also provide a high-quality solution for the manure and CO_2 problems. The key to success in this respect is responsible growth with an emphasis on closing loops."

Not our business

As Manager of the Development of Sustainable Livestock Farming Chain Program, Straatsma is working on a circular business case entitled 'Optimizing the economic value of manure'. "We have been talking about manure for over thirty years," he noted. "It was only three years ago that our then CEO Cees 't Hart said: 'Manure? No, that is not our business.' This was the accepted view until two years ago we drew the conclusion that we needed only ten installations for a total amount of € 13 million to solve a large chunk of the manure problem. More importantly, we saw a business opportunity. We could use components of manure as valuable raw materials in other sectors, such as the chemical industry or the energy industry." At the time, the CEO's remark was in keeping with the prevailing situation at FrieslandCampina. The two group units – the cooperative association with over 19,000 member dairy farmers and the corporation with over a hundred locations and 22,000 employees – then operated fairly independently in the field of innovation and sustainability. This has since changed, mainly as a result of the efforts of the Sustainability department. Farmers and employees convened in nearly 150 regional meetings, which helped them to gain a better understanding of one another's interests, knowledge and skills. The chain collaboration was expanded from quality assurance to include innovative optimization of economic value.

Local

The local communities of dairy farmers and dairy factories welcomed the new approach. These communities traditionally formed the basis of the dairy company, as around 1870, farmers joined forces in local cooperative dairy factories in many places throughout the Netherlands. Various mergers followed, which eventually, by the end of 2008, resulted in FrieslandCampina, with dairy factories in the Netherlands, Belgium and Germany, a company that meets the daily needs for healthy nutrition of millions of people in over a hundred countries. Despite the growth in scale, the local degree of cooperation remained intact – with factories located close to the milk suppliers – and FrieslandCampina was able to maintain the momentum of local collaboration that is so vital to the success of a circular business case.
The first pilot project, 'Optimizing the economic value of manure', has now been successfully completed. FrieslandCampina forged an alliance with waste processing company Omrin in Oudehaske, five farmers from the cooperative, the Wageningen University and Research Center Dairy Campus, and Royal HaskoningDHV engineering consultants. Royal HaskoningDHV provides the technology to extract biogas from manure, as well as organic fertilizer alternatives, minerals, water and fibers. Artificial

fertilizer manufacturers and suppliers, such as Triferto, Cebeco and Culterra, have already expressed an interest in these products in view of their high quality. Especially the biophosphate pellets attract great interest. This indicates that it is now time to scale things up. Together with the farmers, Straatsma is looking into ways to guarantee continuity of supply of the manure to Omrin and is conducting talks with Omrin about the necessary modular adjustments to their waste treatment installations, so that they can adequately respond to market party specifications.

Climate-neutral growth

Even though over-fertilization of pastures is one of the motives behind FrieslandCampina's decision to set up this circular process, there is an even greater interest at stake. The company is particularly interested in biogas as an alternative source of energy for its production locations and transport vehicles. The assumption in the business case is that the farmers supply 100,000 tons of manure to Omrin. The biogas that can be extracted from this quantity will result in a reduction of 10 to 20 kilotons of CO_2 emissions. "This has consequences for our climate objective," according to Straatsma. "In 2010, we made a public commitment to climate-neutral growth when we announced our new growth strategy 'Route 2020'. This means that we have to achieve a reduction of 1,400 kilotons of CO_2 emissions. Our sustainability policy focuses on this CO_2 objective. We have defined seven tools to achieve our objective in our own chain, and the measure that proves most effective is anaerobic digestion of manure. We can achieve half of the targeted reduction in this manner!" Besides Omrin, FrieslandCampina therefore also conducts exploratory talks with parties in Gelderland, where farmers will soon be able to supply 200,000 tons of manure. In addition, a contract was recently signed with a large anaerobic digestion company: Groot Zevert in Beltrum.

'This will be a ground-breaking chain innovation'

Small-scale

Nevertheless, small-scale installations on farmsteads are still necessary to achieve FrieslandCampina's climate objective. This concerns approximately 1,500 to 2,000 installations besides the ten larger installations. Eventually, by 2020, some 8.5 million tons of manure should be processed. "This will be a ground-breaking chain innovation," as Straatsma described the enormity of the task at hand. "In the past, many first-generation anaerobic digestion initiatives have failed because they failed to take distribution, sales channels and specific market demand into account. Adequate organization of the entire chain of using green gas and recycled components from manure for fertilizer alternatives is one of the key conditions for success." A small anaerobic digestion machine costs between € 7,000 and € 8,000. "Unfortunately, this is beyond the budget of the average farmer," Straatsma sighed. FrieslandCampina turned to the national government to apply for subsidy, to no avail. All hopes are now on a green deal that AKZO, DSM, Gasunie, Groen Gas Nederland and FrieslandCampina want to sign collectively with the Ministry of Economic Affairs, and that will recognize the benefits of and encourage multiple optimization of economic value.

Sustainability policy

Besides chain organization, turning the circular process into a success will require a lot more, such as raising awareness among farmers, scaling up and securing funding, as Straatsma enumerated. In 2011, FrieslandCampina introduced the quality and sustainability program Foqus planet as part of the 'Route 2020' strategy. This provides assurance for the sustainable development of every dairy farm. Every three years, the dairy cooperative defines targets in consultation with the member dairy farmers for four themes: animal health and well-being, pasture grazing, biodiversity and nature conservation, and climate and energy. Circular processes are not mentioned specifically, but manure treatment comes under both of the latter two themes. "The term 'circular' does not mean a lot to farmers, but 'closing loops' certainly does," explained Straatsma, who referred to a cooperative that applies itself to manure valorization as a 'green engine'. "Farmers are required to achieve these targets in order to retain their position as suppliers of FrieslandCampina. We also provide financial incentives. Farmers who keep their cows on pasture are paid one cent more for every liter of milk. In addition, they receive a bonus if they manage to save energy, for instance, or if they use an anaerobic digester. This may add up to thousands of euros every year per farmer. The members of the cooperative bring this money in themselves."

Leader

Straatsma said: "Our customers, such as Unilever and Danone, are thrilled about our efforts, because they contribute towards the achievement of their own sustainability objectives. We are their preferred supplier. We hold the joint view that sustainable growth and value creation go hand in hand. It is important to make this visible and tangible in the corresponding business cases." FrieslandCampina would like to create this value in cooperation with the members of the Dutch Sustainable Growth Coalition. Last year, the

FrieslandCampina

company joined Heineken in a meeting to discuss the possibility of partially running one of their breweries on biogas to be generated from manure supplied by local dairy farms. This proved to be just one step too far at that point.

What would be the dream case? Straatsma replied without missing a beat. "Ensuring that the entire dairy farming industry in the region of Gelderland and Friesland is free of artificial fertilizers," he laughed. "Now that would result in an enormous reduction of CO_2 emissions, as the production of synthetic fertilizers costs a ridiculous amount of energy."

Dutch Biorefinery Cluster
DBC (the Dutch Biorefinery Cluster), of which FrieslandCampina is a member, has published a brochure stating that manure valorization is crucial to the realization of a circular economy. It immediately adds the warning that "the sector's focus is still too much on small scale and the short term, and it gives insufficient consideration to business cases that are sustainable also in the long term." It would help if legislation would contribute towards the goals. Current law classifies manure as waste, the disposal of which is subject to charges. Raw materials extracted from manure are likewise treated as waste products and are subject to the trade restrictions of the Environmental Management Act.

Roelof Joosten, CEO FrieslandCampina: *"Manure valorization is an iconic example of the circular economy concept applied in the Dutch dairy sector. It results in the recycling of valuable minerals such as phosphates, the production of green gas and fertilizer replacers. FrieslandCampina has started this innovative and challenging journey – which leads also to a substantial reduction of greenhouse gas emissions – together with a number of public and private partners."*

Heineken

ABOUT THE COMPANY

With a portfolio of over 250 international, regional, local and specialty beers and ciders, Heineken has a long history and heritage as a global brewer, building award-winning brands. The company employs 81,000 people and operates over 160 breweries in 70 countries. Sustainability is a core business priority of Heineken and part of the corporate strategy.

Six commitment areas of strategic focus 'Brewing a Better World'

1. **Protecting water resources -** Reduce water consumption in breweries to 3.5 hectoliter of water intake per hectoliters of beer brewed (hl/hl) overall, and 3.3 hl/hl on average, for breweries in water-scarce areas as well as compensate or balance water consumption by production units in water-scarce areas.
2. **Reducing CO_2 emissions -** CO_2 emission reduction targets for production (40 percent), cooling systems (50 percent) and in distribution (20 percent in Europe and the Americas).
3. **Sourcing sustainably -** Procure at least 50 percent of main raw materials from sustainable sources, procure 60 percent of raw materials in Africa through local sourcing and ongoing compliance with the Supplier Code Procedure.
4. **Advocating responsible consumption -** Advocating responsible consumption through Heineken's brands, building partnerships in each of Heineken's markets and taking action at industry level through the so-called CEO Commitments.
5. **Promoting health and safety -** Ensure that health and safety are systematically addressed across the entire Heineken organization.
6. **Growing with communities -** Through direct contributions made locally, shared-value projects and the Heineken Africa Foundation.

