



Circular Economy & SDGs

How circular economy practices help
to achieve the Sustainable Development Goals

Foreword

Tjerk Opmeer, Netherlands Enterprise Agency

When Dutch entrepreneurs have ambitions to take their business abroad, they can count on the Netherlands Enterprise Agency to help them. We aim to improve opportunities for entrepreneurs, strengthen their position and realise their international ambitions through funding, networking, know-how and support for compliance with laws and regulations. The Netherlands Enterprise Agency is dedicated to helping Dutch sustainable, agricultural, innovative and international businesses develop and grow in markets around the world.

In 2015, 193 nations agreed to tackle the world's biggest challenges by approving the Sustainable Development Goals. It set out a framework that now serves as a joint starting point for a conversation about ambitions and possibilities for entering into new partnerships. We set about working with the SDGs immediately. For instance, the Netherlands Enterprise Agency implements the SDG Partnership facility (SDGP), a Ministry of Foreign Affairs programme that contributes to the implementation of the agenda for aid, trade and investment. The SDGP focusses on three major cross-cutting themes: gender, circular economy and climate. That is why we increasingly see a connection between the UN Sustainability Goals and the transition to a circular economy in our daily activities.

Exploring, debating and making actions visible in the relationship between circular practices and the SDGs is therefore relevant to the continued development of new, innovative solutions. We see promising opportunities for business partnerships in a great variety of sectors, with the circular economy as a cross-cutting theme.

To address the circular economy theme, the Netherlands Enterprise Agency has joined forces with Holland Circular Hotspot. Through this partnership, we ensure access government instruments and the associated network of companies, knowledge institutions and governments, both at national and international level.

Tjerk Opmeer

Director International Programmes, Netherlands Enterprise Agency

Foreword

Freek van Eijk, Holland Circular Hotspot

The 17 Sustainable Development Goals (SDGs) are the world's best plan to build a better world for people and our planet by 2030. Adopted by all United Nations Member States in 2015, the SDGs are a call to action by all countries – poor, rich and middle-income – to promote prosperity while protecting the environment.

The circular economy, an inspiring concept that is gaining tremendous traction worldwide, is concerned with the effective scaling of sustainable economic models within planetary boundaries. The principle of extending the lifecycle for materials – to keep the value of products and materials in the loop as high as possible for as long as possible – is central to this vision, as is the transition to renewable energy, respect for biodiversity, societal balance and social inclusion.

Working on the circular economy means working on the majority of SDGs, not as a cost item but as a business model. In some areas of the world, action takes place under the framework of the SDGs; in other countries, climate issues are the dominant driver for action. Some focus on measures that are creating sustainable and economically viable cities, while there are also regions such as ours which set out on the transition towards a circular economy.

We want to show how the circular economy helps to achieve the Sustainable Development Goals. In our view, the myriad ways that people and businesses interact are rife with opportunity. The circular economy can start small and deliver results 'close to home', creating new pathways for collaboration to preserve and create value. Examples such as revitalised building, meaningful jobs or improved mobility can become powerful drivers for innovation. Inspiration strikes. Demand grows. Good ideas can jump from neighbourhood to neighbourhood, each in their own context and with their own local hero.

Circular examples from various market segments that are closely linked with SDGs such as agri-food, manufacturing and the built environment are included next to cross-sectoral topics such as consumer goods or plastics. We do not aim to be complete or comprehensive, only to inspire you to find ideas that can be adapted to your reality.

Technology is an important theme, but other challenges lie in the realm of social innovation, design and coalition-building. The transition to the circular economy requires systemic change and asks for collaboration. A local government can set the ambition (urgency), define boundary conditions and nurture experimentation. Researchers and knowledge institutes can develop new insights and tools, validate ideas and boost awareness. Local entrepreneurs have the guts and imagination to take risks, accelerate change and deliver scale. Meaningful participation by citizens and residents is also crucial, as is educating the leaders, employees and consumers of the future.

The Netherlands is at the forefront of many of these processes. The Dutch inhabit challenging terrain, a delta, where successive generations have worked hard to create a vibrant society in a densely populated and early industrialised country. This environment has made us innovative and collaborative: a living lab to pioneer solutions for global challenges. Over 150 years, we have learned which government interventions work and which do not. Often, we have learned the hard way – from experience.

By joining forces, Holland Circular Hotspot and the Netherlands Enterprise Agency have shared insights, networks and resources. We hope that this brochure can help you to kickstart circular developments that will boost the SDGs in your region. Please do not hesitate to contact us for further information.

Freek van Eijk
CEO, Holland Circular Hotspot





Introduction

We have looked at the Sustainable Development Goals as they offer a well-known framework for dialogue at an international level. This will enhance the appeal of this brochure to a wide international audience, which is what we want to achieve. The SDGs are also an excellent vehicle for driving the circular economy. In this brochure, the Netherlands Enterprise Agency and Holland Circular Hotspot have joined forces to gather information, and share knowledge and experience on circular solutions which have the potential to inform and inspire parties.

In our search for information about the circular economy and the Sustainable Development Goals, few scientific publications seemed to be available (you will find a reference in the introduction about Circular Economy). In this brochure, the Netherlands Enterprise Agency and Holland Circular Hotspot have included many circular examples from the Netherlands. We believe that many of these concepts can work and have the potential to be scaled up in developed, as well as developing countries.

Firstly, a number of basic principles within the circular economy will be presented and we will briefly explain how we arrived at this (non-exhaustive) list of SDGs. Secondly, the SDGs will be introduced with initial suggestions on how companies can contribute to them. Then the seven goals with the strongest relationship to Circular Economy will be dealt with in more detail; what issues do the development goals stand for and how can the circular economy help achieve them? For each SDG, we try to provide insight into the possibilities that exist through a number of best practices, in the hope that this inspires further actions worldwide.

In addition to these seven SDGs, we also briefly highlight four more SDGs with a link to circular economy practices. Some of these SDGs have been selected because of the attention prominent institutions, such as the Ellen MacArthur Foundation, have already devoted to them.

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Circular approach

In response to the global challenges of the 21st century, the circular economy has emerged as a viable alternative to the unsustainable linear (take–make–waste) status quo. In a circular economy, resources are not consumed but recovered in a system that is continuous and long-lasting, with the goal of keeping them functioning at their highest potential. Instead of destroying value after the use phase, value is retained through cycles of reusing, repairing, remanufacturing or recycling (see the figure below). For this purpose, we need new business models and innovative product design that makes use of non-toxic materials which can be endlessly recycled. The circular economy shifts wealth and prosperity from our current means of consumption to a system that is continuous and long-lasting. It is a system that is regenerative by design, where the needs of all citizens are provided within the natural means of the earth.

In **‘The relevance of circular economy practices to the Sustainable Development Goals’**, Patrick Schroeder et al.¹ studied the 17 SDGs and 169 targets in a comprehensive mapping exercise.

The study showed that the strongest relationships and synergies between circular economy practices and SDG targets lie within SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth), SDG12 (Responsible Consumption and Production) and SDG 15 (Life on Land), which have high scores both for direct and for indirect contributions.

Throughout this brochure, the basic principles of a circular economy will be discussed and referred to. As a number of circular principles will repeatedly appear in this brochure, we have included the following diagram (source: PwC²).

The diagrams illustrate the continuous flow of resources in both the production/distribution phase and the consumption phase.

Circularity in the production/distribution phase is anchored in four strategies (1–4) that aim to maximise the use of renewables and to minimise value leakage across the value chain.

Circularity in consumption includes six strategies (5–10) that reduce value leakage by circulating products and materials at their highest utility through sharing, reusing, repairing, remanufacturing and recycling.

The end of life of a product represents value leakage, as important by-products are not collected for productive reuse. Instead of leaking value by discarding products and materials after use, the circular economy stops this value leakage in order to yield more value.

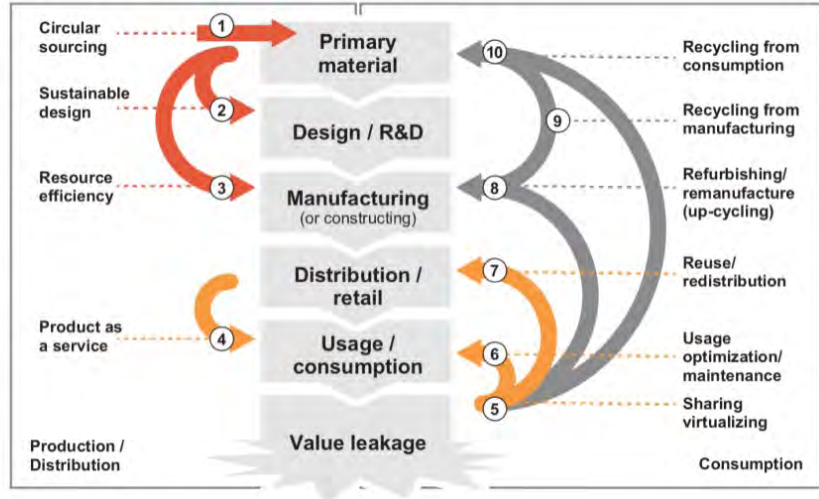
1 Schroeder, Patrick and Anggraeni, Kartika and Weber, Uwe, The Relevance of Circular Economy Practices to the Sustainable Development Goals (February 2019). *Journal of Industrial Ecology*, Vol. 23, Issue 1, pp. 77-95, 2019; available at SSRN: <https://ssrn.com/abstract=3344675> or <http://dx.doi.org/10.1111/jiec.12732>.

2 PwC, The Road to Circularity, 2019; <https://www.pwc.de/de/nachhaltigkeit/pwc-circular-economy-study-2019.pdf>.

3 Principles



& 10 Corresponding Strategies



CE initiatives		Definitions
Prioritise renewable inputs	① Circular sourcing	Replace finite resources / materials with renewable, bio-based, or recycled materials in the production process
	② Sustainable design	Design products - and select raw materials - such that they can be effectively disassembled, reused, repaired and up-cycled
	③ Resource efficiency	Optimise usage of raw materials / resources – minimise waste – in the production process
Maximise product use	④ Product as a service	Provide a service in areas that were traditionally sold as products; increases the product lifecycle through repurposing at the end of usage
	⑤ Sharing/virtualising	Share durable assets such as cars, rooms, appliances, and digitise products to increase their lifetime (e.g., books, music, shopping, autonomous vehicles etc.)
	⑥ Usage optimisation/maintenance	Increase performance / efficiency of a product and prolong life through maintenance
Recover by-products and waste	⑦ Reuse/redistribution	Purchase and sell second-hand and previously owned products to increase product lifecycle
	⑧ Refurbishing/remanufacture	Remanufacture products or components for a new usage, instead of down-recycling
	⑨ Industrial symbiosis Recycling from manufacturing	Waste or by-products from manufacturing become the inputs for another product
	⑩ Recycling from consumption	Recycle discarded materials after the end of consumption

Figures 1 & 2 PwC's 3 principles & 10 corresponding strategies.

Sustainable Development Goals

Adopted by world leaders, the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development officially came into force on 1 January 2016. Over the next fifteen years, with these new Goals that universally apply to all, countries will mobilise their efforts to end all forms of poverty, fight inequality and tackle climate change, while ensuring that no one is left behind.



What makes these seventeen goals unique is their call to action by all countries – poor, rich and middle-income – to promote prosperity while protecting the planet. They recognise that ending poverty must go hand in hand with strategies which build economic growth and which address a range of social needs, including education, health, social protection and job opportunities, while tackling climate change and environmental protection.

Business and SDGs

In its flagship report '**Better business, better world**'³, the Business & Sustainable Development Commission made a business case for the SDGs; it mapped the economic cost for companies to become aligned and guided businesses in achieving the SDGs.

'Achieving the Global Goals opens up US\$12 trillion of market opportunities in the four economic systems examined by the Commission'

3 *Better Business, Better World (2017)*. Business & Sustainable Development Commission.
<http://report.businesscommission.org/report>.

Taking the UN's new Global Goals for Sustainable Development as the basis for its action plan, the Commission explains how businesses (as partners for governments and civil society) transform their own prospects and may outperform those stuck in yesterday's economic game by basing themselves on the return on capital, not just responsibility.

The 4 economic systems mentioned are food and agriculture, cities, energy and materials, and health and well-being. These systems represent around 60 per cent of the real economy and are critical to delivering the Global Goals.

To capture these opportunities in full, businesses need to pursue social and environmental sustainability as avidly as they pursue market share and shareholder value. If a critical mass of companies joins us in doing so now, we will together become an unstoppable force. If they do not, the costs and uncertainty of unsustainable development could swell until there is no viable world in which to do business. This is new territory. Moving business to a sustainable growth model will be disruptive, with great risks as well as opportunities at stake. It will involve experimenting with new 'circular' and more agile business models as well as digital platforms that can grow exponentially to shape new social and environmental value chains. Knowing how to move first and fast is critical, as is reducing exposure to the risk of assets being stranded by the shift to low-carbon, more automated economies.⁴

SDGs in your business: how to start

If you are looking for the relevance of your business activities to the SDGs, there are currently several tools and options to get started. For example, PwC developed an SDG Selector for businesses which want to start and first gain insight into how their business intersects with the SDGs. With this tool, businesses can filter results (see which SDGs are most closely linked) by selecting particular industries, geographies or themes.

It is a useful starting point for companies looking to cut through the complexity and get a high-level grip on how their business intersects with the SDGs.

Take a look for yourself at: <https://dm.pwc.com/SDGSelector/>

For Dutch businesses, sdgnederland.nl also offers guidance, information and access to platforms (e.g. SDG Gateway).

4 *Better Business, Better World (2017)*. Business & Sustainable Development Commission.
<http://report.businesscommission.org/report>.

SDG 2

Zero Hunger

2 ZERO HUNGER



END HUNGER, ACHIEVE FOOD SECURITY AND IMPROVED NUTRITION AND PROMOTE SUSTAINABLE AGRICULTURE



MILLIONS MORE ARE LIVING IN HUNGER



821 MILLION
WERE UNDERNOURISHED
IN 2017

UP FROM

784 MILLION
IN 2015

TWO THIRDS
OF EXTREMELY POOR
EMPLOYED WORKERS
WORLDWIDE ARE
AGRICULTURAL
WORKERS



TWO THIRDS
OF UNDERNOURISHED
PEOPLE WORLDWIDE
LIVE IN TWO REGIONS:

SUB-SAHARAN
AFRICA

SOUTHERN
ASIA



237 MILLION

277 MILLION



22% (149 MILLION)
OF CHILDREN
UNDER 5
ARE STUNTED



5.9% (40 MILLION)
OF CHILDREN
UNDER 5
ARE OVERWEIGHT



7.3% (49 MILLION)
OF CHILDREN
UNDER 5
ARE AFFECTED
BY WASTING



SDG 2 Zero Hunger

End hunger, achieve food security and improved nutrition and promote sustainable agriculture.

Sustainable Development Goal 2 focuses on extreme hunger and malnutrition, as these themes remain barriers to sustainable development and even work downwards (less productive individuals, more prone to disease and unable to earn more for improving their livelihoods).