CIRCULAR BUSINESS MODEL

Collecting and refilling bottles

For Heineken, implementing circular business models is related to process optimization as well as using raw materials in the most efficient and responsible manner.

To achieve results, the company is committed to 'bringing partners to the table' across the entire value chain.

Heineken's circular approach consists of 4 key activities:

1. **Recycle:** kegs and glass bottles in various markets in Europe and Africa
2. **Reduce:** water and energy use across the entire organization
3. **Renew:** various initiatives to install wind turbines and solar panels at brewery locations
4. **Reuse:** brewer's grains as cattle feed across the world.

Heineken

BUSINESS CASE

During the past six years, Heineken has saved € 75 million as a result of less energy use and water consumption. In 2014, Heineken customers saved in total almost € 20 million in electricity charges, through improved standards for cooling equipment. This is equal to the annual electricity consumption of 46,000 households in the Netherlands.

DILEMMAS AND CHALLENGES

- **Collaboration -** Join forces with societal partners to maintain consumer awareness about green solutions.
- **Legislation -** Make sure that circular processes are stimulated and strengthened rather than limiting innovative power.
- **Organization -** Maintain sustainability focus in all layers of the organization.
- **Strike a balance -** Balance between consumer preferences, innovation and improving circular economy and always demonstrate added business value.

INTERVIEW: 'Circular business is smart business'

'Brewing a Better World' is the slogan of Heineken's CSR approach. Sustainability is one of the company's six strategic priorities, based on pillars such as protecting water resources, reducing CO_2 emissions, sourcing sustainably and advocating responsible alcohol consumption. Although closing loops is not specifically mentioned, the group understands that circular processes are an integral part of sustainability.

Michael Dickstein
Director of Global Sustainable Development

Bas Stok
Sustainability Manager

Circular economy is a well-known concept to the 150-year-old brewer Heineken, as Michael Dickstein, Director of Global Sustainable Development at Heineken, underscored. "Circular business is smart business. We have practiced this for years. The goal is to optimize processes and use resources in the most efficient and responsible way." This starts with key ingredients such as barley and water. The residue that remains after the brewing process, called brewer's grain, has been returned to the natural loop for years, to be used as feed for the local dairy cows. "Waste water, yet another example, is purified and directed to the surface water. And the sediment is taken to biogas plants that generate the power for our brewing process," according to Dickstein.

Heineken bottle

Circular processes are also applied in packaging; by means of barrels, kegs and tanks for the hospitality industry and by means of returnable bottles for Heineken and other brands. The lion's share of beer that is sold in Dutch supermarkets, for instance, is bottled in these return bottles. They are refilled some twenty to thirty times. Large brands such as Heineken and a local premium called Brand have their own bottles. Other brands use the standard Dutch return bottles. All are part of a pool for returnable packaging material. "The beer bottle is the only one of a hundred fifty thousand packaging items in Dutch supermarkets that is actually refillable," recounted Bas Stok, Sustainability Manager at Heineken Nederland. "In the past, more products were sold in refillable containers – think of milk bottles as an example – but they have all disappeared from the supermarket shelves."

Value

For Heineken, keeping the value of the material – such as barrels, kegs, beer tanks and glass – as high as possible is where the art comes in: the more refills, the better. Old and broken bottles can be recycled into new glass applications or new bottles. Stok said: "To me, the circular concept consists of recycle, reduce, renew and reuse. We want the materials that we use to be part of a loop as far as possible. That is why we have intensified our cooperation with partners, including packaging suppliers and waste processing companies." Beyond purely environmental objectives, eco-efficiency is another reason why Heineken pursues the use of returnable bottles and packaging materials. Single-use containers can be twice the price of refill containers. In 2012, Heineken switched from brown bottles to green bottles in the Netherlands. Dickstein explained: "We wanted to create a uniform global identity for the Heineken brand. In addition, the new bottle was lighter in weight which allowed us to reduce direct material costs and transportation costs. The positive impact on our footprint was an additional bonus."

Heineken

Bottles
Heineken annually refills over 100 million bottles in the Netherlands alone. On a global scale, the company achieves a recycling rate of close to fifty percent. Dutch consumers return as much as 97 percent of the beer bottles to the retailers, where they are collected by the brewery's own collection and recycling service. Heineken cleans the bottles and refills them with beer. Stok argued that this closes the loop in the Netherlands. The return system functions properly also in Central Europe as well as in many countries on the African continent, including in Rwanda, DR Congo and Burundi. In export markets such as the US and the Caribbean region, it is more difficult at times, particularly in areas with a less effective infrastructure for collection and processing. Dickstein commented: "In those markets, we gather information about the waste treatment flows and link up with local initiatives. In France, for instance, we have installed crushers at catering establishments to pulverize the bottles so that the glass can be recycled. This is a real opportunity for our on-trade customers as it reduces their volume of waste and as a consequence, the amount of waste levy they have to pay."

Cans
As for the situation in the Netherlands, even though there is no returnable deposit system in place for beer cans, Heineken is very satisfied with the recycling rate, as it recently went up to 94 percent. "The quality of the waste treatment plants has improved significantly. They are now able not only to remove steel from residual waste, but aluminum as well. There is a growing market for such resources," according to Stok.

Innovation
Although the beer bottle loop may be closed in the Netherlands, for all intents and purposes, Heineken continues to focus on circularity. Circular principles are included in the innovation policy. Product specifications are drawn up for the specific purpose of encouraging suppliers to apply ecodesign concepts. Dickstein explained: "This is a task we share with suppliers. We respond to their strategy, and we challenge them as well." Stok added: "We encourage transportation companies to switch to electric vehicles, and we ask packaging manufacturers to base their designs on lightweight monomaterials."
Moreover, Heineken would like the public sector to promote the circular economy, implementing incentives rather than regulatory policies. Stok stated: "In 2016, the European Commission will present an extensive policy package: the Circular Economy Package. This concerns aspects including ecodesign and packaging. Rules and regulations can be effective in promoting circular processes. However, rules and regulations can also curtail your innovative edge. So we will keep monitoring these developments carefully."

Consumers
Over 60 percent of Heineken's carbon footprint is generated at customers' locations and in the homes of consumers. One example that comes to mind is litter. "Unless consumers are responsible about discarding used packaging, the effect of our efforts will be limited," according to Stok. "Behavior change remains a major challenge. We respond to this by partnering with Stichting Nederland Schoon (Keeping the Netherlands Clean Foundation). In the past, we have also used marketing tools to generate exposure for surprising awareness-raising campaigns. In addition, all of our labels bear the well-known recycling symbol."

Other green initiatives are included in the marketing communication as well, for that matter. This applies, for instance, to the solar panels on top of the roof of Heineken breweries such as the one in 's-Hertogenbosch in the Netherlands. The link that the advertising campaign for Wieckse Witte made with this type of renewable energy proved to be a resounding success. In the first year after publication, their market share increased by 11 percent.

Message
Heineken's view is that every green investment should add value – by reducing costs, for instance, or by mitigating risks, or by creating new commercial opportunities. That is the main message Dickstein wants to convey. "Business is about added value. All levels of our organization are linked to our sustainability agenda and to indicators that are carefully measured. Three times a year, we report our findings to the Executive Team and to the internal network of sustainability coordinators. In our 2014 sustainability report, we have disclosed the figure of 75 million euros of savings by using less water and energy." Stok added: "We are making significant progress in the development towards circular processes, by remaining true to our core values and leveraging our strengths. Our main strengths are twofold: we have the skills and resources to brew a fabulous product, and we excel at marketing this product."

Heineken

Sustainable agriculture
Collaboration is an essential condition for enhancing sustainability in supply chains. By 2020, Heineken aims to procure 50 percent of its raw materials from sustainable sources. Dickstein explained: "Most of the barley we use in many breweries is sourced in Northern France. We pursue the goal of sustainable agriculture by cultivating the available farm land with the utmost care. For this reason, we increasingly work with cooperative farmers' associations who apply the Sustainable Agriculture Initiative method, a crop rotation method that prevents soil depletion."
In the Netherlands, the Veldleeuwerik Foundation even goes one step further. "Seventy farmers supply us with 8,000 tons of sustainably grown barley for the production of 200,000 hectoliters of beer. In return, we provided the funding for the purchase of flower seeds to be planted at the edges of their fields to promote biodiversity," according to Stok. This is Heineken's way of pursuing the goal of 'sustainable business practice – from barley to bar'.

Jean-François van Boxmeer, CEO Heineken: "The idea of a circular economy is gaining traction. It is a source of inspiration to optimize processes and create new business models. Moreover, it can help foster the competitiveness of Europe and in particular the Netherlands. This concept is a logical next step in sustainable thinking as such. To realize that potential, we require a European policy framework as well as more consumer engagement. For the latter, we have to create a fit between circular economy business models and consumer needs."

KLM

ABOUT THE COMPANY

KLM is a leading air transportation company and part of the Air France-KLM Group. Its core business is transportation of passengers and cargo, and providing aviation maintenance services. KLM has over 32,000 employees in 138 destinations.

CIRCULAR BUSINESS MODEL

Reducing on-board catering waste

KLM has set long-term sustainability objectives. With its Climate Action Plan, the company works on a 20 percent reduction of CO_2 emissions per passenger by 2020.
To achieve this target, KLM invests in new and more fuel-efficient aircraft, lightweight materials, on-board flight optimization and the use of sustainable biofuel.

KLM works closely with suppliers and other parties to contribute towards the use of sustainable materials and resources throughout the value chain.

As a transport provider, KLM is largely dependent on its suppliers to provide sustainable and more circular products. The company can be a catalyst in the value chain through procuring more sustainable and circularly produced goods.

KLM has renewed its sustainable procurement policy and its suppliers' code of conduct. Contracts with KLM are subject to the suppliers' commitment to good corporate governance and respect for environmental protection principles. KLM engages a third party to verify the auditing process. Furthermore, KLM has defined more precise ecodesign criteria for in-flight and on-board products, proactively stimulating its suppliers to improve the ecological and social impacts of their products (continuously).

BUSINESS CASE

KLM annually serves 40 million meals, resulting in 12 million kilograms of packaging and residual waste. Until recently, the company focused only on separating this waste and on which flow would yield a profit. Currently, KLM focuses on the front end of the process as well. For example, KLM is studying the options of retrieving monoflows of plastic to increase the recycling share. This was one of the considerations in the choice to replace the glass wine bottles on board by PET plastic bottles. In addition, this contributed to weight reduction and thus to fuel efficiency.
In 2014, KLM produced nearly 18,000 tons of waste. About 26 percent was recycled. The on-board and catering waste from the European flights can be used for many purposes. For years, KLM had two flows: paper and residual waste. Today, the company separates 14 waste flows; paper, wood and glass being the main ones after residual waste. A few other flows may be smaller but represent considerable financial value. For instance, good progress has been made in closing the loops of aircraft components, polystyrene and carpets by reusing and recycling them.

DILEMMAS AND CHALLENGES

- **Institutional obstacles** – Due to strict safety regulations, catering waste from international flights cannot be recycled or anaerobically digested. KLM therefore participates in IATA task forces to influence parties on EU regulatory reforms (e.g., with respect to intercontinental catering waste).
- **Finance** - Another dilemma is that complex changes (e.g., the 'waste-to-energy' process) often take longer than can be covered by grants. If the initial phase fails to produce a good, sufficiently scalable solution, the further development towards full operational scale may not be feasible.
- **Collaboration** - As an airline company, you also need to search for opportunities with and within the surroundings. Take the airport system for example. Are there synergies to be found with the airport's ambitions of becoming a circular airport with seamless flows that are important for KLM as a hub carrier? Or, more specifically regarding waste treatment, would you need to challenge this further than just the airport but consider the Amsterdam metropolitan area (MRA)? Would more insight into resource flows in and out of MRA be needed?

KLM

From Plane to Product: Dutch Design made from aircraft waste
KLM has launched a platform for creative and innovative upcycling projects. KLM and the Design Academy Eindhoven had commissioned a challenge for students to upcycle elements from the interior of a KLM World Business Class aircraft into new products. Chairs, carpeting, safety belts, TV screens; they could pick whatever they fancied as 'raw materials'. The assignment was to design a prototype – within 12 weeks – of a product that would be useful for travelling, and would consist for at least 70 percent of recycled materials. The results were surprisingly practical and inspirational prototypes: slippers, fitness tools to keep active during flights, a cell phone booster, and a 'privacy hat'. The eight winning designs were exhibited in a spectacular display in the Bijenkorf department store in Amsterdam.

INTERVIEW: 'Product designers and buyers need to adopt a circular approach'

Late in the 1980s, KLM set up the KLM Environmental Center, prompted by environmental laws and regulations. Today, roughly thirty years later, ambitious sustainability goals have been integrated into the corporate strategy and organization, leading to investments in the development of closed loops for fuel and catering.

Herbert Aalbers
Environmental Manager

To Air France-KLM it is obvious that natural resources are being exhausted. The World Business Council for Sustainable Development, for instance, has indicated that crude oil reserves are nearing depletion by 2050. "We need biofuel," according to Herbert Aalbers, Environmental Manager at KLM. "Biofuel can improve our CO_2 footprint by 80 percent when used on a large scale. In addition, it is the only way to preserve the finite oil reserves in a growing demand for aviation and to contribute to renewable energy developments."

For this reason, KLM leads the way in sustainable aviation biofuel development. In 2010, the airline company founded SkyNRG, a supplier of biofuel, and in 2012, KLM launched the KLM Corporate BioFuel Program. This program promotes the demand for sustainable biofuels that meet the most stringent technological and ecological requirements as set out by the Round Table on Sustainable Biomaterials (RSB). "This standard is globally acknowledged as providing the best assurance of sustainable biofuels production," according to Aalbers. "Corporate customers can join the KLM Corporate BioFuel Program. Participants pay a surcharge that covers the difference in cost between biofuel and traditional kerosene. This surcharge is fully used for the purchase of sustainable biofuel. Through these partnerships, members confirm their leadership and actively contribute to the development of a market for sustainable aviation biofuels. Among other members of the Dutch Sustainable Growth Coalition, DSM, Heineken, Philips and FrieslandCampina have joined as well."

Circular process
According to the environmental manager, biofuel facilitates a circular process as the energy is generated from decaying plant waste and biomass that does not compete with food production, as well as from used frying oil. The CO_2 that is released in biofuel-powered flights was previously absorbed by plants that were used as a resource for biofuel. In 2011, KLM operated the world's first commercial biofuel flight, marking the start of a series of biofuel-powered flights to destinations including Paris, Rio de Janeiro, New York, Aruba and Bonaire. "The development proceeds step by step," Aalbers observed. "What is important now is to ensure that the rest of the aviation industry and the government as well remain alert to the fact that this is the only option if we want to achieve a more sustainable aviation system." Air France-KLM, for one, has adopted ambitious sustainability goals for CO_2 emissions. Besides the 20 percent CO_2 emission reduction per passenger in 2020, growth of the transportation sector must be carbon-neutral as from that year, and by 2050, CO_2 emissions by the fleet should be reduced by 50 percent compared to the levels of 2005.

Development
Aalbers pointed out that KLM's development towards a more circular business model has been a gradual process. In the late 1980s, compliance with environmental laws and regulations was paramount. In view of this perspective, KLM set up the KLM Environmental Center (Dutch abbreviation: KMC), which processes waste water and hazardous waste originating from maintenance units of the airline company's engineering & maintenance division. In the 1990s, the introduction of the environmental management system broadened the focus to include not just compliance with the law but also continuous improvement of environmental performance.

'We apply the circular principles by minimizing waste in our supply chains and by using renewable energy'

The next step was taken a few years ago as the sustainability policy was revised from a circular perspective. "We apply the circular principles by minimizing waste in our supply chains and by using renewable energy. In reality, the circular economy is not a new concept, but rather an amalgamation of existing ideas. In the past, we have applied life cycle analysis and the cradle-to-cradle approach, and we have talked with Michael Braungart, one of the founders of the cradle-to-cradle philosophy. So the idea of closing loops and the systems approach – from purchase to disposal – has been around for a while. In the end, it is important for us to be part of a sustainable mainport Schiphol."

Supply chain
KLM is actively searching for ways to reduce the environmental impact in the entire supply chain and has defined mandatory standards for its suppliers. First of all, they are required to sign the 'Sustainable Development Charter'. In 2014, 75 percent of the nearly five thousand suppliers committed themselves to the charter, promising to implement the universal sustainability principles of the United Nations Global Compact in their operations. These principles cover corporate ethics, employment conditions and the environment. With respect to the environment, suppliers are required to pursue a policy that will minimize the negative impact on the environment of their production processes, and to observe laws and regulations. KLM engages a third party to perform audits and monitors compliance with the charter. Furthermore, KLM has defined specific product specifications for the purpose of encouraging suppliers to develop sustainable products. Aalbers mentioned two interesting examples in this respect. The first concerns the relocation of the laundry services to a KLM building at Amsterdam Airport Schiphol. "This removes the need for the service company to travel far to transport our laundry; the pillows and the blankets." The second example he mentioned concerns the UTZ-certified coffee and sustainable palm oil and soy products in the catering on board. He did, however, qualify his remarks, saying: "We do not always have the option of choosing sustainable products, simply because sometimes there are no sustainable alternatives available, or they are not in stock."

Upcycling
Converting waste into resources, one of the fundamental elements of the circular economy, is another focus area within the airline company for which it has set ambitious goals. "By the year 2020, we strive to recycle or repair all our waste products." In 2014, KLM produced almost 18,000 tons of waste at Amsterdam Airport Schiphol, approximately 26 percent of which was recycled. For years, there were only two flows: paper and residual waste. Today, there are fourteen waste flows; residual waste, paper, wood and glass being the main ones. A few other flows may be smaller but represent greater financial value, such as aircraft components. Aalbers stated: "We are looking into reuse, upcycling, recycling and recovery in order of priority. Together with suppliers we need to consider as early as in the design phase what to do once the product's useful life has expired, and we need to consider alternative funding options, such as lease constructions."