At the moment, more than 800 million people suffer from hunger worldwide and the number of people going hungry has increased since 2014. The prevalence of undernourishment remained virtually unchanged in the past 3 years at a level slightly below 11 per cent⁵.

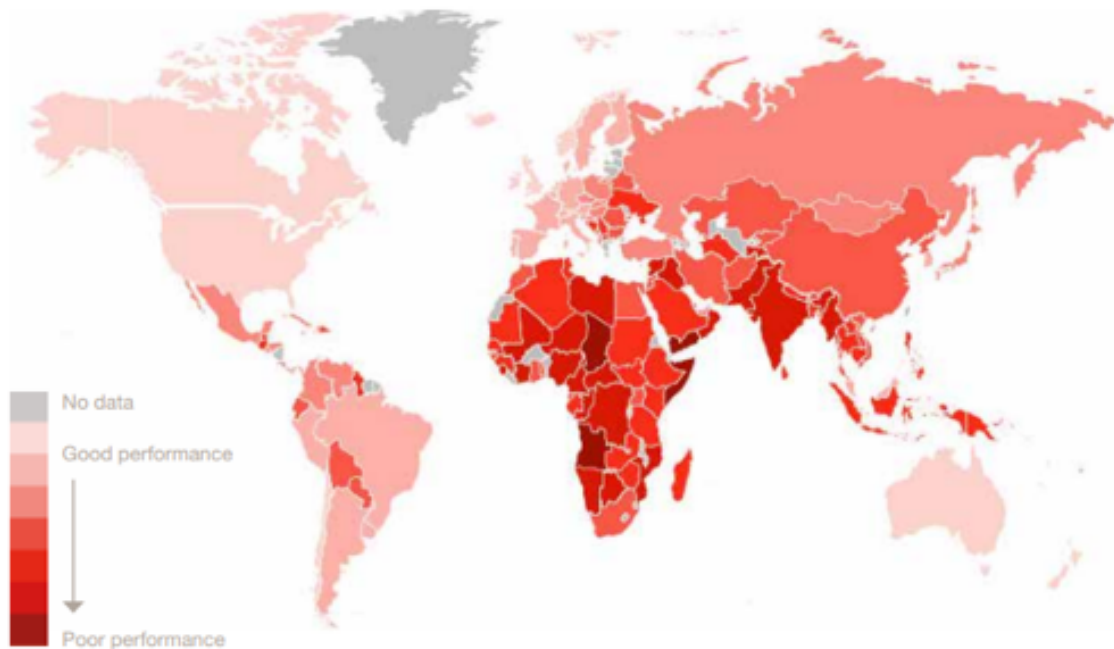


Figure 3 Global Goals (PWC, 2016); www.pwc.com/globalgoals.

Climate-induced shocks, civil insecurity and declining food production have all contributed to food scarcity and high food prices. Investment in the agriculture sector is critical for reducing hunger and poverty, improving food security, creating employment, and building resilience to disasters and shocks. Food safety is not just about producing but also about reducing food losses in the value chain. To give an idea of the extent of food loss: if global food loss and waste were a country, it would rank as the third-largest emitter after the United States and China⁶.

5 SDG2 Zero Hunger: Why it matters, 2016;
www.un.org/sustainabledevelopment/wp-content/uploads/2016/08/2.pdf.

6 Food Waste Footprint & Climate Change. Food and Agricultural Organization of the United Nations, 2015;
www.fao.org.

Contribution of each phase of the food supply chain to carbon footprint and food waste

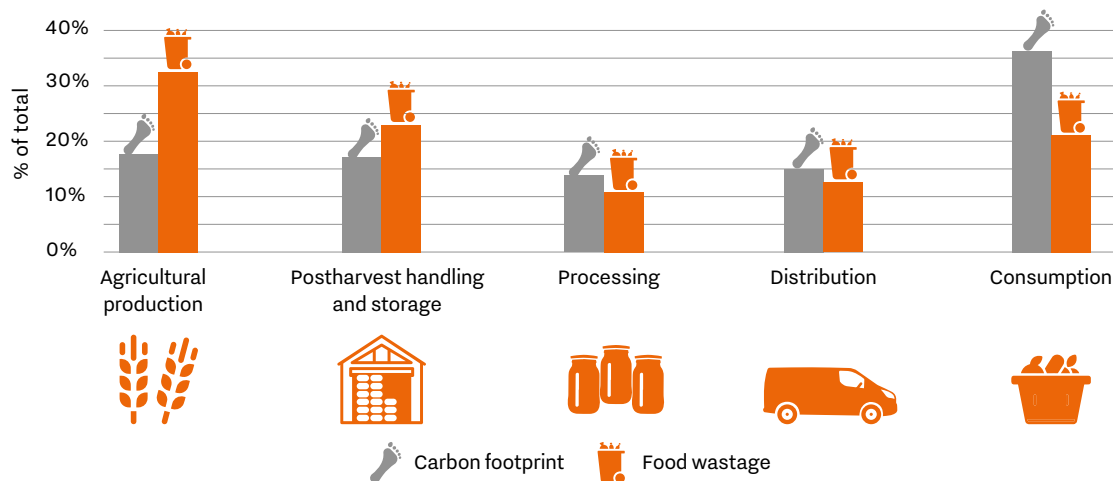


Figure 4 Food waste footprint & climate change www.fao.org.

The relevance of circular economy practices

The concept of circular agriculture can help restore and enhance the quality of soil by using techniques such as the design of local nutrient loops. Rethinking our value chains in agriculture can also prevent food (and waste) losses.

SDG 2 (especially sub-target 2.4) focuses on the implementation of sustainable food production systems and resilient agriculture to increase productivity and production as well as build resilient ecosystems that can adapt to climate change and severe disasters.

Biomass can form the heart of the circular economy. It is classified as a renewable resource which can capture CO₂ from the air and which offers a broad range of applications. Biomass is a resource for food, animal feed, materials, transport fuel and energy, for example. It is not a singular resource but a collective name for a range of agricultural crops, wood, grasses, water-grown crops such as algae and weeds, as well as residual streams that form in the chain from harvest to consumption and final processing. Products from animal residual materials are also considered to be biomass.

Food is mankind's basic necessity of life. Our current food system is not yet sustainable. Important issues about our food supply revolve around how we can continue to feed the growing world population as well as around healthy and safe food, healthy food patterns and sustainable, circular production systems. Food waste and protein provision are two important bottlenecks. Globally, about one third of all the food in the entire chain is wasted, ranging from waste during harvest to food that is not consumed. The production of animal feed uses more than half of all agricultural land. This entire chain, from production to consumption, causes serious ecological disruption.

When looking at the wide range of applications for biomass, there is a great sense of urgency to create circular production and a well-considered application of the relatively scarce biomass in our economy. Due to the growth of the global population and the increasing level of prosperity worldwide, the use of biomass for food production and other applications has increased significantly. At the same time, the ecological capacity of the earth has already been exceeded: consider the deforestation; the decrease in biodiversity; the disrupted nitrogen, phosphate and carbon cycles; and the decline of soil quality.

Furthermore, there is a degree of competition between the various functions of biomass, including the use of biomass for achieving climate policy goals.

In order to face these challenges and create opportunities, the following four strategic goals are key:

1. Sustainable/regenerative production of sufficient biomass with extensive closure of nutrient cycles at a geographic scale that can be as small or as large as is necessary. Such cycles are already in place at land-based livestock farms, among other things;
2. Optimum use of biomass and food. All resources and finished or semi-finished products will stay in the cycle for as long as possible at as high a quality as possible through the full use of resources, the high-grade use of biomass and the recycling of residual streams. This process also includes dealing with biomass as efficiently as possible (cascading and multifaceted valorisation) by countering food waste, preventing waste substances, monitoring the dosed application of synthetic fertilisers and ensuring efficient incineration, among other things;
3. Reduced utilisation and replacement of non-renewable resources with renewable ones (recyclate and sustainably produced biomass);
4. Development and implementation of new ways of production and consumption that lead to improvements as well as a departure from past trends in how biomass and food are handled.⁷

Dutch transition agenda: biomass & food

In the Netherlands, to reach these goals, six intrinsic lines of action have been formulated alongside three preconditional ones in the **'Transition agenda circular economy 2018: biomass & food'**.

Intrinsic lines of action are:

- Increasing the supply of sustainably produced biomass;
- Making circular and regenerative use of soil and nutrients;
- Ensuring optimum valorisation of biomass and residual streams in circular, bio-based products;
- Reducing food waste;
- Realising the protein transition towards more vegetable proteins;
- Feeding and greening megacities as the Dutch revenue model.

The three preconditional lines of action formulated are:

- Enhancing the investment climate for bio-based industry;
- Emancipating regulations;
- Honouring long-term carbon sequestration in soil and products.

Looking to our agriculture, there are multiple circular principles applicable in every part of the food value chain which can help enhance and enrich the soil, maintain nutrient loops and increase resiliency. Examples are the use of biochar, biogas, composting techniques and manure for organic fertiliser production. Circular agriculture is a concept that can make a relevant contribution to this issue.



Figure 5 Farm to Fork.

⁷ Transition Agenda Circular Economy Biomass & Food (2018).

Source: <https://hollandcirculairhotspot.nl/wp-content/uploads/2019/09/Transition-Agenda-Biomass-and-Food.pdf>.

The role of animals in a Circular agrofood system

In 2050, the global population will have risen to 9.5 billion people. In a circular food system we can use the current available agricultural land to provide the growing world population with food, without causing any extra burden to the earth. An essential part of this system is in establishing smart connections between plant-based and animal products, in order to create an integral agrofood system.

www.wur.eu/circularfood

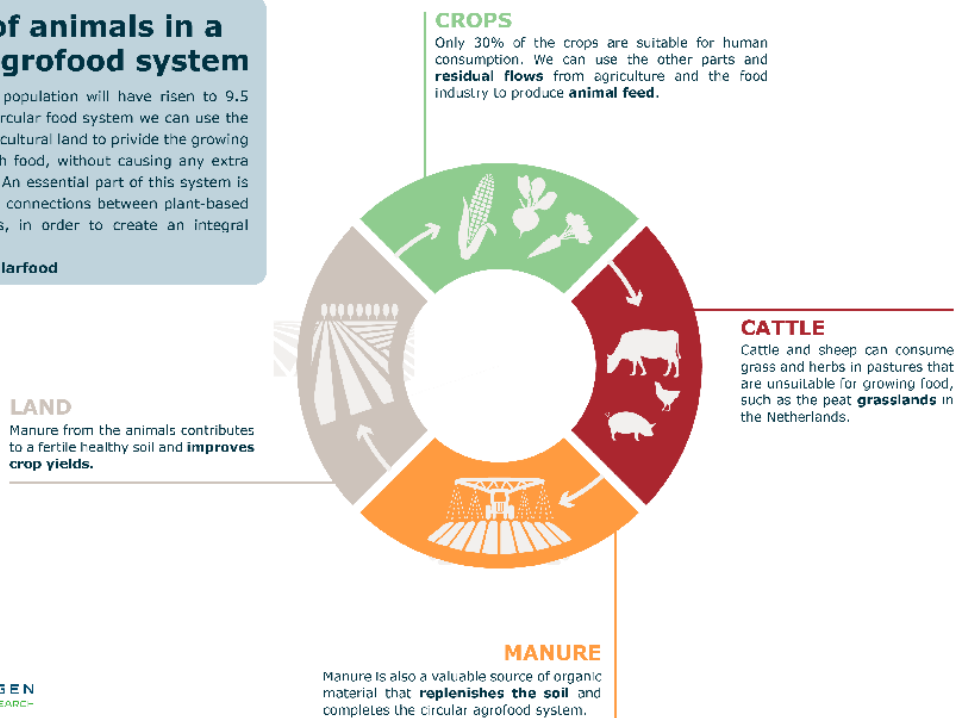


Figure 6 Circular Agrifoodsystem (source: Wageningen University).

Dutch agriculture is known for its special-purpose food production. While this picture is correct for the individual chains, the efficiency of the system as a whole could be even better. Now, for example, we use crops for animal feed which people could also consume. This use comes at the expense of agricultural land, on which we can also grow food for people.

Recycle farming is based on the principle that there are no waste flows. All products that leave the farm are used as end products or as raw materials for one of the other links in the cycle.

Without a global shift, agriculture could consume 70% of the total GHG budget by 2050⁸. Therefore, we have to rethink our food chain from *farm to fork*.

Waste and the food and drink hierarchy

Food wastage and losses occur at every step of the value chain, from farm to fork. In high-income countries, waste is mainly caused by consumers at the end of the chain. In middle- and low-income countries, losses occur at the start of the chain. The reasons for this waste are mainly financial, technical and organisational limitations; for example, in forecasting, harvesting techniques, storage and cooling facilities in challenging climates, infrastructure and logistics (time to market), packaging and marketing systems⁹ (FAO, 2011).

For food and drink, it is important to follow the material hierarchy, as explained in the graph below.

A circular food system is not only about not being wasteful, however; it should also be regenerative, resilient and healthy. The rehabilitation of degraded land can be achieved by reconnecting nutrient loops. Farms should be located close to consumers through urban and peri-urban farming. Organic agriculture would minimise the need for fertilisers and pesticides.

8 The New Climate Economy, 2018.

9 Global food losses and food waste, FAO, 2011; www.fao.org.



Figure 7 KerrSmith Design: <http://kerrsmithdesign.com/2018/05/sam-magazine/>.

People would receive high-quality, non-toxic food for a healthier lifestyle, while digital solutions would match supply and demand, creating a less wasteful, on-demand system. Food cost per person could be more than 30 per cent lower than today. For the average European household, capturing all of the improvement as total cost of ownership (TCO) savings could reduce food costs to a potential 25–40 per cent by 2050. This perspective on a circular food system can be read in ‘**Growth within: a circular economy vision for a competitive Europe**’ by the Ellen MacArthur Foundation (EMF, 2015)¹⁰.

Biogas, organic waste treatment

Using agricultural residues and organic waste for composting or biogas production is relatively easy to implement, with benefits in the field of waste management, soil quality, emissions to air and resource utilisation.

Biogas technologies are currently developing rapidly (e.g. in China, a country which is rich in waste resources from agriculture and which is developing exponentially). The reduction, recycling and reuse of organic wastes through biogas technologies has attracted widespread attention. It is an important strategic initiative to upgrade agricultural waste treatment and utilisation levels, improve rural landscapes and the ecological environment, and enhance agricultural efficiency and rural incomes¹¹.

10 GROWTH WITHIN: A CIRCULAR ECONOMY VISION FOR A COMPETITIVE EUROPE, Ellen MacArthur Foundation, 2015.

11 Chen, L., Zhao, L., Ren, C., Wang, F. 2012. The progress and prospects of rural biogas production in China. Energy Policy Volume 51, December 2012, pages 58–63.