Scrap Plaza
In 2009, this resulted in the setup of Scrap Plaza, a secluded area at the site of KLM's maintenance division, Engineering and Maintenance (E&M), where the various flows of technical waste from aircraft and engines are collected. Aalbers added: "This gave an extra boost to the concept of closing loops and creating value from waste. Wherever possible, the cradle-to-cradle principle is applied, returning discarded materials to the production cycle through external waste treatment facilities." Even aircraft carpets are recycled in cooperation with the Dutch carpet manufacturer Desso. In 2014, KLM provided 39 tons of carpeting with a second life. A third example concerns the 90,000 kilograms of fabric that were left over after the uniforms were changed in 2010. The fabric was converted into a resource, still visible in the blue details in the new carpets aboard the aircraft.

Catering
He furthermore identifies opportunities for circular processes in the treatment of cabin and catering waste. Due to the sizeable quantities involved, efforts in this respect will have a major effect. KLM annually serves 40 million meals and snacks, resulting in 12 million kilograms of packaging and residual waste. "Until recently, we focused only on separating this waste and which flow would yield a profit. Today, we focus on the front end of the process as well. We are studying the options of monoflows of plastic to allow for more recycling, for instance. The main reason why we replaced the glass wine bottles on board by PET plastic bottles was to save weight and thus fuel, but this also contributed to an increased monoflow of PET plastic."

'We hardly have any legal options to recycle catering waste from international flights'

KLM initially focuses on Amsterdam Airport Schiphol. "The cabin and catering waste from our European flights can be used for many purposes. However, we hardly have any legal options to recycle catering waste from international flights. The possible risk of transmission of pathogens has led to strict regulations, forcing us to have the largest share of the residual waste flows of intercontinental flights incinerated within 24 hours. KLM therefore closely follows the efforts of the International Air Transport Association (IATA) to exert influence for more flexible EU regulations. It would help if the government would introduce exceptions for particular cases or reconsider certain provisions."

Trolley
KLM itself will take care of part of the waste treatment process. Employees are encouraged to contribute ideas on how this can be done. According to the environmental manager, one of the conditions for the development towards a circular economy is that solutions should come from the work floor, from people who work with the products in their everyday lives. To illustrate this, Aalbers pointed out the special cup-collecting compartments that now make up a part of every KLM waste trolley on European flights. These are tubes into which used plastic cups can easily and efficiently be stacked. "Our Catering division built a prototype of the trolley with a piece of drainpipe," Aalbers recounted with enthusiasm. When this proved effective, purpose-built tubes were manufactured in low-density PE. Crew members welcomed this innovation with open arms, since not only are they recycling, but they are also saving space in the bins, which resulted in improvement of logistics on board. "The passengers notice it too and we get a lot of positive reactions from them." Not every initiative turns out to be a success, though. Aalbers explained: "Technical limitations sometimes prevent the closing of loops. Solutions may be too complex or too expensive. Collaboration may bring relief. The municipality of Amsterdam is currently conducting a circular economy project to gather information about all of the regional material flows. KLM and Amsterdam Airport Schiphol participate in this project."

Dream
When asked about his dream, he answered without pausing for breath. "Product designers and buyers need to adopt a circular approach. This will enable us to devise solutions at the front end, the design process, instead of at the back end where the waste treatment process comes in, and to create momentum for the circular economy." He is convinced that this will increase the market value of companies as well as products, because consumers appreciate companies that invest in sustainability. "You have to be able to explain the story. In our case, it is vital that passengers notice our true commitment to sustainability."

Pieter Elbers, CEO KLM: "The circular economy underlines smart sustainable system thinking and the efficient use of resources. By reducing our own environmental footprint and collaborating with our sector and supply chain partners to accelerate innovations, we will contribute to a circular as well as a competitive Mainport Schiphol."

Philips

ABOUT THE COMPANY

Philips is a diversified health and well-being company, focused on improving people's lives in the areas of health technology and lighting. Its vision is to make the world healthier and more sustainable through meaningful innovation. The company employs approximately 106,000 employees with sales and services in over 100 countries.

CIRCULAR BUSINESS MODEL

Second life for hospital equipment

For Philips, the circular economy in its simplest form is about decoupling material use and energy consumption from economic growth.
Philips builds on two approaches:

1. Transitioning from selling products to providing solutions as services. By maintaining control over the assets, Philips can lower the total life cycle cost through maintenance, repair, remanufacturing and refurbishment.

2. Designing and manufacturing high-quality products for multiple life cycles, including the integration of used components and recycled materials.

BUSINESS CASE

Philips has been applying circular economy principles successfully to strengthen customer relationships, save costs, develop new markets and grow existing ones.

With its Circular Lighting proposition, Philips sells the service of lighting and not the product. The company focuses on maintenance and service support that provide technology upgrades to extend the life of its products and enable reuse.

In Healthcare-related business, Philips' objective is to enable healthcare providers to deliver better care outcomes at lower costs. To achieve this, it offers solution-based models that avoid capital expenditure and instead focus on ensuring access to technology and functionality.

The company focuses on integral life cycle management of its solutions through long-term partnerships with care providers. To date, Philips has over 40 such alliances globally.

Philips optimizes collaboration between design, production and refurbishment departments to maximize the amount of component reuse after a product's first life cycle. This enables, for example, selling refurbished healthcare equipment at 60 to 85 percent of the equivalent new system price with the same guarantees. The company also reduces costs by using recycled materials in new products. For example, the Senseo Coffee machine incorporates 13 percent recycled plastics into its design.

Circular Lighting at Schiphol Airport

A recent example of light as a service is the partnership for new lighting in the terminal buildings of Schiphol Airport. Through this model, Philips improved serviceability, leading to a 75 percent longer lifetime than of comparable fixtures.

Amsterdam Airport Schiphol pays for the light it uses, while Philips remains the owner of all fixtures and installations. Philips works with Cofely to ensure performance and durability of the system and ultimately its reuse and end-of-life recycling.

Philips

Westchester Medical Center Health Network
With Westchester Medical Center Health Network (WMC Health) in the US, Philips engaged in an unprecedented multiyear enterprise partnership of 500 million dollars. Under a unitary payment structure, Philips assumes the risks and accountability for the ownership, management and maintenance of the medical technology.

DILEMMAS AND CHALLENGES

- **Change in mindset -** In order to move from a product to a service and solutions-oriented business, Philips needs a change in mindset, culture and ways of working at various levels and in diverse departments (supply chain management, innovation and design as well as in sales, marketing and communication).
- **Awareness -** Customers are not yet fully aware of the availability of different types of business models and of the benefits they provide in terms of performance, service levels, total costs of ownership as well as social and environmental impacts.
- **The Internet of things -** This opens up new opportunities for smart asset management that can lower costs and increase customer benefits by exploiting circular principles. Open data standards could facilitate the creation of a service industry in this domain.
- **International legislation -** This is restricting the free movement of refurbished and recycled goods across borders. It was originally intended to control the export of waste, but now hampers circular business.

INTERVIEW: 'It is performance that counts, not the ownership of the equipment'

The quote by Frans van Houten, CEO of Philips Electronics NV, leaves no room for confusion about the agenda. On the wall of the reception hall of the refurbishment facility in Best in the Netherlands, the following quote is displayed in life-size letters: "Like all major transitions in human history, the shift from a linear to a circular economy will be a tumultuous one. It will feature pioneers and naysayers, victories and setbacks. But if businesses, governments and consumers each do their part, the evolution of innovative business models and closed-loop concepts like remanufacturing, refurbishing and parts harvesting will put the global economy on a path of sustainable growth. Many years from now, people will look back on it as a revolution."

Markus Laubscher
Global Circular Economy Program Manager

Nestor Coronado Palma
Director of the Circular Economy Program

Markus Laubscher, Global Circular Economy Program Manager, and Nestor Coronado Palma, Director of the Circular Economy Program in Philips Refurbished Systems, were asked to set this revolution in motion within Philips. They are true champions of the cause – they are passionate, inspired and eager. They share the views of the Ellen MacArthur Foundation and want to implement new business models in which Philips sells medical equipment as well as its performance, marketing performance as a service. "We want to optimize the use of materials, product parts and systems," Coronado Palma explained. "As we sign service level agreements with our customers, it should not matter to them whether the equipment contains reconditioned parts. Philips guarantees optimal performance of the product. What counts is the value of functionality, and we always offer premium value!"

MRI scan
Take an MRI scanner as an example. The magnet in this device accounts for around seventy percent of the value of the scanner: several hundred thousand euros. The raw material for the magnet is copper, and copper is growing scarce. Coronado Palma said: "If you think about it, it would be a shame if recycling would be the best we can do when a product is discarded. All of the energy and labor that went into manufacturing an MRI scanner would go to waste to some extent. Philips is a technology company, and therefore materials and components are just a vehicle in providing the service to the customers. In the end, the operative word is the service delivered by the product, to which materials and components, in turn, are subordinate. For this purpose, we focus on refurbishing, renovation and reuse; recycling should be considered a last option. Therefore, we aim to design our components and products for multiple life cycles."

Philips

Enablers
Coronado Palma referred to four enablers of Philips' circular strategy: service, refurbishing, parts harvesting and recycling. The service aspect includes service and performance business models with the objective to utilise to the utmost the value created with the devices. The electronics company takes care of maintenance, repairs, and updates to hardware and software. In refurbishment, Philips ensures that existing medical systems are upgraded to the quality level of new products. This involves replacing the necessary parts, providing the system with the latest software, and repainting it to provide a look and feel as new. When all this is done, there is no way to tell the difference between a refurbished and a new product. Philips refers to this as 'Diamond Select'.

'It would be nice if we could double the refurbishing business within the next five years'

In parts harvesting, Philips recovers parts from upgraded systems in the field and back ends from refurbished systems. The parts are cleaned, reconditioned and tested in accordance with new parts test protocols. Once harvesting is no longer an option, the residual material will be recycled to extract the last bit of value. This will be arranged by a professional recycling company and will yield a residual financial value too. "It would be nice if we could double the refurbishing business within the next five years," Coronado Palma stated. "A single-digit percentage of hospital equipment is currently returned. Our goal is to increase this to double-digit rates within the next five years."

Circular Lighting
In the Circular Economy group brochure, the electronics company emphasizes that the basic principles of the new way of thinking are not all new: "Philips has operated refurbishment and recycling programs for over twenty-five years." As raw materials and fossil fuels are becoming increasingly scarce and expensive, closing loops and efficient use of raw materials is a necessity, now more than ever before. Three years ago, the lighting division played a pioneering role in this respect by launching the 'Pay per lux' circular lighting model in conjunction with architect Thomas Rau. The model was a great success. Just recently, in April of 2015, the news was announced that Philips will lease out lighting solutions to Schiphol Airport. Philips will retain ownership of all of the lamps and fittings, and Schiphol pays for the hours the lights are on. By consequence, it is in Philips' interest to design a lamp that will last as long as possible. And in the unlikely event that a lamp breaks, Philips aims to reuse the raw materials.
Coronado Palma smiled. "A pioneering role? No, no, that is not right. It just seems that way as the marketing is better, with a greater focus on the consumer market. We focus on hospitals, which is an entirely different story." The brochure mentions the example of the Gross Grönau radiology clinic of the University of Lübeck, that has leased the Philips Diamond Select Advance MRI system for a number of years now. This system contains a 3,000 kilogram previously owned magnet. Philips has issued a certificate to the effect that this magnet will last for at least a decade. Furthermore, an upgrade was performed to reduce the system's energy consumption by fifty percent. "As a result, it is now within budgetary reach for the clinic," Laubscher said. "This enables us to expand into new markets as well."

Promoting leasing
Leasing may not be a new concept, but promoting it in full force certainly is, especially to hospitals that have the resources to purchase Philips products. Another aspect that is new is that Philips develops lease contracts in collaboration with the financial sector. In conjunction with hospitals, Philips now wants to explore ways to increase efficiency in healthcare and reduce costs at the same time. Coronado Palma declared: "The aim is to realize a single-digit annual growth for the lease business, and a substantial growth rate for the reuse of parts." In Asia, Africa and China, where the notion of refurbishing is not yet sufficiently endorsed, according to Coronado Palma, this will present a huge challenge.

"As materials are relatively expensive in developing countries and labor is relatively cheap, people tend to repair everything, but the quality of the repairs is often insufficient to provide quality assurance. Based on this perspective, it is hard for them to understand that Philips products containing used parts are, nevertheless, premium products."

Broad market
Although the Philips Health Systems Circular Economy Program as yet focuses exclusively on hospitals, the company's future ambition is to serve the broad healthcare market. The Personal Health (consumer focus) and Health Systems (professional focus) business group clusters are currently being merged based on a five-year change process. Laubscher stated: "It has been a year now since we started the process and we are analyzing all of the business operations. Our goal in this sequence is to incorporate the circular processes. In our views, health should be approached as a continuum of care: we design products for

prevention, diagnosis, treatment and recovery." Coronado Palma declared: "In relation to the continuum of care, you can take apnea as an example. Patients suffering from apnea experience pauses in breathing or instances of shallow breathing during sleep. Philips manufactures ventilators and snoring masks to prevent apnea at home. In addition, Philips manufactures X-ray machines that enable accurate apnea diagnosis in a hospital setting. As Philips retains ownership of these machines, the company can easily control the product life cycles and optimize the use of the technology, increasing access to this technology and improving people's lives. Laubscher added: "We need an advanced digital infrastructure to make all of our data accessible. This involves, for instance, equipment tracking and tracing to monitor their location and service level and to assess whether upgrades are required or certain parts need to be replaced."

Difficult

It is much more difficult to create a business model based on a lease structure for the consumer market than it is for hospital care. The players are numerous and the return logistics for the collection of obsolete or broken products often present problems. Furthermore, according to Laubscher, consumers are still driven by price when purchasing a product, and they are reluctant to take out subscriptions. And yet, he detects the emergence of a different type of consumers, who are more interested in access and product performance than ownership. The success of companies such as Zipcar and Spotify provides evidence to this effect. "Fortunately, we can choose from a range of business models that hold the middle between sale and lease. Personally, I think that repurchase programs have a greater chance of success. In these programs, consumers who return old products receive a discount on a new and more advanced product. Pilot projects for such programs are already in progress. In addition, we are studying the possibilities of a stepping stone solution: our equipment is used in the hotel and catering industry, housing associations and residential care homes. It is easy to negotiate lease agreements with large parties such as these. It is essential in this respect that the parties adopt or at least embrace our business model – it requires a joint effort. Collaboration is an important element of any circular model."

Five FTEs

Five FTEs have been reserved for the development of circular business cases. "In proportion to a global workforce of 106,000 Philips employees, that is a relatively small team," Laubscher indicated, "but our role is to support the existing functions in transitioning to a more circular approach. The problem we face today is that there are no convenient parameters available yet to demonstrate the extent to which circular processes reduce costs or lead to expansion into new markets. Another obstacle is the fact that the separation of the healthcare and lighting business that is currently in progress, requires our full concentration."

Both gentlemen take the view that Philips should include a KPI (Key Performance Indicator) for circular economy in the group strategy. Laubscher explained: "We research options for quantifying circularity, but in practice, we are confronted with a dilemma: we have to balance the need to perform accurate measurements against the necessity to avoid too much complexity in the implementation. We cannot afford any interruption of business operations merely to conduct circularity measures on the thousands of products Philips has. In addition, the measuring results have to be converted into operational processes. For years, we have developed linear processes. It is not easy to change that. The greatest obstacle is in our own head. People think in a linear fashion, they want to sell or buy."

"We need to encourage our organizations to sell integrated services, performance and solutions, rather than the equipment itself, and offer our customers attractive solution proposals," Coronado Palma added. "The circular economy is about access to the technology and its functionality when needed; I am convinced this will soon be business as usual."

Frans van Houten, CEO Philips: *"Like all major transitions in human history, the shift from a linear to a circular economy will be a tumultuous one. It will feature pioneers and naysayers, victories and setbacks. But if businesses, governments and consumers each do their part, the evolution of innovative business models and closed-loop concepts like remanufacturing, refurbishing and parts harvesting will put the global economy on a path of sustainable growth. Many years from now, people will look back on it as a revolution."*

Shell

ABOUT THE COMPANY

Shell is a global energy and petrochemical company employing 92,000 people in over 70 countries. Growing world population and rising living standards will increase the global demand for energy. Shell's aim is to help meet the global future energy needs in an economically, environmentally and socially responsible way.

The company sets objectives within its individual business units to achieve continuous sustainability performance improvements. Sustainability measures account for 20 percent of the company's annual performance scorecard. Shell improves energy efficiency in its own operations and supports customers in managing their energy demands. Furthermore, the company invests in researching and developing technologies that increase efficiency and reduce harmful emissions in liquids and natural gas production.

CIRCULAR BUSINESS MODEL

Producing sustainable biofuels

Fossil and liquid fuels will be needed in the coming decades to provide for global energy demand. Shell invests in the production of natural gas and renewable sources like wind, solar energy and biofuels. Biofuels can play an important role in the world's transition to a low-carbon energy system.

Shell has been working to enhance sustainability of biofuel feedstock production. The company invests in actively engaging farmers in its biofuel supply chains to produce according to acknowledged sustainability standards and to engage them in certification schemes.

Shell has been involved in the distribution of biofuels for over 30 years. Together with the Brazilian sugar and ethanol company Cosan SA Indústria e Comércio, Shell founded the joint venture called Raízen in 2011. By the end of 2014, 12 out of their 24 mills were certified by the robust Bonsucro multistakeholder standard.