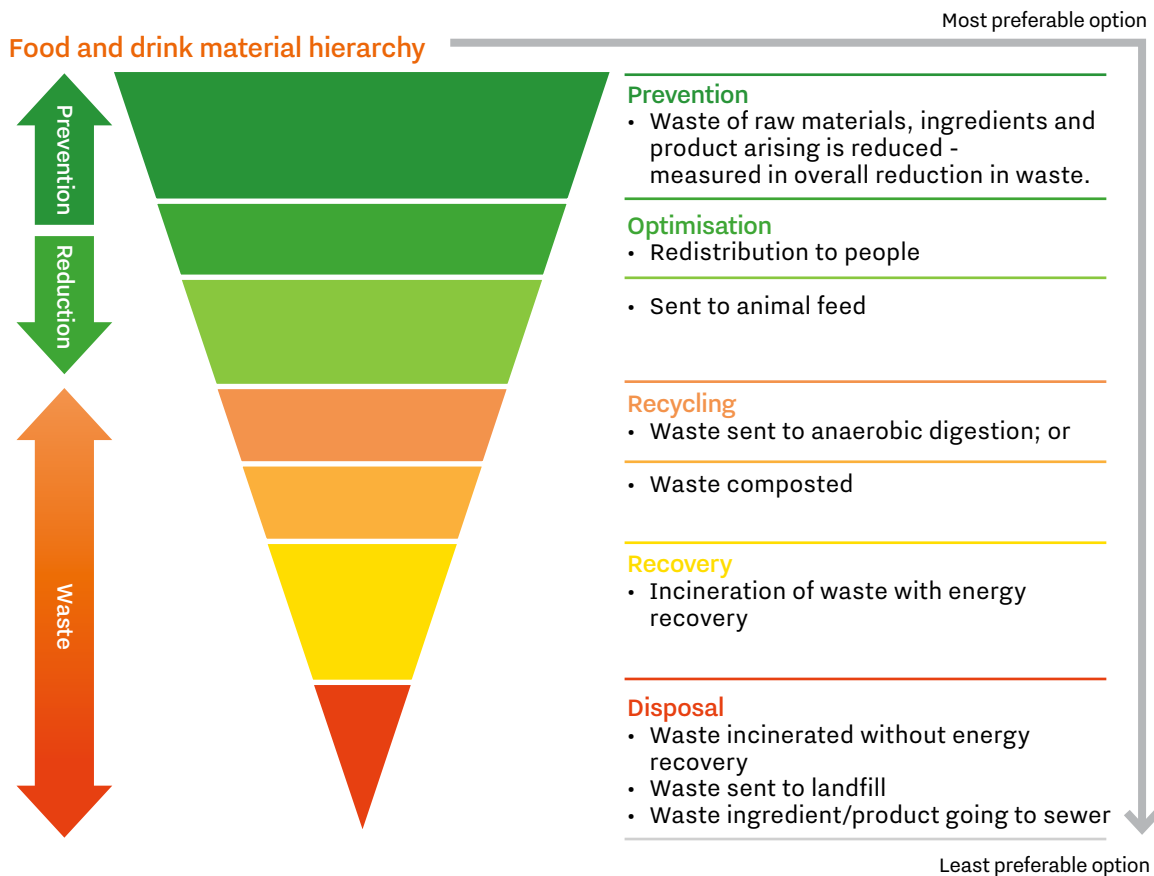


Figure 8 Food and Drink Material Hierarchy (Source: fao.org).

Biochar

As emissions relating to fertilisers have increased ninefold since the 1960s (FAO, 2017), the need for fertilisers such as biochar is attracting more and more interest.

The interest in biochar has increased in recent years due to the property that it can capture carbon in the soil. When organic material is pyrolysed, the carbon in the resulting biochar is much more difficult to break down than the original carbon from the organic material. This characteristic means that once it is used in the soil, the carbon in the biochar can be retained for centuries or millennia. By comparison, organic matter that is introduced into the soil in the unsaturated state is digested in years or decades. Furthermore, it has been shown that biochar generally increases crop yield, especially in nutrient-poor tropical soils. It has also been shown that the leaching of fertilisers and the emission of N_2O (an important greenhouse gas) from the soil are reduced¹².

From a value perspective, it is interesting to explore applications beyond composting and digestion, such as biowaste to chemicals or biowaste to food.

Circular farming means that we retain agricultural biomass and the nutrients stored in it within the food system. By using scarce resources more sparingly and wasting less biomass, fewer nutrients need to be supplied from elsewhere in the form of fertiliser and imported animal feed, for example. The availability of circular raw materials thus determines the production capacity and the options for consumption that result from this situation.

12 Wageningen University, Biochar; <https://www.wur.nl/nl/Onderzoek-Resultaten/Onderzoeksinstituten/Environmental-Research/Faciliteiten-Producten/Laboratoria-Omgevingswetenschappen/Bodem-Hydro-Fysisch-Laboratorium/Onderzoek-1/Biochar.html>.

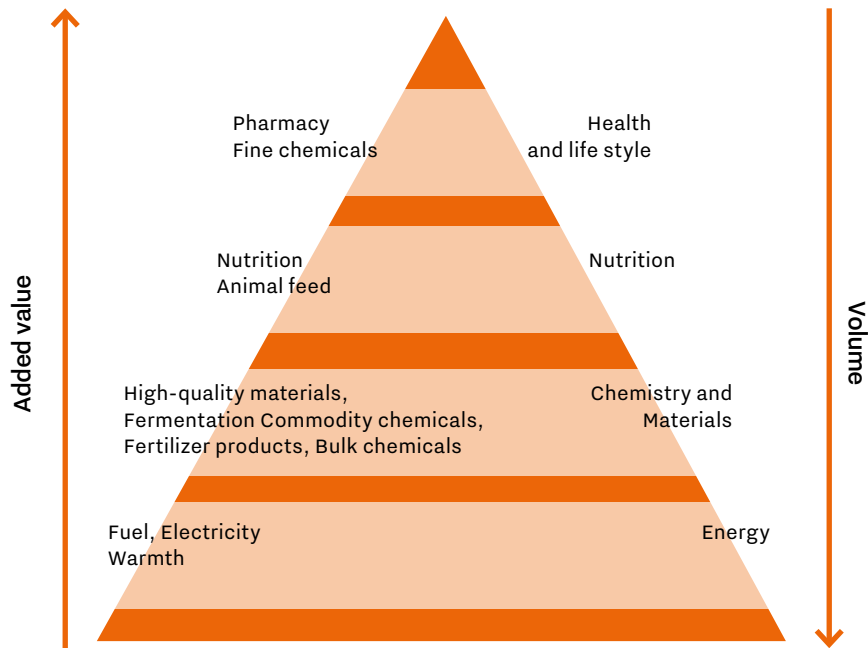


Figure 9 Value pyramid.

Protix – Nature and technology working together

With a rapidly increasing world population and limited resources for food production, we need smarter methods of producing much-needed proteins. Protix tackles the challenges of food security for both humans and animals, reducing organic waste in the process.

The Dutch company Protix has developed a sustainable and circular way to harness the power of insects. Protix produces insect-based meals and high-concentration protein products, which are used to produce aquaculture and animal feed, food and pharmaceuticals. Insects are nature's most powerful upcyclers and are the missing link in our food system. They can help create a circular food system and enable us to move away from a resource-depleting, linear system of production.

More information: <https://protix.eu>

Examples

New Business Models



Plant-based foods that have a lower environmental impact and help meat lovers to find a tasty substitute.

www.vegetarianbutcher.com



The plant uses the detritus from a nearby sewage treatment station and organic waste to produce electricity.

www.csbioenergia.com.br



Insect-based protein products which can be made where it is needed.

www.agriprotein.com

SDG 6

Clean Water and Sanitation



ENSURE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL



785 MILLION
PEOPLE REMAIN
WITHOUT EVEN

**BASIC
DRINKING
WATER**

SERVICES (2017)



**2 OUT OF 5
PEOPLE**

WORLDWIDE

DO NOT HAVE

= A BASIC =
HANDWASHING
FACILITY WITH
SOAP AND WATER
AT HOME (2017)

1 OUT OF 4

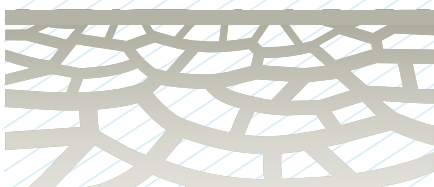
HEALTH-CARE FACILITIES
WORLDWIDE LACK BASIC
DRINKING WATER SERVICES
(2016)



BY 2030,
700 MILLION
PEOPLE COULD BE
DISPLACED BY
INTENSE
WATER SCARCITY

673 MILLION
PEOPLE (9% OF THE
GLOBAL POPULATION)
STILL PRACTISE
OPEN DEFECCATION
(2017)

THE MAJORITY OF THEM
ARE IN **SOUTHERN ASIA**



2 BILLION PEOPLE LIVE
IN COUNTRIES EXPERIENCING
HIGH WATER STRESS



SDG 6 Clean Water and Sanitation

To ensure access to safe water sources and sanitation for all.

The demand for water has outpaced population growth, and half the world's population is already experiencing severe water scarcity at least one month a year. Access to water, sanitation and hygiene is a human right, yet billions are still faced with daily challenges accessing even the most basic of services.

3 in 10 people lack access to safely managed drinking water services. About 3 billion people lack access to basic sanitation services, such as toilets or latrines. More than 80 per cent of wastewater resulting from human activities is discharged into rivers or sea without any treatment, leading to pollution¹³.

Water and sanitation-related diseases remain among the major causes of death in children under five; more than 800 children die every day from diarrheal diseases linked to poor hygiene. Safe and affordable drinking water, sanitation and hygiene are therefore key-elements in this target.

The relevance of circular economy practices

A circular economy can help achieve universal and equitable access to safe and affordable drinking water (sub-target 6.1) by the development of technologies and systems like;

- Small scale water purification technologies;
- Desalination;
- Wastewater treatment to reducing waste water discharge into drinking water sources^{14 15}.



Figure 10 The Water Pathway. Source: International Water Association, Water Utilities Pathways in a Circular Economy (2016).

13 SDG6 Clean Water and Sanitation: Why it matters (2016). Foundation, 2015.
 14 International Water Association (2016) Volume 51, December 2012, pages 58–63.
 15 Jeffries (2017).

In the report **'Water Utility Pathways in a Circular Economy'**, The International Water Association shares a framework (targeted towards decision makers in water utilities) to support the identification of opportunities, and the means to make the most of these opportunities within three interrelated pathways: the Water Pathway; the Material Pathway, and the Energy Pathway.

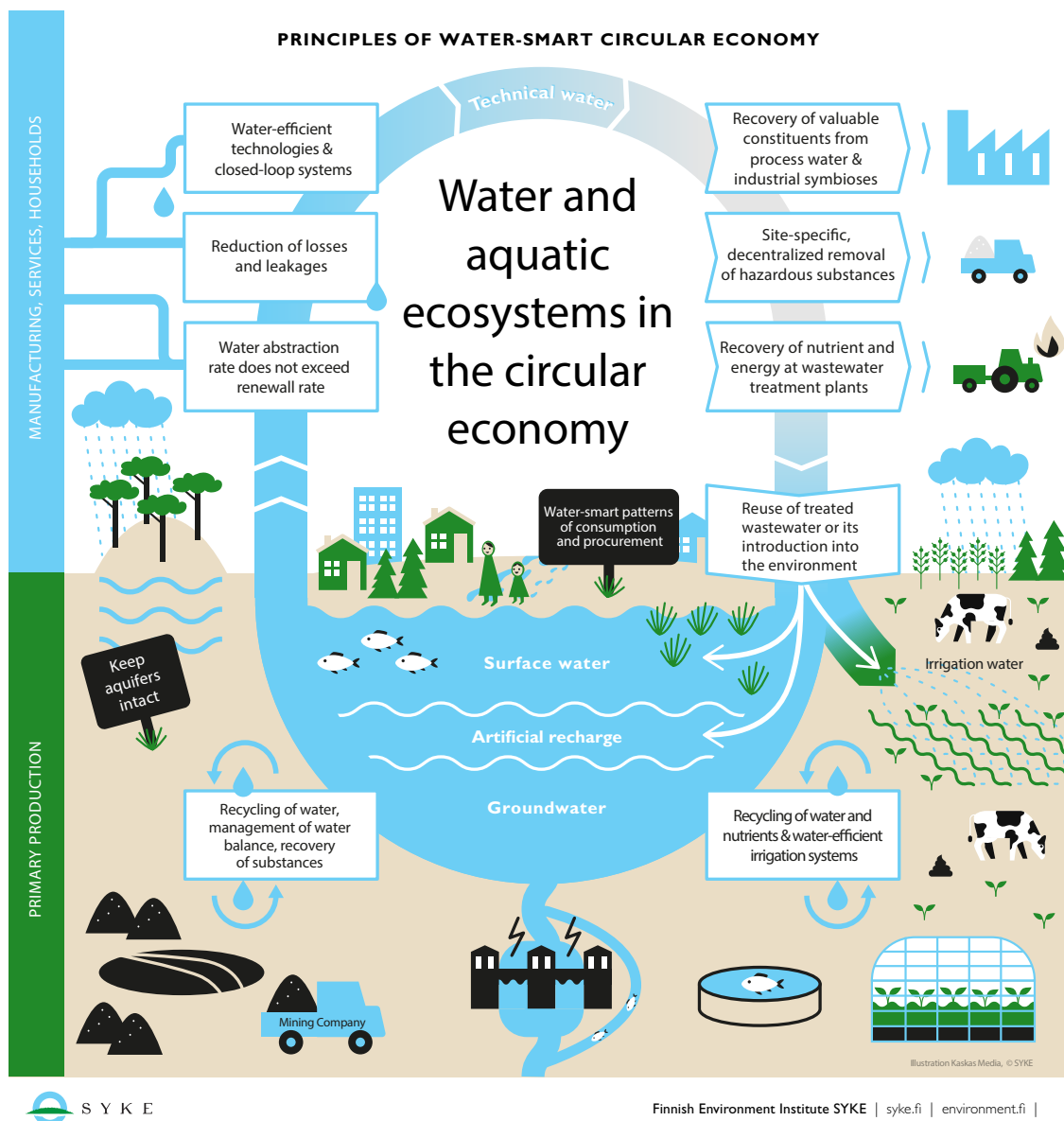


Figure 11 In the report 'Towards water-smart circular economy', connections between water, water ecosystems, and circular economy are presented. This figure illustrates the identified connections (source: Finnish Environment Institute SYKE, syke.fi).

The framework can provide the basis for initiating and developing national or regional dialogues around the water utility pathways in the circular economy, taking into consideration the importance of local context. The report can be found here¹⁶.

16 International Water Association, Water Utilities Pathways in a Circular Economy (2016). https://iwa-network.org/wp-content/uploads/2016/07/IWA_Circular_Economy_screen-1.pdf

Sanitation

A circular economy can also help achieve access to adequate and equitable sanitation and hygiene for all and end open defecation (sub-target 6.2) by the development of technologies and systems like;

- Composting toilets;
- Sustainable sanitation;
- Latrine management;
- Biogas systems.

Additionally, the recycling and reuse of water is essential in improving water quality, by reducing pollution and minimizing (eliminating) hazardous chemicals and materials (sub-target 6.3). This also applies to water recycling and water-use efficiency in all sectors, as sub-target 6.4 focusses on water-use efficiency in all sectors. Circular Economy practices directly contribute in industry and agriculture to reuse wastewater and reduce fresh water withdrawal.



The Inceptor of The Ocean Cleanup.

The Interceptor – The Ocean Cleanup

According to a study conducted in collaboration with Deloitte, yearly economic costs due to marine plastic are estimated to be between \$6-19bn USD. The costs stem from its impact on tourism, fisheries and aquaculture, and (governmental) cleanups. These costs do not include the impact on human health and the marine ecosystem (due to insufficient research available). This means that intercepting plastic in rivers is much more cost-effective than dealing with the consequences downstream.

Rivers are the main source of ocean plastic pollution. They are the arteries that carry waste from land to the ocean. Our research found that 1000 rivers are responsible for roughly 80% of the pollution.

The Interceptor is The Ocean Cleanup's answer for river plastic waste. It is the first scalable solution to prevent plastic from entering the world's oceans from rivers. It is 100% solar-powered, extracts plastic autonomously, and is capable of operating in the majority of the world's most polluting rivers.

More information: <https://theoceancleanup.com/rivers/>

SafiSana

The shortage of good sanitary facilities not only causes environmental problems. It also contaminates drinking water and can spread malaria and diarrhea. At the same time, slums continue to grow explosively. So a sustainable solution is needed for the lack of sanitation.

With the placement of Communal Service Blocks, Safi Sana introduces a new standard for sanitary facilities.

- Toilets and drinking water under one roof;
- Optimal hygiene, space and comfort;
- Access is paid to guarantee long-term quality and to make the toilet blocks profitable for local entrepreneurs;
- Waste is collected daily for optimum health;
- Safi Sana trains and guides the local entrepreneur and his employees;
- Collects and processes the faeces in the processing plant, where it is collected and fermented. Thanks to this reuse, biogas and natural fertilizers are created.



With this concept, Safi Sana contributes to:

- The sanitary facilities in the slums;
- Offers a solution to the waste problem;
- Raises awareness of the population.

DyeCoo Textile Systems

Water and Chemical free textile dyeing



DyeCoo's technology.

DyeCoo has more than 15 years of experience in CO₂ technology. With extensive knowledge of design and engineering of CO₂ equipment, DyeCoo provides clean textile processing solutions on an industrial scale. DyeCoo's CO₂ technology is the world's first 100% water-free and process chemical-free textile processing solution.

No process chemicals, no water, no wastewater and therefore no wastewater treatment is necessary, and the CO₂ used is reclaimed from existing industrial processes, recycling 95% of it in a closed-loop system.

More information: www.dyecoo.com

FosVaatje

Your urine as fertilizer

Urine contains valuable raw materials. That is why Waternet (Amsterdams water company) collects urine for the FosVaatje project. Huge amounts of energy and chemicals are required to transport and purify sewage. The system is neither sustainable nor circular, as valuable substances not recovered from the urine.

Therefore, Waternet has been collecting phosphate since 2013 using a struvite reactor called the FosVaatje, which takes in urine after a fermentation process. In 2016, Waternet collected 80,000 litres of urine. If phosphate were recovered from all Amsterdam's wastewater in a year, it would save 400,000 euros and fertilise an area comparable to the size of 10,000 football fields.



FosVaatje silo containing struvite.

Bucuti & Tara Hotel, Aruba

Bucuti is one of Aruba's - and the Caribbean's - greenest hotels. Some of the initiatives are also on water (re-)use:

- By using greener, eco-friendly types of paper (for marketing materials), the resort was able to save 82 trees, as well as reduce waste water by 37,617 gallons, solid waste by 2,315 lb and greenhouse gases by 7,936 lb;
- The water for guest rooms and the laundry is heated by solar panels;
- Water reducers cut down water flow by 60% in all showers and faucets, and low-flow toilets;
- Water coming from the shower and sink is treated and reused in the gardens;
- The detergents used are bio-degradable and environmentally friendly.

More information: <https://www.bucuti.com/>

SDG 7

Affordable and Clean Energy



ENSURE ACCESS TO AFFORDABLE, RELIABLE, SUSTAINABLE AND MODERN ENERGY FOR ALL

9 OUT OF **10** PEOPLE WORLDWIDE
HAVE ACCESS TO ELECTRICITY

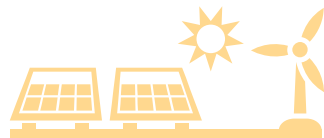
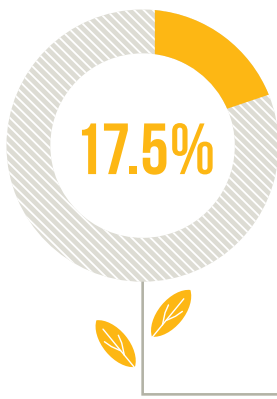


87%
OF THE
840 MILLION
PEOPLE WITHOUT
ELECTRICITY LIVE IN
RURAL AREAS

ON AVERAGE,
2.3%
LESS ENERGY
WAS NEEDED TO CREATE



OF ECONOMIC OUTPUT
EACH YEAR
(2010–2016)



OF TOTAL FINAL ENERGY
CONSUMPTION COMES FROM
RENEWABLE ENERGY



3 BILLION
PEOPLE LACK
CLEAN COOKING FUELS
AND TECHNOLOGY



SDG 7 Affordable and Clean Energy

Ensure access to affordable, reliable, sustainable and modern energy for all.

A well-established energy system supports all sectors: from businesses, medicine and education to agriculture, infrastructure, communications and high-technology.

Access to electricity in poorer countries has begun to accelerate, energy efficiency continues to improve, and renewable energy is making impressive gains. Nevertheless, more focused attention is needed to improve access to clean and safe cooking fuels and technologies for 3 billion people.

Nearly 9 out of 10 people now have access to electricity, but reaching the unserved will require increased efforts. In sub-Saharan Africa, an estimated 573 million people still lacked access to electricity. Without electricity, women and girls have to spend hours fetching water, clinics cannot store vaccines for children, many schoolchildren cannot do homework at night, and people cannot run competitive businesses. The health and well-being of some 3 billion people are adversely impacted by the lack of clean cooking fuels, such as wood, charcoal, dung and coal, which causes indoor air pollution.

Circular Economy & Energy

As stated by the EMF in her latest paper '**Completing the picture how the circular economy tackles climate change**' (2019)¹⁷ to date, efforts to tackle Climate Change have focused on a transition to renewable energy, complemented by energy efficiency. Though crucial and wholly consistent with a circular economy, these measures can only address 55% of emissions. The remaining 45% comes from producing the cars, clothes, food, and other products we use every day. These cannot be overlooked. The circular economy can contribute to completing the picture of emissions reduction by transforming the way we make and use products.

To illustrate this potential, EMF's paper demonstrates how applying circular economy strategies in just five key areas (cement, aluminium, steel, plastics, and food) can eliminate almost half of the remaining emissions from the production of goods – 9.3 billion tonnes of CO₂ in 2050 – equivalent to cutting current emissions from all transport to zero.

When we are talking emissions we are for a large part talking about energy needed to make new products for a planet with a growing resource demand.

In industry, this transformation can be achieved by substantially increasing the use rates of assets, such as buildings and vehicles, and recycling the materials used to make them. This reduces the demand for virgin steel, aluminium, cement, and plastics, and the (energy and) emissions associated with their production.

Mimi Moto

Globally, 500 million households prepare their meals on open fires using wood or charcoal. This produces high levels of indoor air pollution, resulting in sickness, and ultimately causing over 4 million premature deaths each year.

Also, buying fuel consumes a large portion of the average household income, making it difficult for people to save money to improve their lives.



Mimi Moto in use.

To achieve this, we present Mimi Moto: an affordable cookstove specifically designed to burn cheap, locally produced biomass fuel such as wood pellets in a very clean and efficient way. When using a Mimi Moto, the amount of smoke and other harmful emissions easily complies with the air quality guidelines stated by the WHO.

The implementation of a Mimi Moto goes beyond the stove itself. In different parts of the world, households still cook on open fires every day, each spending around \$35 per month on charcoal. Often mothers and grandmothers are the ones who prepare everyone's meal while also taking care of the children. For this reason, women and young children are the ones most affected by indoor air pollution. Cooking with a Mimi Moto will not only improve the indoor air quality; an average household will also save around \$12 dollar per month on fuel. An opportunity to achieve a better life.

More information: <https://mimimoto.nl/>

The Waste Transformers

'Business in a box' model



Waste Transformer in use.

The Waste Transformers began transforming organic waste into value at an Amsterdam hotspot: the Westergasfabriek, located in a park at a former gas works. Local residents subscribe to the energy The Waste Transformer produces, and the fertiliser makes the park bloom even more. The company (and partners) guarantee that the energy consumed is 100% local and green. The solution can be applied on-site at any location which produces 600 to 3600 kilos of organic waste per day. Its 'Business in a Box' model even provides local employment in developing countries with support and training from The Waste Transformers.

Concept Transferral – Sierra Leone

An example of an application in a developing country is Sierra Leone. Together with local partner Masada Waste Management, The Waste Transformers are in the process of realizing 40 Waste Transformers in and around Freetown in Sierra Leone.

More information: www.thewastetransformers.com

Circl Pavilion

Circl is a pavilion in Amsterdam, owned by the Dutch bank ABN AMRO and constructed entirely on circular principles. Circl is the first built practical example of sustainable and circular design. The reuse of the materials used has been taken into account from the start of the process. With the creation of a circular pavilion, a philosophy has been put into practice. Examples of circularity:

- The material of the floors in Circl once had a different application: rejected wooden frames were sawn into wooden floors. Tile floors were made from crushed reused concrete containing processed PCM (phase changing materials) that control the indoor climate;
- The wooden supporting structure is made from fully demountable locally extracted larch wood;
- Discarded jeans from employees and partners of the bank (16,000 pairs of jeans) are incorporated in the ceiling as insulation material;



Circl Pavilion in Amsterdam.

- The elevators in Circl are not purchased but leased and return to the manufacturer after ten years;
- All materials, components and parts that make up the building are recorded in “digital twins”; the building passport called LLMNT;
- Circl has direct current throughout the entire building.

EU Ecodesign Directive

There is world-wide demand for more efficient products to reduce the consumption of energy and other natural resources in line with improving overall sustainability. The EU legislation on ecodesign is an effective tool for improving the environmental performance of products by setting mandatory minimum standards for their energy efficiency. This eliminates the least performing products from the market, significantly contributing to the EU’s energy efficiency objective.

Ecodesign also supports industrial competitiveness and innovation by promoting better environmental performance of products throughout the internal market.

An important change in the new ecodesign rules is the inclusion of elements to further enhance the reparability and recyclability of appliances. Several of the new measures include requirements, such as ensuring the availability of spare parts - making key parts more easily replaceable - and access to repair and maintenance information for professional repairers.¹⁸

SmartCrusher

SmartCrusher consumes around 85% less energy per processed ton of concrete rubble compared to traditional crushers¹⁹.

SmartCrusher has developed a technique for recovering the sand, the gravel and the cement from concrete. With this technique, it is possible to create almost climate neutral new concrete from concrete waste. Additional to the existing crushing and milling technology, additional technologies are under development that will make concrete completely 100% circular.

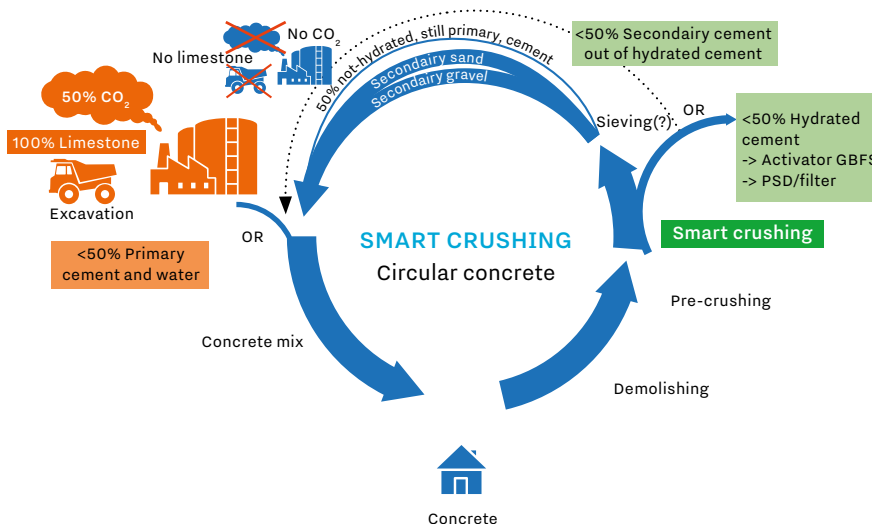


Figure 12 Closing the loop with smart crushing (source: slimbreker.nl).

18 https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-ecodesign/about_en#Ecodesign.

19 <https://www.slimbreker.nl/daarom-slimbrekers.html>.

SDG 8

Decent Work



PROMOTE SUSTAINED, INCLUSIVE AND SUSTAINABLE ECONOMIC GROWTH, FULL AND PRODUCTIVE EMPLOYMENT AND DECENT WORK FOR ALL



REAL GDP GREW BY **4.8%** ANNUALLY IN LDCs (2010–2017), LESS THAN THE **7% SDG TARGET**

MEDIAN HOURLY PAY OF MEN IS **12% HIGHER** THAN THAT OF WOMEN



THE GLOBAL UNEMPLOYMENT RATE IS **5%** (2018)

ONE FIFTH OF YOUNG PEOPLE **ARE NOT IN**

EDUCATION, EMPLOYMENT OR TRAINING



IN 2018, **LABOUR PRODUCTIVITY** INCREASED BY **2.1%** FROM 2017: THE HIGHEST ANNUAL GROWTH SINCE 2010





SDG 8 Decent Work

Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

Sustained and inclusive economic growth can drive progress, create decent jobs for all and improve living standards. While real GDP per capita and labour productivity have increased globally, 731 million people remain below the USD 1.90 (a day) poverty line.

Having a job does not guarantee a decent living. In fact, 8 per cent of employed workers and their families worldwide lived in extreme poverty in 2018. More than 700 million women and men who are working are not earning enough to lift themselves or their families out of poverty.

Productive employment and 'decent work' are key elements to achieving fair globalisation as well as poverty reduction. Decent work means opportunities for everyone to get work which is productive and which delivers a fair income, security in the workplace as well as social protection for families, better prospects for personal development and social integration.

Circular economy – innovation and job creation

Today's economy is wasteful. Most resources at the end of their life end up in a landfill and are lost forever. In the circular economy, these resources are kept into circulation by redesign, reuse, repair, refurbishment, remanufacturing and recycling. These activities are to be preferred over recovery and disposal. While going down this road, an important aspect is to create jobs.

Compared with primary production and the large disposal practice in the linear economy, a circular economy actually creates more jobs than the linear economy. Moreover, these jobs are local and meaningful.