BUSINESS CASE

Although it is complicated to calculate the amount of CO_2 emissions saved, Shell is convinced that producing biofuels sustainably can lead to a reduction in CO_2 emissions. During the sugar cane biofuel production process, all of the biowaste is reused. The crushed dry cane is burned for electricity, more ethanol can be converted from cane waste materials and the liquid waste is returned to the field as a natural fertilizer.

DILEMMAS AND CHALLENGES

- **Competition** – How to strike the balance between investing significantly in renewable sources as a frontrunner, without pricing yourself out of business.
- **Sufficient demand** - If you want to be a leader in sustainable biofuel production, there has to be sufficient market demand.
- **Collaboration** - The need to work in partnerships, including with 'unconventional' partners like companies outside your sector and NGOs.
- **Certification** - Convincing mills to certify is quite a challenge, and convincing smallholder farmers further in the supply chain is a further challenge.

Shell

Collaborative partnerships for sustainable biofuel

Shell believes in innovation by working with partners – a wide range of companies, NGOs, academia and the public sector – to spark new ideas, share knowledge or minimize its operational footprint. Working with partners transparently helps to speed up developments in biofuels, solar power, energy efficiency, water treatment and CO_2 management. Furthermore, it helps Shell employees to improve their understanding of the energy, water and food nexus. Shell has a collaborative partnership with the International Union for Conservation of Nature (IUCN) on biofuel sustainability. IUCN contributed to sustainability analysis for the joint venture Raízen. An IUCN expert group, assessing biodiversity implications of Raízen's implementation of the Bonsucro standard in Brazil, elaborated on some positive effects regarding enhanced biodiversity in the field, the mill and at company management level. The expert report also raised some potential issues and challenges. These were translated into recommendations to assist Raízen in effectively achieving Bonsucro certification while enhancing biodiversity and other environmental benefits of its sustainability efforts.

INTERVIEW: 'We are working to increase the amount of certified biofuels'

Shell expects global energy demand to double by 2050. The number of vehicles in the transport sector will double as well. In the meantime, Shell aims to reduce CO_2 emissions. A bigger share of sustainable biofuels in the energy supply is an indispensable part of the solution. Fortunately, the production of biofuels is a circular process.

Michelle Morton
Biofuels Sustainability Manager

"Now, one may think that low oil prices are a real challenge. And they are, although our industry is used to dealing with them. But the challenge of low oil prices may pale in the face of the challenge of moving towards a low-carbon future." It is Ben van Beurden, CEO of Royal Dutch Shell, speaking at the Oil & Money Conference on 6 October 2015. He takes every opportunity to emphasize that an energy transition is necessary, but also that the demand for oil is likely to grow. "There will be more people on this planet, more people living in cities, and more people buying their first car or refrigerator... I know that some people would like fossil fuels to be replaced by renewables as we speak. But for technical and economic reasons, this can only happen step by step. And it will not happen across the board. Sectors like heavy industry, heavy-duty transport and chemicals need carbon to operate. And the resource base of the other large source for carbon – biomass – is insufficient to meet their demand...if we consider only that portion of biomass that doesn't compete with food."

Involved

"Although we've been blending biofuels for years to meet government mandates, biofuel production is quite new for Shell," said Michelle Morton, Biofuels Sustainability Manager of Shell International, "but we are getting more and more involved. We are learning how farming works. We are keen on responsible farming which safeguards proper land use and protects the environment and local communities." Shell helps farmers to get certified. Producing and using biofuel is consistent with a circular process, according to Shell. The sources, like corn, sugar cane, palm oil and soy, come from plants that capture CO_2 when they are growing; the same CO_2 that is released when biofuel is burned in vehicles. "It is like a loop," Morton confirmed. "It's not a totally closed loop as there is some inefficiency and energy usage in the manufacturing and transportation of biofuels and you have to consider the by-products."

Raízen

Morton is very proud of Raízen, one of the world's largest producers of biofuels today. In 2011, Shell and Brazilian company Cosan set up this joint venture. Shell has invested 12 billion dollars and holds 50 percent of the shares. In 2014, Raízen produced over 2 billion liters of low-carbon biofuel. The source is sugar cane. The production process at the mills is designed to reduce its environmental footprint. By-products are recycled: the solid waste bagasse is burned and generates electricity and the liquid waste vinasse is returned to the fields as fertilizer. Raízen also uses rainwater to water the crops and mechanized harvesting. The mechanization process prevents burning, part of traditional manual

harvesting, and in this manner helps to reduce greenhouse gas emissions.
It is no coincidence that Raízen is a company based in Brazil. Morton stated: "Brazil is a world leader in biofuels. Thirty years ago, the government saw ethanol technology as a fantastic opportunity to reduce the need to import oil and supported the development year after year, while nobody else was doing this. Agriculture is one of the most important industries in Brazil, and the country has the right climate as well as vast expanses of land.

Certification
Shell requires that the biofuels it purchases are produced in a way that is environmentally and socially responsible when reviewed across the life cycle of the production chain. "We are working to increase the amount of certified biofuels in our supply chain," Morton said resolutely. "Typically, it's part of my job to help convince our suppliers and their suppliers (farmers) to get certified. In the long term, it will be about market access. In the short term, we work on trying to develop the business cases to support certification; for example if the farmers change their processes, their yield may go up, their costs for fertilizers and chemicals can drop, there will be fewer complaints from their neighbors, their employees will be healthier... It's very challenging to convince people of this. Initially, they don't believe you, and often prefer to focus on obtaining a premium for their products."

'It's very challenging to convince people of this'

Raízen, who looks after the own operations and sustainability programs, was the first company in the world with a certified sugar cane mill in 2011. It used the robust Bonsucro sustainability standard. Since then, some 50 percent of Raízen's mills (11 out of 24) have been certified. "The mills and the associated land and farming they control are the first part," Morton explained. "The next part is the suppliers – we call them third-party cane suppliers – further in the supply chain. Half of the sugar cane originates from them, it's a big job!"

Solidaridad (Farmer support)
In Brazil, Solidaridad is supporting Raízen with the evaluation of the farmers' readiness for certification. They have developed a self-assessment questionnaire for farmers to complete and with the results found, they develop recommendation reports and action plans to address the gaps. Noteworthy is that the most common gaps are often health and safety practices such as a lack of safe storage for chemicals and the use of chemicals. Solidaridad and Raízen help the farmers to select priorities and to resolve the discrepancies. Morton stated: "In Thailand, another example, we ran a 3-year program for the farmers supplying one of our biofuel suppliers. We went down in the supply chain and helped 800 palm oil farmers to improve their farming practices which then led to certification. Our partner in this training program was Patum Veg Oil, who supplies us with biodiesel made from palm oil. Shell invests a lot in helping the farmers to get a certificate. The costs may be high for a small farmer and the majority of the farmers in Thailand have small farms. In this way, we contribute to the circular economy. We currently buy biofuels from over 100 suppliers around the world, which are blended into our own fuels in many countries in order to meet government mandates."

Mandate
According to Morton, the share of certified biofuels in the energy supply will not increase substantially unless more countries around the world adopt laws that require the biofuels to be certified as sustainable. "Fortunately, Europe does just that with the Renewable Energy Directive. This requires 20 percent of all energy used in the EU to come from renewable sources by 2020 and 10 percent renewable energy in road transport with 7 percent from sustainable biofuels. Under this rule, only certified sustainable biofuels count. We would like to have similar sustainability regulations in other continents."
She explained that around 60 countries in the world have regulations for bio-based fuels. They mandate them for one of these reasons: energy independence (reduce imports), helping their farmers (new market and rural development), and reducing CO_2 emissions. But only a few of these regulations require certified sustainable biofuels. In the 2014 sustainability report, Shell wrote: "We introduced our own sustainability contract clauses back in 2007 when no industry standards existed and certified material was not available to purchase. These contract clauses aim to drive improvements in human rights standards and biodiversity from the biofuels that we purchase. In 2014, over 99 percent of the biofuel volumes that Shell bought and blended into petrols and diesels were covered by these contract clauses, while around 40 percent of these volumes were also certified as sustainable by an independent auditor." Shell participates in the Round Table on Sustainable Palm Oil, the Round Table on Responsible Soy, the Round Table on Sustainable Biomaterials, Research Training and Revolving Funds (RTRF), and Bonds to Grow.

Shell

'As a society, we need to address the issue of how we use our land'

Deforestation

However, Morton still worries, especially about deforestation, one of the gravest consequences of agricultural expansion. Morton said: "As a society, we need to address the issue of how we use our land. It's food versus fiber versus animal feed versus urbanization versus a lot of other uses. The business community as a whole should also discuss its role in society before discussing the role of specific companies. It's about the interconnection between farming and the energy industry as a whole."

Technology

"It is hard to say how big the share of biofuels will be in the future," Morton responded when asked about the ambitions of the oil company. "In 2014, we blended around 9 billion liters of biofuels in our petrol and diesel worldwide, making us one of the largest blenders of biofuels globally. Sugar cane ethanol has one of the best CO_2 performances compared with almost any other conventional biofuel available today in commercial volumes, but the source depends on the country: corn in the US, palm oil in Asia, sugar cane in Brazil and different stocks in Europe. We can get the ball rolling faster if we know what the right solutions are. How can we use the peaks of renewable energy? How can we store it? What is the right direction?"