The UK Waste & Resources Action Plan (WRAP) studied the potential expansion of the circular economy in the European Union by 2030; the results showed the creation of 3 million extra jobs within the EU, three times more than with 'business as usual'²⁰.

Examples of circular business models include designing goods to last longer, which can lead to greater reuse; greater repairability, which can support the growing remanufacturing industry; and allowing for the easy recovery of materials when a product is eventually recycled. Service models, which could include product maintenance and takeback schemes as well as rental and peer-to-peer sharing models, also hold much potential.

It is estimated that the current employment in the circular economy sector (repair, waste & recycling, rental & leasing) is around 3.4 million people. On the current development path, this figure is set to increase by 1.2 million jobs in 2030. WRAP's more ambitious scenario would see recycling rates increase by 34% and remanufacturing by 50%, while renting as well as leasing products and services would double compared with the 2014 base level.

Circular economy practices such as industrial symbiosis and remanufacturing are economic activities which add great value and which have high innovation potential. The recycling sector is labour-intensive with much potential to increase productivity²¹.

In addition, practices such as repair, remanufacturing, recycling, industrial symbiosis and closed-loop supply chains are very important for achieving higher levels of resource efficiency in production. New circular economy business models based on second-hand markets, product service systems (PSS) and the local sharing economy complement these efforts on the consumption side.

20 Economic Growth Potential of More Circular Economies <http://www.wrap.org.uk/content/economic-growth-potential-more-circular-economies>.

21 Schroeder, Patrick and Anggraeni, Kartika and Weber, Uwe, The Relevance of Circular Economy Practices to the Sustainable Development Goals (February 2019). Journal of Industrial Ecology, Vol. 23, Issue 1, pp. 77–95, 2019; available at SSRN: <https://ssrn.com/abstract=3344675> or <http://dx.doi.org/10.1111/jiec.12732>.

Sims Recycling Solutions

The rapid growth in the number of IT products in use today as well as the rapid technological developments mean that electrical and electronic equipment (EEE) is one of the fastest-growing waste streams.

On behalf of its clients, Sims Recycling Solutions (SRS) is responsible for discarded electronics. SRS refurbishes, repairs, remanufactures and restores equipment for a continued useful life. In addition to facilitating the reuse of electronic equipment, SRS also recycles equipment, transforming waste to raw materials. Recycling diverts materials from landfills or incineration and provides a feedstock for making next-generation products.

SRS helps companies reimagine the traditional model of electronics use in the materials economy to a closed-loop sustainable model. Working together, SRS and its clients can challenge conventional models of design, manufacturing, distribution, reuse and recycling in an increasingly global, value-driven, competitive, regulated as well as resource-challenged marketplace.

SRS engages collaboratively with global clients to re-examine business models, to strengthen current approaches, and to plan for continual evolution towards a circular model based on knowing the disposition of retired electronic assets and managing their movement through the reverse supply chain.

Philips Healthcare



Refurbishing in healthcare by Philips (source: Philips).

With healthcare budgets under pressure and a global trend towards circular business models, refurbished medical products provide a solution that can deliver both social and economic value. Through its Refurbished Systems business, Philips offers a choice of second-hand systems that have been thoroughly refurbished, upgraded and quality-tested. By keeping vital parts in the chain, the health-tech giant can provide high-quality equipment with full Philips warranty at a lower cost. Supplying these refurbished systems is enabled by taking back medical equipment from installed base customers. Philips is able to create a win-win situation, because there is still significant value in these used systems, which flows back to the customer.

More information: www.philips.nl/healthcare

Closing the Loop: One for One model

In the developed world, we are reusing more and more equipment. This trend is a great way to extend the useful life of devices and should be encouraged. The downside is that 70% of these devices end up in emerging markets, with no recycling facilities once these devices reach their end-of-life about 4 years later. Closing the Loop takes care of this problem by removing such obsolete devices from these emerging markets and creating safe employment.

Closing the Loop offers users and sellers of phones an easy way to make their device material-neutral and waste-free. It collects scrap phones on behalf of customers, thereby offsetting their phone on a One for One basis. To enable this One for One model, Closing the Loop works with local entrepreneurs in Africa and Asia, creating local recovery networks that collect scrap mobile phones for recycling.



Closing the Loop: closed loop solutions for mobile phones.

The partners in Africa and Asia range from students that are running a small business to established companies that have been operating for many years, such as Maiden Group in Ghana. To date, Closing the Loop has helped more than 2,000 people earn additional income through safe employment and has collected more than 2.2 million phones.

Sweepsmart

In countries such as India and Indonesia, most waste is openly burnt or dumped, polluting streets, rivers, nature and our oceans. Enormous landfills are polluting the groundwater, constantly burning and emitting methane greenhouse gases. Toxic waste, explosions and risks of collapse lead to a life expectancy of 40 years for the waste pickers living on top of them.

Sweepsmart customises European waste management systems into systems that work in countries such as India and Indonesia, understanding the local context and environment.

With local partners, Sweepsmart turns waste pickers into waste managers. They collect, segregate and recycle the waste, thereby offering a professional waste management service. To this end, the Smart Waste Systems have a Europe-meets-local design, which includes the total package of hardware, IT, processes and training.

With our segregated waste management system, there is no pollution from waste, there is more recycling (thereby creating smaller landfills) and waste pickers are given a job of which they can be proud!



Dry Waste Collection Centre in Yeshwanthpur, Bangalor (source: Sweepsmart).

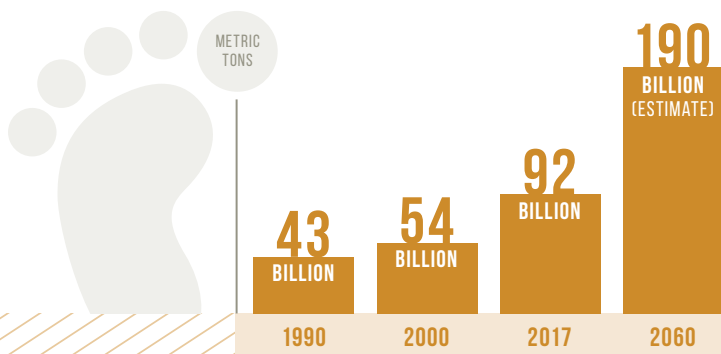
More information: www.sweepsmart.org

SDG 12

Responsible Consumption and Production

ENSURE SUSTAINABLE CONSUMPTION AND PRODUCTION PATTERNS

THE GLOBAL MATERIAL FOOTPRINT IS RAPIDLY GROWING, OUTPACING POPULATION AND ECONOMIC GROWTH

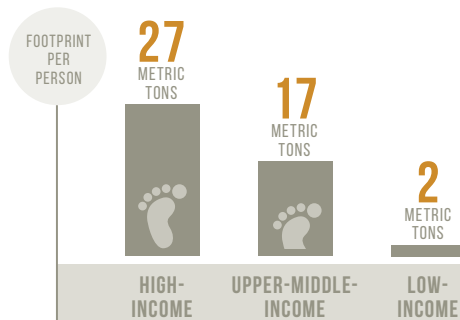


DEVELOPED COUNTRIES USE ONE FIFTH OF NATURAL RESOURCES

TO PRODUCE THE SAME AMOUNT OF ECONOMIC OUTPUT AS DEVELOPING COUNTRIES

MATERIAL FOOTPRINT PER CAPITA IN HIGH-INCOME COUNTRIES IS

60% HIGHER THAN IN UPPER-MIDDLE-INCOME COUNTRIES **AND MORE THAN 13 TIMES** THE LEVEL OF LOW-INCOME COUNTRIES



NEARLY 100 COUNTRIES ARE

ACTIVELY ADOPTING POLICIES AND MEASURES

TO PROMOTE SUSTAINABLE CONSUMPTION AND PRODUCTION

303 POLICIES AND INSTRUMENTS ARE IN PLACE GLOBALLY





SDG 12 Responsible Consumption and Production

Ensure sustainable consumption and production patterns.

Economic and social progress over the last century has been accompanied by environmental degradation, which is endangering the very systems on which our future development and very survival depend. Changing consumption and production patterns will be needed; otherwise, irreversible damage will be dealt to the environment. Furthermore, when it comes to consumers, households consume 29 per cent of global energy and contribute 21 per cent of the resultant CO₂ emissions.

It is in businesses' interest to find new solutions that enable sustainable consumption and production patterns. A better understanding of the environmental and social impact of products and services is needed, both for product life cycles and for the way that their use is affected by lifestyles. Identifying 'hot spots' within the value chain where interventions have the greatest potential to improve the environmental and social impact of the system as a whole is a crucial first step.

Implementing the circular economy in full practice

Within SDG 12, a lot of circular practices mentioned are highly relevant; e.g. water management, waste management, sustainable products and services, sustainable supply chains as well as synergies with renewable energy. Circular economy practices can reduce the industrial pollution of water and soil. The circular Rs of rethinking, reducing, redesigning, reusing, repairing, refurbishing, remanufacturing, recycling and repurposing are essential principles to this specific problem.

Decoupling economic growth from natural resource use is fundamental to sustainable development. Global figures, however, point to worsening trends: domestic material consumption (the total amount of natural resources used in economic processes) increased from 1.2 kg to 1.3 kg per unit of GDP from 2000 to 2010. Total domestic material consumption also rose during the same period – from 48.7 billion tonnes to 71.0 billion tonnes. The increase is due in part to rising natural resource use worldwide, particularly in eastern Asia.

Current and projected rates of material consumption are simply not sustainable. The impact of rising consumption coupled with the projected growth of the middle class in developing countries will require even more resources.

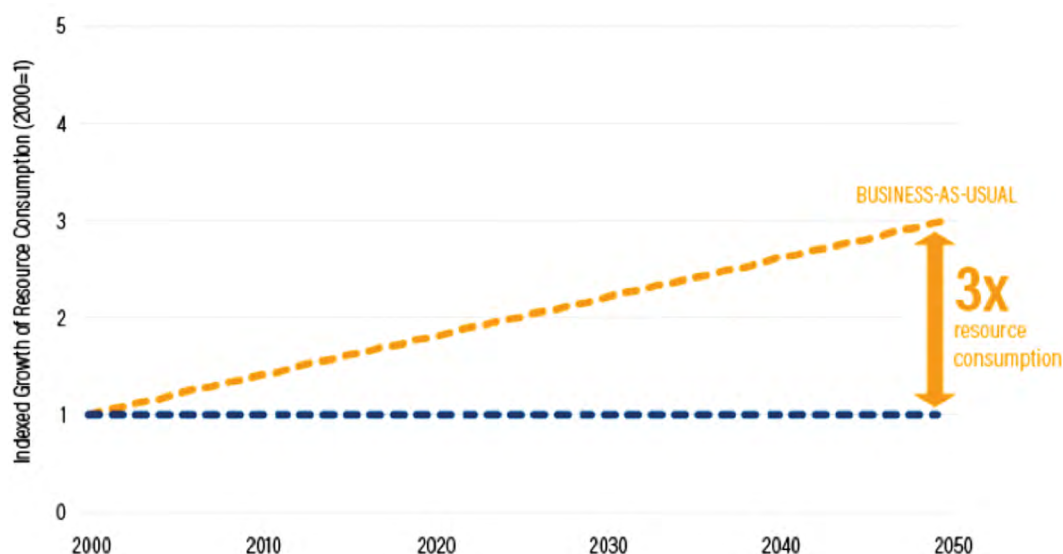


Figure 13 Resource Consumption set to triple. Source: World Resource Institute (wri.org).

The OECD, in its ‘**Global material resources outlook to 2060**’ (2018), projects a doubling of global primary materials use between today and 2060. Population and converging per capita income growth drive the growth in materials use. However, structural change – especially in non-OECD countries – and technology improvements partially dampen that growth. The use of metals and non-metallic minerals are projected to grow more rapidly than other types of materials.

Consumer impact

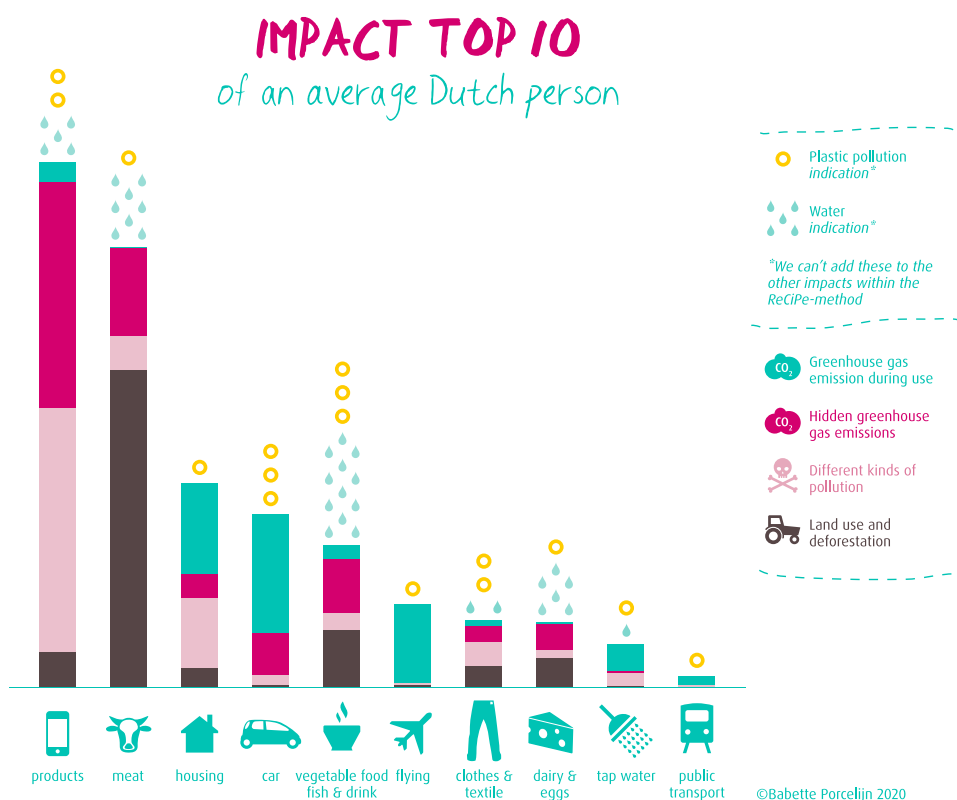
Through regularly purchasing products, consumers have a major impact on the planet. In ‘**The Hidden Impact**’, Babette Porcelijn went in search of the total impact of our daily lives, including the purchasing of products. This sector has a major hidden impact: 86% of the impact comes from the processes of production and transport.

There is also a great deal of hidden impact when it comes to energy: 43% of global energy is used for the manufacture of products, food, construction, services, and so on, while an additional 33% is lost because generating energy also costs energy.

The use of raw materials cannot be viewed separately from the energy transition. As energy use related to raw materials is a significant part of our energy management, the circular economy has great potential for the energy transition.