Shell has advanced biofuel teams and research agreements with experts in leading institutions across the world. The company continues to invest in new ways of producing biofuels from sustainable feedstocks as well as in building pilot plants. The oil company has spent 1.2 billion dollars on R&D by 2014. The goal is serious business. Morton concluded: "We want to decarbonize transportation fuel. Biofuels can be an efficient way to reduce carbon dioxide emissions!"

Ben van Beurden, CEO Shell: "Widespread adoption of carbon pricing. More natural gas. The development of carbon capture and storage. Low-carbon biofuels. Those are some of the key practical things we need to make a lower carbon, higher energy future a reality."

UNILEVER

ABOUT THE COMPANY

Unilever is one of the world's leading suppliers of fast-moving consumer goods with operations in over 100 countries and sales in 190 countries. The company employs over 172,000 people.

Unilever aims to decouple growth from its overall environmental footprint and to increase its positive social impact. This strategy is implemented through the comprehensive Unilever Sustainable Living Plan that entails three major goals for 2020:

1. To help over 1 billion people improve their health and well-being
2. To halve the environmental footprint of Unilever's products
3. To source 100 percent of the company's agricultural raw materials sustainably and enhance the livelihoods of people across its value chain

These goals are supported by nine commitments and annual targets.

Commitment areas Unilever Sustainable Living Plan:

- **Health and hygiene:** To help more than a billion people to improve their hygiene habits and bring safe drinking water to 500 million people.
- **Nutrition:** To double the proportion of our portfolio that meets the highest nutritional standards, based on globally recognized dietary guidelines.
- **Greenhouse gases:** To halve the greenhouse gas impact of our products across the life cycle and to become climate-neutral for our own operations (2030).
- **Water:** To halve the water associated with consumer use of our products.
- **Waste:** To halve the waste associated with the disposal of our products.
- **Sustainable sourcing:** To source 100 percent of our agricultural raw materials sustainably.
- **Fairness in the workplace:** To advance human rights across our operations and extended supply chain.
- **Opportunities for women:** To empower 5 million women.
- **Inclusive business:** To have a positive impact on the lives of 5.5 million people by improving livelihoods of smallholder farmers and increasing participation of young entrepreneurs in our value chain.

CIRCULAR BUSINESS MODEL

Circular thinking and increased focus on packaging

The circular economy principles match well with the Unilever Sustainable Living Plan, especially regarding waste reduction. Unilever focuses on reducing waste from plastic packaging. This objective entails lighter packaging, packaging that lasts longer and packaging that can be reused or refilled. The ultimate goal is to increase recycling of plastic at the end of its useful life, preventing incineration or landfill.

Currently, R&D, product developers and marketers are encouraged to 'rethink' a product in the design phase. They need to sit down together and analyze whether all ecodesign or circular principles have been taken into account throughout the life cycle of a new product.

Consumer awareness and behavior is another key enabling factor to collect waste from packaging after its useful life is over. Unilever invests in several awareness and education programs and sometimes it provides incentives. In areas where waste collection infrastructure is lacking and people cannot read or write, you can motivate people to refill or return old packaging by offering them a financial incentive.

UNILEVER

BUSINESS CASE

For Unilever, the business case is based on ecological, social and economic drivers. Unilever is already affected by increased material prices. Combined with the extended producer responsibilities and the increasing number of countries that implement packaging taxes, the financial drivers to go circular are manifest.

DILEMMAS AND CHALLENGES

- **Change in mindset -** You need to invest a lot of time to change people's mindsets into circular and systems thinking, instead of only recycling and recovery. This starts with leadership, engaging and training executive teams and then other employees involved. R&D and product developers have to 'rethink' product design completely, until the phase of disposal at the end of a product's useful life. Did I take all ecodesign principles into account? How can I generate value from the waste stream?
- **Collaboration -** The challenge is to invest in extensive collaboration throughout the whole value chain with both internal and external actors and stakeholders. Collaboration with policymakers or the government in order to accelerate harmonized waste policies on an EU level will be key to reaching the tipping point for change.
- **Projects with a quick win -** The implementation of Lighthouse Projects – projects with a tangible quick win and a positive business case – is crucial to engage and inspire employees from early on.

INTERVIEW: 'We train both internal and external associates to apply a new way of thinking'

Unilever staff receive training in applying a new way of thinking. This no longer involves merely enhancing the key qualities of innovations. Instead, it focuses on sustainable development and the circular economy as a driver of innovation and growth. Outside the company, Unilever offers educational programs in several countries. Consumers need to be made aware of the value of waste products.

Gavin Warner
Director of Sustainable Business

Louis Lindenberg
Packaging Sustainability Director

Christiaan Prins
Head of European External Affairs

"When CEO Paul Polman introduced the Unilever Sustainable Living Plan in 2010, he talked about a vision that set out to decouple growth from resource contraints," recounted Gavin Warner, Director of Sustainable Business at Unilever. "This is the exact same principle behind the circular economy model. Polman was strengthened in his conviction when he met Ellen MacArthur in person. He was inspired by how the circular economy model could act as a catalyst to identify new ways to tackle and to extract value from waste."

Sustainable Living Plan

The Unilever website explains the Sustainable Living Plan: "Our purpose is to make sustainable living commonplace. The Unilever Sustainable Living Plan will help us double the size of our business while reducing our environmental footprint and increasing our positive social impact. We can help to change things on a global scale: deforestation and climate change; water, sanitation and hygiene; and sustainable agriculture and smallholder farmers."

"The targets are an integral part of our organization," according to Christiaan Prins, Head of European External Affairs. "They have become part of our DNA. That is a train that cannot be stopped." Warner added: "Our managers want innovations that will help to reduce the use of resources, energy and water. Circular thinking can help in this respect; there is no need for coercion. Today, I receive more requests than ever before to explain the principles of the circular economy to colleagues."

UNILEVER

Mindset

Many of the Unilever researchers responsible for the development of products and packaging already have a circular mindset. Before, they would design for a one-year life span, and thought that recycling of detergent bottles, for instance, was not worth the hassle. "The basic idea was that once products were shelved in stores, they were no longer our responsibility," Prins stated. These days, product designers give serious consideration to value creation for the materials that are left over after consumption of the products. This circular thinking has resulted in refillable detergent packages as well as deodorant aerosols that use 33 percent less aluminum than the conventional aerosols. There is still a lot of work to be done, for Unilever markets four hundred global brands and their corresponding packages, including Omo, Dove, Axe, Knorr, Ola and Lipton. People are not put under pressure, though. "We do not force or coerce people to think in terms of circular processes. We do not even provide incentives, for that matter. We want our people to take this journey in their own way, step by step. As there are savings to be made, especially in packaging, the first steps are already being taken," according to Warner.

Lighthouse

Louis Lindenberg, Packaging Sustainability Director, points to several projects, the so-called Lighthouse Projects, that the group kicked off in 2014 for the purpose of piloting a set of circular principles which can be applied across Unilever's product categories and portfolios, starting with packaging. Ellen MacArthur had such a powerful message, it sent a jolt of excitement through Unilever, as he perceived it. "For many, many years, in many, many countries, companies have focused on repairing and recycling. Ellen MacArthur made us understand that fast-moving consumer goods (FMCG) had not yet been included in the circular economy to a large scale."

In the United Kingdom, Unilever is taking part in a two-year project entitled 'Project Reflex'. Companies from across the supply chain work together in this project, including Amcor, Axion Recycling, Dow Chemical, Nestlé, SUEZ (former SITA UK), TOMRA, Interflex Group, and Unilever. Lindenberg outlined the basics: "The project aims to create a circular economy for flexible post-consumer packaging, such as plastic pouches. The government co-funded the project under the Innovate UK scheme, because as much as 32 percent of consumer waste in England consists of flexible plastic packaging.

Soup

Reflex is important to the FMCG industry as increasing quantities of products are packed in flexible bags. For example, whereas soup used to come in tins, today a large portion of it is packed in pouches that are lighter and take up less space. This allows savings on transport costs as well as CO_2 emissions. The disadvantage is that the pouches consist of composite materials for which there is currently no technology to separate them. The plastic pouch is, therefore, not recyclable. In addition, the research aims to unlock new sorting techniques that will allow for recyclable flexible plastic packaging to be separated from other nonrecyclable flexible materials in a Materials Recovery Facility (MeRF). Lindenberg emphasized that Reflex is looking for practical and cost-effective solutions for this purpose, both for brand manufacturers and retailers. Prins raised a delicate question on this subject: "What if the study results show that separating materials is more expensive than producing these bags from new materials?" He feels that the government should create consumer demand for recycled packages so that the tipping point can be reached through increase in scale.