Additionally, circular economy practices in the use of small-scale biomass technologies (e.g. biogas; see SDG 2) are important elements of renewable energy systems – making energy available for all. Circular economy practices can also be used in industry and buildings for energy efficiency, however (e.g. waste heat recovery or insulation materials).

Figure 14 The Hidden Impact by Babette Porcelijn (thinkbigactnow.org).



An example: clothing

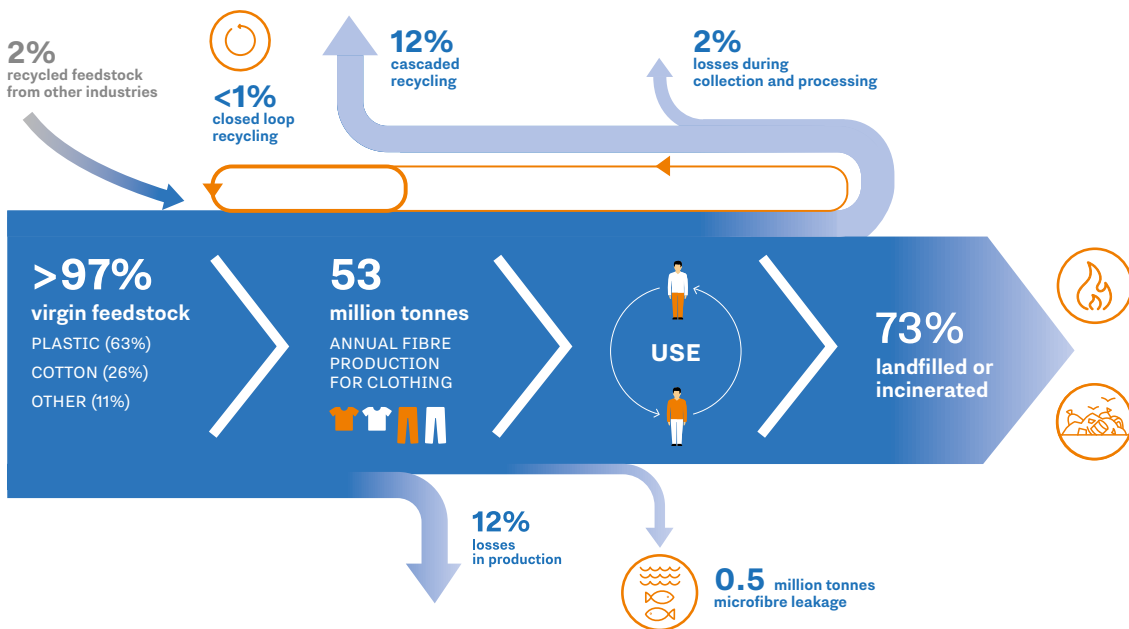
According to the EMF report ‘A new textiles economy’²², more than 300 million people are employed by the USD 1.3 trillion clothing industry along the value chain. Clothing represents more than 60% of the total textiles used (and is also expected to remain the largest application of textiles in future).

Meanwhile, this textile system operates in an almost completely linear way: large amounts of non-renewable resources are extracted to produce clothes that are often used for only a short time, after which the materials are mostly sent to landfills or incinerated. More than USD 500 billion of value is lost every year due to clothing underutilisation and the lack of recycling. Furthermore, this take-make-dispose model has numerous negative consequences for the environment and society.

For instance, the total greenhouse gas emissions from textiles production of 1.2 billion tonnes annually are more than those of all international flights and maritime shipping combined.

Hazardous substances, which affect the health of both textile workers and clothes wearers, escape into the environment. When washed, some garments release plastic microfibrils, of which around half a million tonnes every year contribute to ocean pollution – 16 times more than plastic microbeads from cosmetics. Trends indicate that these negative effects are rising inexorably, with the potential for catastrophic outcomes in future. This linear system is ripe for disruption.

Figure 15 Global Materials flow for clothing (Ellen MacArthur Foundation, 2015).



Source: New Textiles Economy: Redesigning Fashion's Future. Ellen MacArthur Foundation (2017).



Fibersort machine (circle-economy.com).

To this end, the Ellen MacArthur Foundation formulated 4 relevant ambitions for the textile industry based on the circular economy:

1. Phase out substances of concern and microfibre release [reduce];
2. Transform the way that clothes are designed, sold and used in order to break free from their increasingly disposable nature [reuse];
3. Radically improve recycling by transforming clothing design, collection and reprocessing [recycle];
4. Make effective use of resources and move to renewable inputs [renew].

The report '**A new textiles economy**' can be read at <https://www.ellenmacarthurfoundation.org/>

Fibersort

Over 20 million tonnes of post-consumer textiles are landfilled across Europe and North America every year simply because these items have reached the end of their initial use phase. This excess provides an incredible opportunity of applying circular strategies to the industry in order to capture the inherent value of textiles, displace the use of virgin fibres upstream and eliminate textile waste downstream.

The Fibersort is a technology that automatically sorts large volumes of mixed post-consumer textiles by fibre type. Once sorted, these materials become reliable, consistent input materials for high-value textile to textile recyclers.



Sorting the military equipment (Ministry of Defence).

Public Procurement – circular textiles

In the Netherlands, the Ministry of Defence investigated the impact of public procurement. With its large amount of military equipment (e.g. 53,000 green overalls), the Ministry of Defence is a major user of textile products.

In its procurement strategy, worn-out clothing is no longer burnt but recycled and reduced to reusable fibers. The Ministry of Defence offers this product to the market as a high-quality raw material. Moreover, new suppliers must use recycled fibers in new textiles.

Around 750,000 articles of military equipment are delivered for sorting each year. These articles are coming from soldiers who hand in their clothing when they leave service, for example.

The clothing is hand-sorted by people with a distance from the labour market. As a result, the Ministry of Defence also contributes to the social domain. Clothing that was still good to wear was reused, realising considerable savings for the Ministry.

SDG 15

Life on Land



PROTECT, RESTORE AND PROMOTE SUSTAINABLE USE OF TERRESTRIAL ECOSYSTEMS, SUSTAINABLY MANAGE FORESTS, COMBAT DESERTIFICATION, AND HALT AND REVERSE LAND DEGRADATION AND HALT BIODIVERSITY LOSS

RED LIST INDEX:

BIODIVERSITY LOSS IS HAPPENING

AT AN ACCELERATED RATE

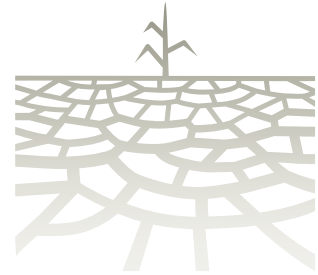


THE RISK OF SPECIES EXTINCTION HAS **WORSENERD BY ALMOST 10%** OVER THE LAST 25 YEARS

RED LIST INDEX TRACKS DATA ON MORE THAN 20,000 SPECIES OF MAMMALS, BIRDS, AMPHIBIANS, CORALS AND CYCADS. THE HIGHER THE VALUE, THE LOWER THE CONCERN



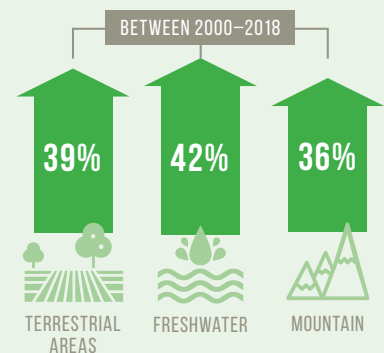
116 PARTIES HAVE RATIFIED **THE NAGOYA PROTOCOL**, WHICH ADDRESSES ACCESS TO **GENETIC RESOURCES** AND THEIR FAIR AND EQUITABLE USE

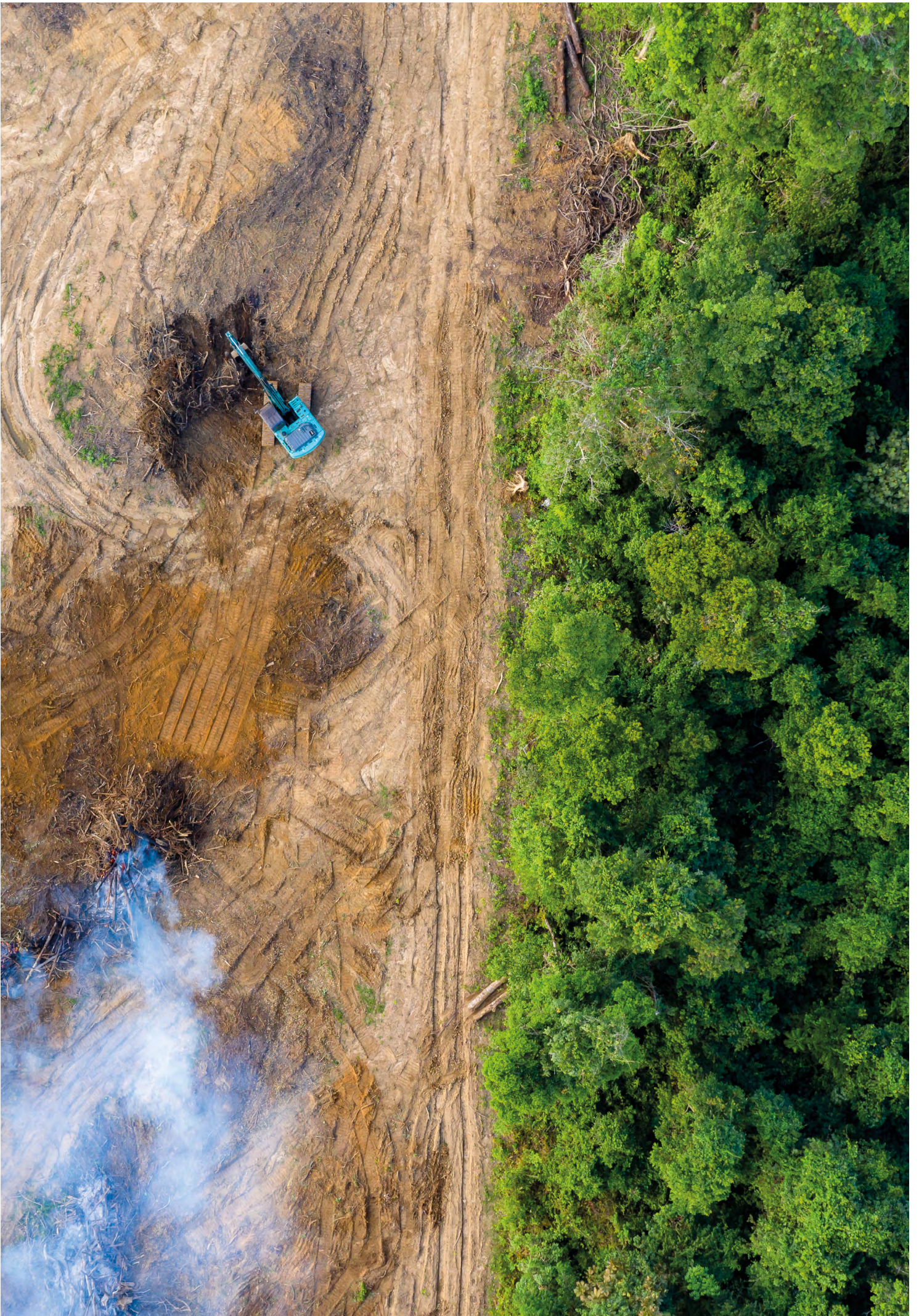


LAND DEGRADATION IS AFFECTING ONE FIFTH OF THE EARTH'S LAND AREA AND THE LIVES OF 1 BILLION PEOPLE

MORE OF EACH KEY BIODIVERSITY AREA IS PROTECTED

THE GLOBAL MEAN PERCENTAGE OF EACH KEY BIODIVERSITY AREA COVERED BY PROTECTED AREAS INCREASED BY:





SDG 15 Life on Land

Sustainably manage forests, combat desertification, halt and reverse land degradation and halt biodiversity loss.

Forests cover nearly 31 per cent of the planet's land area. Around 1.6 billion people depend on forests for their livelihood. Almost 75 per cent of the world's poor are affected directly by land degradation.

In addition, forests are home to more than 80 per cent of all terrestrial species of animals, plants and insects. However, biodiversity is declining faster than at any other time in human history. An estimated 20 per cent of the earth's land area was degraded between 2000 and 2015. Biodiversity as well as the ecosystem services that it underpins can also be the basis for climate change adaptation and disaster risk reduction strategies, as they can deliver benefits that will increase the resilience of people to the impact of climate change.

Deforestation and forest degradation result in loss of habitat for all species, a decrease in freshwater quality, an increase in soil erosion, land degradation and higher emissions of carbon into the atmosphere. In short, not taking action on forests affects both the health of the planet and our communities.

Circular economy – regenerative practices

To forestry, as to circular farming, organic agriculture and organic waste management (fertilisers, soil restoration, biochar) are valuable for the issues raised within SDG 15. Regenerative agro-forestry practices, multispecies plantations and industrial symbiosis in forestry can enhance the resilience to the benefit of biodiversity as well as forestry. Additionally, circular water management practices in arid regions (e.g. fog harvesting) are also practices needed for sustainable forest management.

Biomimicry

Another concept which is often talked about and which is interesting in seeking new circular solutions is the use of 'biomimicry'. Just as the circular economy, biomimicry is a model that relies on the operation of ecosystems. The difference is that where the circular economy is inspired by natural ecosystems, biomimetic thinking sees the ecosystem as a first principle to be taken into account.

Heineken Green Circles

Heineken Nederland is one of the pioneers of Green Circles, a partnership to make the region around the Heineken brewery a global example for the circular economy and an area of sustainable development. The driving force behind this collaboration is the development of Heineken's Zoeterwoude brewery into a circular, climate-neutral company.

Green Circles ambitions:

- A climate-neutral Heineken brewery in a climate-neutral chain;
- A sustainable economy;
- A pleasant living environment where knowledge is developed for a circular society.

Green Circles is committed to these ambitions. It acts on them by taking nature as a starting point to realise programmes on the topics of energy, water, raw materials, mobility and the living environment.

Heineken Zoeterwoude has a lot of experience with reusing its waste streams, of which it currently recycles 97% with its suppliers and customers. Green Circles is researching how the residual products and by-products of the brewery, such as waste streams, BSG or phosphate, can be reintroduced into the cycle. Green Circles will use this knowledge to improve the reuse of residual flows with and for companies in the province of South Holland.

More information: <https://www.groenecirkels.nl/en/Green-Circles.htm>



London (Canada) facility of Orgaworld.

Orgaworld is a firm that processes organic waste. Orgaworld uses techniques (e.g. wet and dry digestion, composting) as well as solutions which enable the efficient transformation of waste into green energy and unique bio-based products. Currently, Orgaworld produces a wide range of special environmentally friendly products (sold under the Orgapower brand), such as nutrient-rich agricultural fertilisers, replacements for artificial fertilisers, tree starters, lawn fertilisers and bio-stimulators.

Orgaworld has built a facility in London (Canada) consisting of 12 tunnels, an indoor compost maturation hall and a state-of-the-art odour abatement treatment system, which has limited and continues to limit odour emissions as much as possible. The facility has the capacity to process 150,000 tonnes of organic waste per year and currently transforms 120,000 tonnes of organic waste into high-quality compost, which benefits the surrounding area.

More information: orgaworld.nl

Ecoshape: clay ripening



Clayripping van Oord (photo: Melle Koelewijn).

Clay ripening = circularity – a win-win situation

Excessive accretion of sediment in the Ems Dollart Region is having a negative impact on water quality and biodiversity. Large amounts of sediment accumulate in ports, making regular dredging necessary. At the same time, clay soil is needed in the area to reinforce dykes and to elevate low-lying farmland.

The purpose of clay ripening

Ripening sediment into clay that can be used to reinforce a failed sea wall over a length of 12.5 km, collecting sediment from the Ems Dollart Region and turning it into clay soil produces a win-win situation: the water quality improves, while there is more clay soil to reinforce dykes and to elevate low-lying farmland.

The Clay Ripening Pilot Project was developed and implemented by a consortium consisting of Ecoshape (Van Oord, Boskalis, Arcadis, RHDHV, Witteveen+Bos, Wageningen Marine Research and Deltares), Groningen Seaports, Rijkswaterstaat, Het Groninger Landschap, the Province of Groningen, and the Hunze and Aa Water Authority.

More information: <https://www.ecoshape.org/en/projects/clay-ripening-pilot-project/>

Metsä Group

Metsä Group manufactures products from renewable wood out of the northern forests, which replaces the use of fossil raw materials. All of the wooden raw materials that Metsä Group uses are fully traceable. Products made from renewable raw materials are in high demand, as competition for natural resources is tight. The Group manages and grows forests sustainably. Raw materials, water and energy resources are wisely used.

The business operations cover the entire value chain for wood: tissue and cooking paper, paperboard, pulp, wood products, and wood supply and forest services.

In the bio-based economy, renewable resources are processed into products that replace the use of fossil raw materials. Within the circular economy, the renewable products are kept in circulation for as long as possible – as reusing and re-utilising them maintains the value of the raw material. In the circular economy, the manufacturing and consumption of products also generate as little loss and waste as possible, making production resource-efficient.



Figure 16 Metsagroup.com.

SDG 17

Partnerships for the Goals



STRENGTHEN THE MEANS OF IMPLEMENTATION AND REVITALIZE THE GLOBAL PARTNERSHIP FOR SUSTAINABLE DEVELOPMENT



NET ODA
TOTALLED
\$149 BILLION
IN 2018,

DOWN BY

2.7%

FROM 2017

IN 2018,
BILATERAL
ODA
TO THE LDCs

FELL BY

3%

IN REAL TERMS
FROM 2017

AID TO
AFRICA

FELL BY

4%



REMITTANCES

WILL BE THE LARGEST SOURCE OF EXTERNAL FINANCING IN LOW- AND MIDDLE-INCOME COUNTRIES IN 2019 (PROJECTED TO REACH \$550 BILLION)

CURRENT COMMITMENTS TO STATISTICS—

0.33% OF TOTAL ODA— MUST BE DOUBLED TO MEET STATISTICAL CAPACITY-BUILDING OBJECTIVES BY 2030

IN SUB-SAHARAN AFRICA, LESS THAN **ONE QUARTER** OF NATIONAL STATISTICAL PLANS ARE FULLY FUNDED



OVER 80%
OF PEOPLE IN DEVELOPED COUNTRIES ARE ONLINE



COMPARED TO 45%
IN DEVELOPING COUNTRIES



AND ONLY 20%
IN LDCs





SDG 17 Partnerships for the Goals

Revitalise the global partnership for sustainable development.

To achieve the Sustainable Development Goals, governments, civil society, scientists, academia and the private sector will need to come together, mobilising both existing and additional resources – technology development, financial resources and capacity-building. In addition, developed countries will need to fulfil their official development assistance commitments.

Multi-stakeholder partnerships will be crucial to leverage the inter-linkages between the Sustainable Development Goals to enhance their effectiveness and impact as well as to accelerate progress in achieving the goals.

Circular economy partnerships

This document contains many circular examples from various market segments that are closely linked with SDGs such as agri-food, manufacturing and the built environment. Also included are cross-sectoral topics such as consumer goods and plastics. In all these segments, technology is an important theme, but other challenges lie in the realm of social innovation, design and coalition-building.

The transition to the circular economy requires systemic change and asks for collaboration. A local government can set the ambition (urgency), define boundary conditions and nurture experimentation. Researchers and knowledge institutes can develop new insights and tools, validate ideas and boost awareness. Local entrepreneurs have the guts and imagination to take risks, accelerate change and deliver scale. Meaningful participation by citizens and residents is crucial as well, as is educating the leaders, employees and consumers of the future.

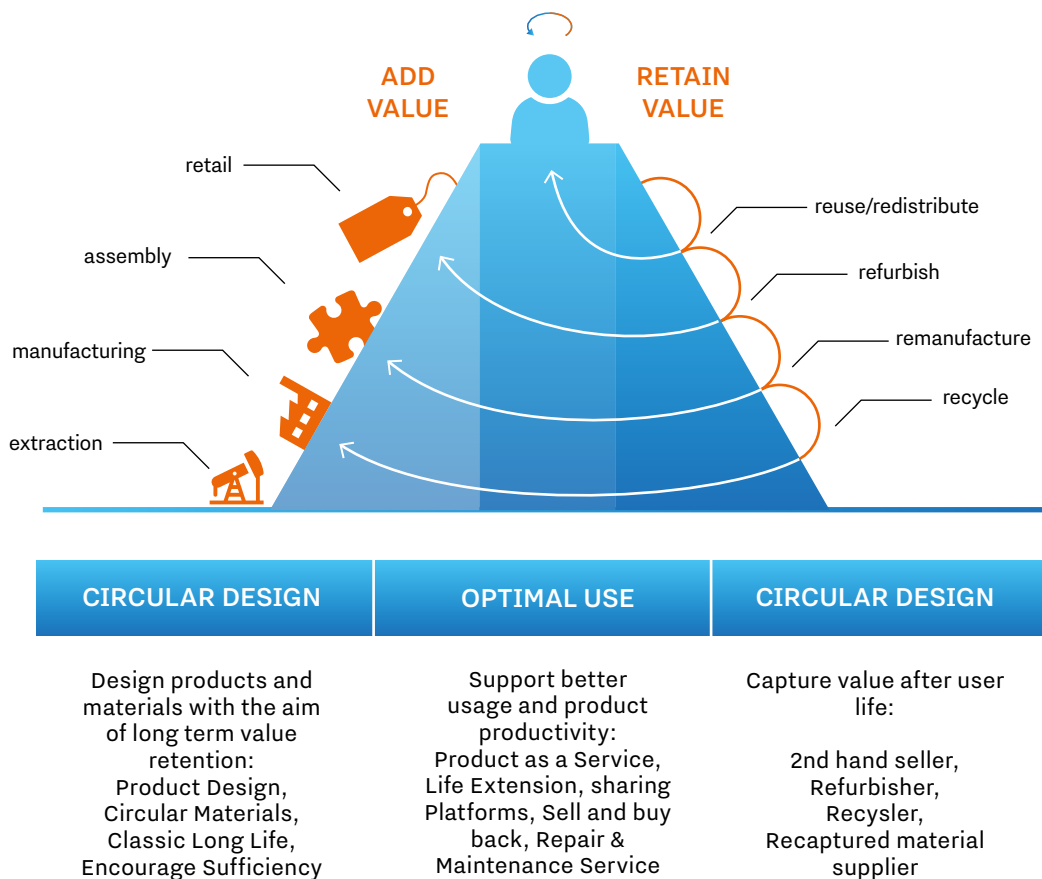


Figure 17 The Value Hill - Circle Economy.



MoU between HCH and Planet Ark (Australia).

The circular Rs of rethinking, reducing, redesigning, reusing, repairing, refurbishing, remanufacturing, recycling and repurposing require companies to create new loops in their value chain or within their ecosystem far beyond the traditional client-supplier relationship, as is depicted in the concept of the value hill.

The concept of industrial symbiosis, where one company's waste is another's resource, creates a mutual symbiotic dependency.

In the execution of official development assistance programmes (ODA), circular concepts (e.g. adopting life cycle concepts or recycling infrastructure) can be a cooperation opportunity to support developing countries in waste taxation, user charges and fees (and possibly resource taxation).

Another opportunity to achieve the Sustainable Development Goals is to include the circular economy in aligning sustainability policies (government-to-government practices) as well as in the development, transfer and distribution of ecological technologies to developing countries. Circular economy-related tech transfer, in particular for industrial symbiosis but also for environmentally sound recycling technologies, and eco-design are examples that can be part of the sub-target (17.6) to enhance international triangular cooperation on and access to science, technology as well as innovation and enhance knowledge-sharing.

International Network of Hotspots

Holland Circular Hotspot (HCH) works together with other circular organisations around the globe to exchange knowledge and experiences: <https://hollandcircularhotspot.nl/en/network/>.

Holland Circular Hotspot is a public-private platform in which companies, knowledge institutes and local authorities collaborate internationally with the aim of exchanging knowledge as well as stimulating entrepreneurship in the field of the circular economy.

The activities of Holland Circular Hotspot are:

- Stimulating cooperation between the private sector, knowledge institutions, local authorities and other relevant parties;
- Providing international visibility to Dutch CE innovations/best practices;
- Assisting foreign parties in linking up with relevant Dutch CE parties;
- Establishing an online community where both Dutch and foreign companies can post CE challenges as well as solutions and generate business matches;
- Facilitating access to Dutch and international financing instruments and programmes.

Holland Circular Hotspot collaborates with other hotspots around the world. The community keeps growing, so follow HCH via LinkedIn and stay up to date with our international collaborations.

Green Deal

The Dutch government supports sustainable economic growth, or 'green growth', by stimulating sustainable innovation. Such innovation has a positive economic impact (growth and jobs) and avoids harm being done to the climate, water, soil, raw materials or biodiversity. Companies, civil-society organisations and other government bodies that want to take steps towards sustainability sometimes encounter barriers. The central government can help them overcome such barriers by closing a Green Deal with other parties. In this way, the Green Deal approach aids the implementation of sustainable initiatives.



A Green Deal is a mutual agreement or covenant under private law between a coalition of companies, civil-society organisations and local and regional government. The deal defines the innovative initiative and the actions involved as clearly as possible (in quantitative aims or output, if possible), as well as the input of the participants. Since its start in 2011, more than 200 Green Deals have been closed, involving a total of 1,090 participants. Green Deals cover nine themes: energy, bio-based economy, mobility, water, food, biodiversity, resources, construction and the climate.

Further exploration of SDGs

In the previous pages, we have focused on SDGs with a direct strong link to circular economy. There are, however, links between circular economy and the majority of the SDGs. In the next pages, we will briefly provide examples for some of the other SDGs.



SDG 9 Industry, Innovation and Infrastructure

Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation.

Economic growth, social development and climate action are heavily dependent on investments in infrastructure, sustainable industrial development as well as technological progress.

Sustainable growth must include industrialisation which firstly makes opportunities accessible to all people and which secondly is supported by innovation as well as resilient infrastructure.

Basic infrastructure such as roads, information and communication technologies, sanitation, electrical power and water remains scarce in many developing countries. An estimated 3.8 billion people still do not have access to the internet, representing 80% of the population in the least developed countries. 3 Billion people worldwide lack access to basic sanitation and 3 in 10 people lack access to safely managed drinking water.

The growth of new industries means an improvement in the standard of living for many of us. In addition, if industries pursue sustainability, this approach will have a positive effect on the environment.

Circular economy – industrial symbiosis

Circular economy practices are crucial for sustainable industrialisation and an inclusive economy; in particular, industrial symbiosis, remanufacturing and closed-loop supply chains are relevant concepts that contribute to this SDG.

Industrial symbiosis is the process by which waste or by-products of an industry or industrial process become the raw materials for another. The application of this concept allows materials to be used in a more sustainable way and contributes to the creation of a circular economy.

Industrial symbiosis creates an interconnected network which strives to mimic the functioning of ecological systems, in which energy and materials continually cycle without waste.

The World Business Council for Sustainable Development published a '**Chemical sector SDG roadmap**'²³ in July 2018. This Roadmap offers a collective vision for the sector on what the key impact opportunities to contribute to the SDGs are. Eighteen impact opportunities are identified in relation to the SDGs. Demonstrating the benefits of industrial symbiosis is one of these opportunities.

Chemical hubs are a well-established concept in many regions and provide opportunities by helping to reduce raw material as well as waste disposal costs, earning new revenue from residues and by-products, supporting circular business models and developing new business opportunities. Best practice principles that enable industrial symbiosis in the chemical sector can be deployed at a far greater scale to help address feedstock availability issues and to improve resource management in a cost-effective manner.

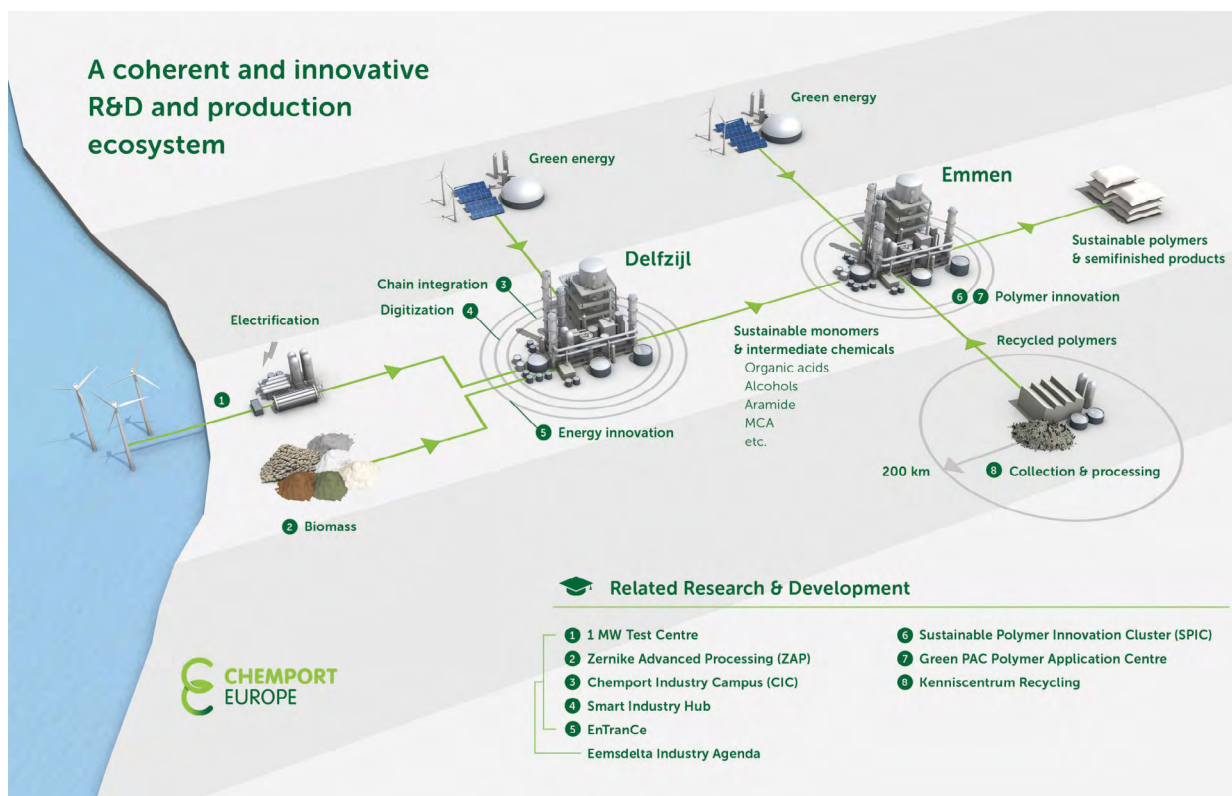


Figure 18 Chemport Europe. Full video can be watched via <https://www.youtube.com/watch?v=PIDIUIZF5Dc>.