Warner underscored the importance of instruments such as the extended producer responsibility (EPR). "I would support economic instruments like EPR, which are likely to be deployed in more and more countries around the world, provided they meet important criteria such as ensuring all members of the value chain share responsibility and that costs are proportionate to the environmental benefit realized. This would encourage companies to take greater consideration for type and amount of materials used in packaging."

Lessons

Unilever considers education and creating awareness to be the second main condition for the development towards a circular economy, and relative to other multinationals, the company invests heavily in these aspects, both internally and externally. Warner is responsible for the internal paradigm shift and has developed a three-year program for this purpose that was launched in 2014. "The principles of the circular economy are being included in the management training programs, with key design principles already integrated into training for R&D pack designers. They are actively promoted by our managers and directors and they inspire employees to adopt a new way of thinking. Unilever is a global partner of the Ellen MacArthur Foundation. I use the educational materials of the foundation in the training programs for our researchers, product designers and marketers. Moreover, these three departments themselves are actively involved in this partnership." Lindenberg added: "Unilever globally employs around eight hundred packaging engineers. We continually train and develop our people in design for recycling principles and other elements of designing for a circular economy. We develop most of our products and packages at group level, and they are rolled out at a local level."

UNILEVER

Waste bank
Due to lack of technology or infrastructure in some countries, to recycle some of the materials which Unilever uses, the company is setting up projects to promote waste collection and recycling. One successful project is the Waste Bank in Indonesia. Unilever teaches local communities how to set up a waste management system that will earn local residents a profit to boot. Special dedicated Unilever trainers assist in the implementation of a professional approach, in which different types of waste products are separated and collected, people are reimbursed for their waste products, and the waste products are sorted further and where possible sold. Yet another example is located in Brazil, where Unilever works in partnership with companies such as Coca-Cola, Nestlé, Johnson & Johnson and the NGO Cempre to encourage increased recycling through cooperatives (formalized waste pickers). Materials are collected from various drop-off points and taken to the cooperative, where the materials are hand-sorted, baled and sold to recyclers.

Government
Prins emphasized that governments should take their responsibility in influencing consumer behavior and setting up a waste treatment infrastructure. Unilever advocates a harmonized footprint methodology in Europe. Prins explained: "This methodology will enable us to label products, for instance A through G, in which A stands for 100 percent sustainable and G for anything but sustainable. This will set the market in motion, for every company will want to obtain the A label." This seems like a simple solution, but without so much as pausing for breath, he added a warning. "This type of methodology is fairly tricky, though. One can wonder, for instance, what is more 'sustainable', the package that is easiest to recycle or the package that optimally extends the shelf life of the product it contains? Or is it the package that can be reused, such as glass, but the sheer weight of which causes relatively high CO_2 emissions?" "We will have to meet in the middle," Lindenberg argued. "Through materials innovation, and sorting and reprocessing technology innovation, brands and recyclers can come closer together, ensuring maximum value for resources utilized."

Education
Prins stated: "European Commission President Juncker proposed a European investment plan in July of 2014. He wants to generate 315 billion euros in investments, predominantly in energy networks, energy-efficient transport and renewable energy. To realize such an investment, the European Commission has to paint a long-term vision for the circular economy. There are countries in Europe, even today, where waste is landfilled – if it is collected at all. There is no point in putting a recyclable packaging material on the market when it is not recycled. Fortunately, the European Parliament adopted a resolution in July of 2015 that called on the EU to set binding recycling targets. "Waste is business. In the best-case scenario it is a resource, in the worst-case scenario it is energy. The internal market should equally apply to resources from waste. Countries with a proper infrastructure, such as the Netherlands, that even has overcapacity, should be allowed to process waste streams of other European countries. The rules and regulations governing the transport of waste and hazardous materials should be adjusted to accommodate this." Unilever and a number of other companies, including Philips and DSM, advocate government policies that will enable closing the loops.

Ball
Warner expressed the warning that we are still far away from delivering fully circular innovations. To start the ball rolling, he feels that we need more than just encouraging European policies; the middle managers of companies should be encouraged to focus on the long term. "They need support in building the business case for circular initiatives that consider externalities like EPR (Extended Producer Responsibility) and even longer pay-back periods. He also feels that changing consumer behavior is one of the greatest challenges. "Their current behavior is consistent with a system that was built up over many years. You cannot change that overnight." Although he does not have many examples of 'fully' circular innovations in packaging in fast-moving consumer goods – beyond the returnable bottle system of the beer industries – he is definitely passionate about the circular economy, "even though we still have a long way ahead of us to get there."

6 Conclusions & Recommendations

Both the economy and society as a whole would benefit greatly from embracing circular principles. It would lead to more jobs, reduced environmental burden, and economic growth. All companies, as shown by the DSGC cases, take their own approach, as they all operate in different markets and value chains. The sooner companies successfully implement a new, more circular business model, the sooner they can start reaping the benefits of being ahead of the curve.

6.1 Conclusions

The individual approach to implementing circular business models differs greatly among companies and the same goes for the members of the DSGC.

Where Philips focuses on long-term service partnerships, DSM invests in bio-based and nontoxic components to enhance recyclability, and amongst others, Unilever looks for more sustainable packaging solutions. They have all started their journeys to embed circularity in their organizations, step by step.

A commonly shared conclusion is that the business case must be sound and generate financial, ecological as well as social value. Furthermore, effective collaboration is crucial for a feasible circular product or service design, both externally in the value chain and internally by the various departments engaged in product development.

On their journey of building circular business models, DSGC companies recognize the need to persevere and to take a long-term perspective, as this transition takes time. After all, going circular is clearly a process of learning by doing and of testing new solutions. Simultaneously, it is about directing the organization in the transition and 'rallying the herd'. Success will highly depend on leadership, building confidence and forging long-term partnerships, a carefully thought-out approach and ample consideration of the change process and interventions to use.

"A great many Dutch companies are in the process of rethinking their business models with a focus on sustainability. I am convinced that this will result in a massive positive contribution to their ecological and economic performance. Planet, profit and people will benefit, and that is what counts for society and the global trademark of the Netherlands."
Hans de Boer, President VNO-NCW

6 Conclusions & Recommendations

6.2 Recommendations

Based on what they have learned in practice, the DSGC companies would like to highlight a few recommendations, as they may provide valuable leads for the accelerated implementation of circular business models.

1 Take a holistic perspective

In order to build a circular business model, companies must, by definition, explore beyond the boundaries of their own organization. Taking the holistic concept starts with the realization that as a company, you are part of a greater system. This requires a structural development of thinking in terms of systems. We plead for 'transformational leadership' - leaders who think holistically themselves and are capable of developing this mindset, combined with entrepreneurial, innovative skills. Supporting the management team to become effective leaders of change is a critical success factor.

2 Incorporate circularity explicitly in your corporate strategy

Developing a circular business model is an essentially new approach to doing business. It is not a small-scale project or a few noncommittal experiments. Circularity impacts the entire organization over the longer term. Therefore, integration in the corporate strategy is advisable.

3 Partner up in an early stage with all of the different actors involved

Collaboration from the earliest stage is crucial for the implementation of a circular business model. In the internal organization, this means that various departments, such as Marketing, Sales, and R&D, should be involved early on in the process of creating the circular process or product. It also means that partnerships should be set up with (new) suppliers and (new) customers. And finally, banks or other financial institutions should be regarded as valuable chain partners who should be involved early on in order to ensure that the circular business model will succeed and that the business case is viable and complete.

4 Choose your entry point to tap into the circular potential

Circularity is not a goal in itself; it is a way of thinking and working, a driver and enabler of innovation and new business. As shown by the case examples of DSGC, there are many different ways and entry points for developing a (more) circular business model. It is particularly this flexibility – based on principle-based thinking – that offers opportunities to implement circularity successfully in every business and to ensure its congruence with the long-term strategy.

5 Tell the circular economy story

Particularly the ability to build up confidence within the organization that the (long-term) agenda is justified is essential according to the DSGC companies. The 'tone at the top' is crucial in convincing people of the importance of a more circular business model and its underlying principles. They need to convey this message actively, frequently and in words that people can understand. Storytelling in a creative way, in a way that appeals to people and that they can relate to, will inspire the desired change in behavior in the internal organization. Sharing quick wins in practice (at product level) can be effective externally as well. If inspirational stories become more accessible for consumers, they will become more aware of the importance of sustainable products and services, and they can be encouraged to embrace the transition we are making and that we are shaping together.

6 Change the rules of the game

DSGC advises the Dutch government to start developing a vision on the transition in society from a linear economy to a far more circular economy. That vision should ideally be developed on the scale of the markets; for mainstream products and chains, a European scale will fit. Part of that vision should be an analysis of the role of different 'players', especially companies and consumers. Governments must come up with an overarching approach to encourage and facilitate companies and consumers to shift to more linear concepts and processes. Regarding new regulations, the DSGC would be in favor of a 'circular economy assessment' in order to ensure new policies and regulations will enable or even accelerate the shift towards a more circular economy. Existing regulations and policy schemes should be evaluated to identify those regulations that fundamentally hamper circular initiatives and products. The next step will be to propose an alternative policy in favor of the circular economy.

Bibliography & Colophon

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