Chemport Europe

Chemport Europe, located in the northern Netherlands, is an example of where industrial symbiosis is developed; in this region, businesses, government bodies and knowledge institutions work together to establish an industrial ecosystem. It will be an innovative ecosystem for chemicals and materials, with the ambition to become the first cluster with zero CO₂ emissions and minimum environmental impact. The entire Chemport Europe industry cluster will only use renewable energy and feedstocks by 2050.

The presence of several chains, abundant green feedstocks, increasing amounts of sustainable energy and fast connections with every part of the world makes our region the ideal environment for renewable energy plants, test plants or research facilities.



SDG 11 Sustainable Cities and Communities

Make cities and human settlements inclusive, safe, resilient and sustainable.

Due to urbanisation, more than half the world's population has been living in cities since 2007 and that share is projected to rise to 60 per cent by 2030.

Cities and metropolitan areas are powerhouses of economic growth, contributing about 60 per cent of global GDP. However, they also account for about 70 per cent of global carbon emissions and over 60 per cent of resource use. The levels of urban energy consumption and pollution are worrying as well. Cities occupy just 3 per cent of the Earth's land, but they account for 60–80 per cent of energy consumption and 70 per cent of carbon emissions.

Inequality is also a grave concern: over 1 billion people live in slums and this number keeps rising.

Circular economy – read the Circular Cities brochure!

In a city, everything comes together; the vast majority of us live in cities. These places where we live, work and recreate can determine our common future. Both cities and the circular economy are essential in achieving our climate goals and the SDGs. Cities are places of action and time is running out.

In cooperation with Circle Economy, Holland Circular Hotspot presented its first brochure entitled '**Circular cities**', where the relationship between circular practices and urban systems is further explained as well as illustrated with examples and lessons learnt.

A circular city is resilient, healthy and competitive, able to provide for all the societal needs of its citizens within the natural boundaries of the earth. Core elements of circularity are embedded within each key urban system; from water, via housing and infrastructure, to food and nutrition. Much as in a circular economy, resources in a circular city are kept at their highest potential for as long as possible through sharing, reusing, repairing, remanufacturing and recycling. Yet a city is inherently a human place, fostering collaboration and innovation to test as well as scale the solutions in order to create a truly inclusive, healthy and thriving place for all.

The transition towards a circular city is a complex journey that involves collaboration and coordination between the local government, businesses, local organisations, technologies as well as resources. In cities around the world the diverse benefits of circularity are increasingly being recognised. However, local governments are commonly faced with the same question: what tangible actions can be taken to accelerate the transition towards a more circular economy?

The lessons and experiences that are being collected from pioneering cities both throughout the Netherlands and around the world can provide important insights as well as guidance, and serve as an action agenda for aspiring circular cities of the future.

Action agenda for cities

Eight practical actions are presented which can serve as an action agenda for cities throughout the world, both in lower- and in higher-income countries. To support many of these steps, practical tools have been developed in the Netherlands, which can be scaled and applied internationally to assist in the creation of circular cities.

8 ACTIONS FOR CITIES TO ACCELERATE CIRCULARITY

1. Provide a platform to showcase best practices in your city;
2. Discover the circular potential of your city, and set priorities and ambitions;
3. Involve businesses from the start and create space for experimentation;
4. Understand the barriers to circularity and start addressing them;
5. Facilitate interdisciplinary and cross-sectoral collaborations;
6. Lead by example and build on successes;
7. Introduce and mainstream circular thinking into all education and training;
8. Monitor, adjust and scale.

The '**Circular cities brochure**' can be downloaded here²⁴.



SDG 13 Climate Action

Taking urgent action to tackle climate change and its impacts.

Climate change effects are evident worldwide. More severe weather and rising sea levels are affecting people as well as their properties in developed and developing countries.

If left unchecked, climate change will cause average global temperatures to increase beyond 3°C and will adversely affect every ecosystem. We are already seeing how climate change can exacerbate storms and disasters, as well as threats such as food and water scarcity, which can lead to conflict.

This problem asks for transformations in energy, industry, transport, food, agriculture and forestry systems to ensure that we can limit global temperature rise to well below 2°C, maybe even 1.5°C²⁵.

An inevitable role for the circular economy

Today's efforts to combat climate change have focused mainly on the critical role of renewable energy and energy-efficiency measures. However, meeting climate targets will also require tackling the remaining 45% of emissions associated with making products. A circular economy offers a systemic and cost-effective approach to tackling this challenge.

The EMF launched its position paper '**Completing the picture: how the circular economy tackles climate change**' in September 2019²⁶.

Key findings were that circular economy strategies, when applied to four key industrial materials (cement, steel, plastic and aluminium), could help reduce emissions by 40% in 2050. When applied to the food system, the reduction could amount to 49% in the same year. Overall, such reductions could bring emissions from these areas 45% closer to their net-zero emission targets.

25 SDG 13 Climate Action. Why it Matters, 2016.

26 https://www.ellenmacarthurfoundation.org/assets/downloads/Completing_The_Picture_How_The_Circular_Economy_-_Tackles_Climate_Change_V3_26_September.pdf.

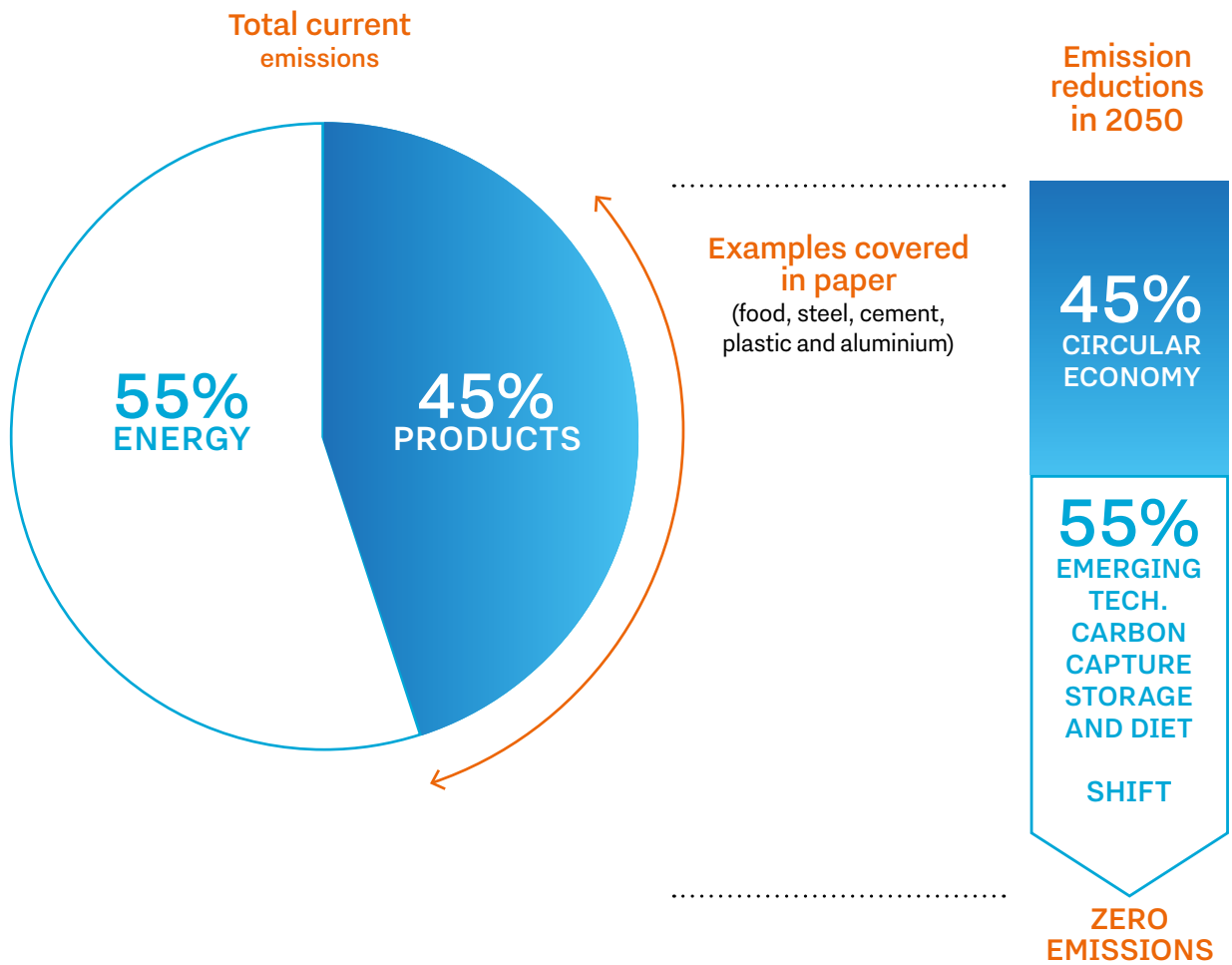


Figure 19 Underpinned by a transition towards renewable energy, a circular economy can help tackle the overlooked 45% of emissions by transforming the way goods are made used.



SDG 14 Life below Water

Conserve and sustainably use the oceans, seas and marine resources for sustainable development.

Oceans provide key natural resources, including food, medicine, biofuels and other products. They help with the breakdown and removal of waste and pollution, while their coastal ecosystems act as buffers to reduce damage from storms. Maintaining healthy oceans supports climate change mitigation and adaptation efforts.

Increasing levels of debris in the world's oceans are having a major environmental and economic impact. Marine debris affects biodiversity through the entanglement or ingestion of debris items by organisms, which can be fatal or make reproduction impossible.

About 20 per cent of the world's coral reefs have been effectively destroyed and show no prospects for recovery. Around 24 per cent of the remaining reefs are under imminent risk of collapse through human pressures and a further 26 per cent are under a longer-term threat of collapse.

The topic of the plastic soup, made famous by the EMF's claim that there will be more plastic in the ocean than fish by 2050, has reached consumers in all corners of the world.

According to the World Economic Forum, 8 million tonnes of plastic reach the oceans annually. Of this amount, 70% is non-biodegradable plastic, whose presence is expected to triple between 2015 and 2025.

It is an environmental, health and economic time bomb that requires urgent action.

Circular economy – closing the loop for plastics

To work on circular solutions for the plastic soup, value chain measures are needed from design and production to usage and dealing with waste.

Governments have to set ambitions locally, nationally and internationally. Interventions can be regulatory, such as setting up or expanding extended producer responsibility (EPR) for packaging or working with the carrot and the stick (bans, taxes, subsidies).

It requires communication to consumers about the impact of the products that they buy and the way to separate their waste. It is about facilitating in order for behaviour to follow. Source separation of plastics should be easy and cool. It is about new technologies that can sort the complexity of materials presently on the market. Guidance on standards and quality is needed, as the industry must be able to use the recycle that comes on the market. Designers are working on the packages of tomorrow. They should phase out unwanted materials such as single-use plastics, anticipate a full lifetime and invent circular concepts that can be reusable, bio-based or recyclable, for example.

Until we sort out this issue, we have to clean up the mess that we created in the oceans. As stated in the section on SDG 6, initiatives such as The Inceptor from The Ocean Cleanup help with the problem of a polluted sea, which is often caused from land.

Measures are imminent worldwide

Political and economic sentiment has also been rapidly changing in recent years. In 2015, 174 countries signed the Paris Climate Agreement and the United Nations established the Sustainable Development Goals.

Many countries, including 15 on the African continent, announced a ban on the free provision and use of plastic bags. In addition, many countries such as Indonesia and Ghana, now have their government and industry working on the design and implementation of expanded causes. For example, Bali wants to enforce a ban on single-use plastic in Indonesia despite resistance from the industry. A growing awareness of the plastic challenges and the requirement for international cooperation results from international marine litter initiatives. Examples are the UN Global Partnership on Marine Litter as well as the G7 and G20 action plans²⁷.

Individual cities and institutions worldwide are also taking action to help make plastic more sustainable. San Francisco International Airport, for example, bans the sale of plastic water bottles. From 20 August 2019, passengers can only purchase refillable bottles of glass or metal at the airport²⁸. In Europe, a strategy for plastics in a circular economy was drawn up in 2018 and a Single-Use Plastics (SUP) Directive was issued by the European Commission²⁹.

Among other things, the European Commission wants to make recycling more interesting for business, reduce plastic waste, halt pollution at sea, stimulate investment and innovation, and encourage global changes. Key themes here are design (improving design and supporting innovation to make plastics as well as plastic products easier to recycle), expansion and improvement of plastic waste source separation (ensuring qualitative input to the recycling industry), expansion and modernisation of EU sorting and recycling capacity, as well as creating viable markets for recycled and renewable plastics.

Following the new plans, it should be possible to recycle all plastic packaging on the EU market by 2030, reduce the use of single-use plastics and limit the deliberate use of microplastics. Some disposable products and materials are banned, reduction targets are set for others, while an Extended Producer Responsibility (EPR) system is established for still other products.

27 G20 action plan: G20 Implementation Framework for Actions on Marine Plastic Litter, G20 Japan 2019.

Document can be found at: https://www.mofa.go.jp/policy/economy/g20_summit/osaka19/pdf/documents/en/annex_14.pdf.

28 CNN news 24th August 2019. <https://edition.cnn.com/travel/article/sf-airport-water-bottle-ban-trnd/index.html>.

29 European Commission. European strategy for plastics. https://ec.europa.eu/environment/waste/plastic_waste.html.

Colophon

The Netherlands Enterprise Agency supports entrepreneurs, NGOs, knowledge institutions and organisations. We aim to facilitate entrepreneurship, improve collaborations, strengthen positions, and help realise national and international ambitions with funding, networking, know-how as well as compliance with laws and regulations. We are a government agency which operates under the auspices of the Ministry of Economic Affairs and Climate Policy. Its activities are commissioned by the various Dutch ministries and the European Union.

At Holland Circular Hotspot (HCH), we believe that creating a circular economy calls for a profound transformation in the way that we work and produce, as well as the way that we design, teach, invest and buy. For this reason, we strive to connect the global circular community by inspiring cross-sectoral collaborations, stimulating the exchange of knowledge and innovations, and boosting circular entrepreneurship.

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