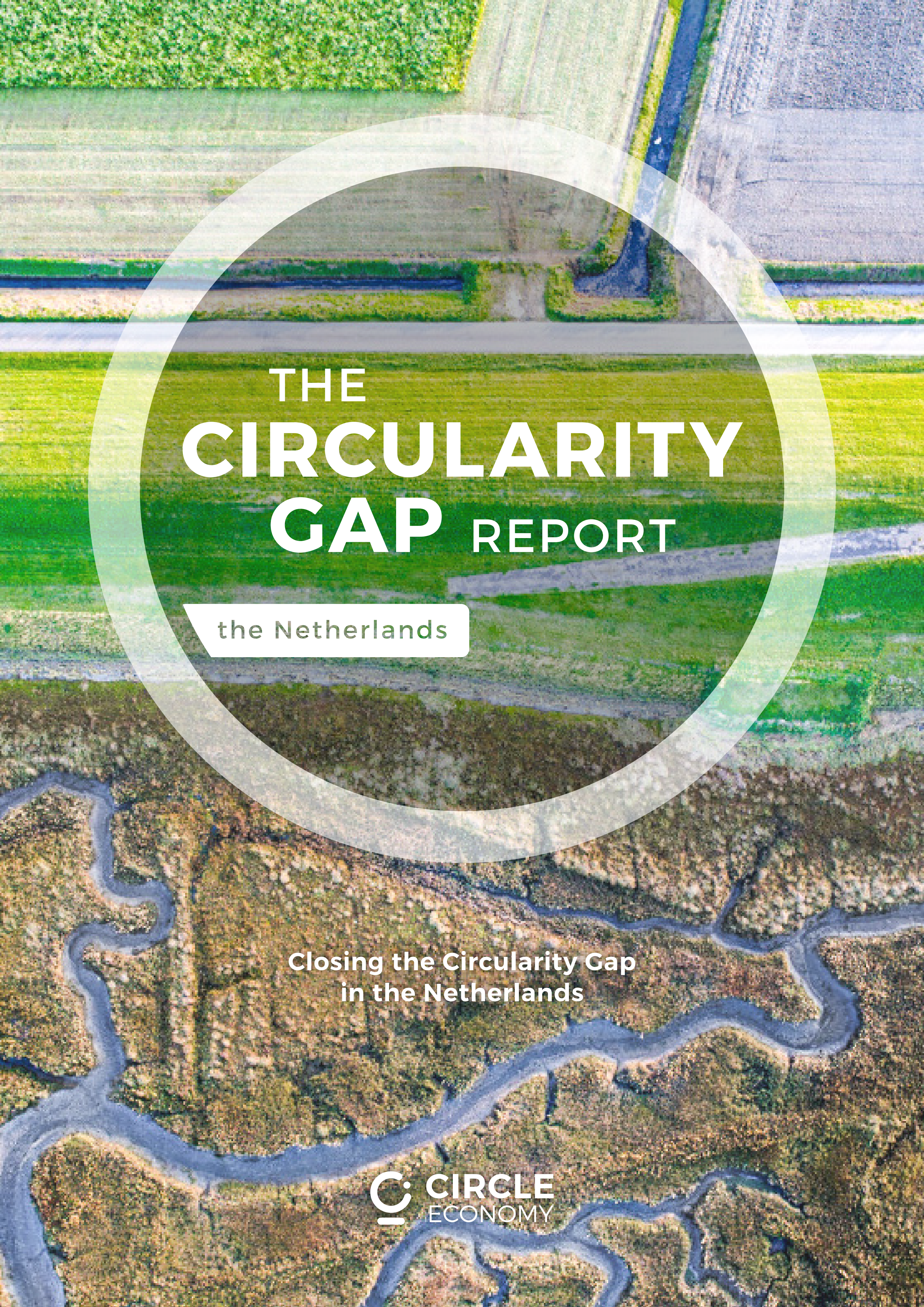


THE CIRCULARITY GAP REPORT

the Netherlands

Closing the Circularity Gap in the Netherlands

CIRCLE ECONOMY

WHO WE ARE

Circle Economy works to accelerate the transition to a circular economy. As an impact organisation, we identify opportunities to turn circular economy principles into practical reality.

With nature as our mentor, we combine practical insights with scalable responses to humanity's greatest challenges. Our vision is economic, social and environmental prosperity, without compromising the future of our planet.

Our multiple programmes and initiatives aim to connect and empower a global community to create the conditions for systemic transformation. Using metrics to guide this transition is our *Circularity Gap Reporting Initiative* (CGRI). This measures the state of global and national economies and identifies key levers to accelerate the transition to circularity. Meanwhile, our *Circular Jobs Initiative* defines and identifies circular jobs and analyses the environment needed to create them and maximise their societal benefits.

The Platform for Accelerating the Circular Economy (PACE)

This report is published as part of the Platform for Accelerating the Circular Economy (PACE). PACE is a public-private collaboration mechanism and project accelerator dedicated to bringing about the circular economy at speed and scale. It brings together a coalition of more than 70 leaders and is co-chaired by the heads of Royal Philips and the Global Environment Facility. It was initiated at the World Economic Forum and is currently hosted by the World Resources Institute.

IN SUPPORT OF THE CIRCULARITY GAP REPORT

MARIETTE HAMER
Chairwoman at the Social and Economic Council

"The transition to a circular economy is much needed: from a sustainable and socio-economic perspective. This report provides valuable insights and inspiration to spark the necessary discussion of what a circular future for the Netherlands could look like and the skills needed to make it a reality."

DIMITRI DE VREEZE
Co-CEO at DSM

"The Dutch government's ambitious target to be fully circular by 2050 means that policymakers and businesses must join forces; we have to do this together. The baseline assessment and future scenarios sketched in this report provide a good starting point to drive both the discussion and collaboration needed to enable a circular Netherlands."

MARIEKE VAN DOORNINCK
Deputy Mayor at City of Amsterdam

"The insights in the Circularity Gap Report demonstrates why it is important to strengthen our circular economy. Together with the larger cities in the world, Amsterdam should be a leading example and a driving force in this transition. To achieve our sustainability goals we must look further than city limits and country borders."

MARIA VAN DER HEIJDEN
Director at CSR the Netherlands

"What gets measured, gets managed. And what gets managed, gets done. This illustrates the importance of this study. Although it is practically impossible to be 100% complete and accurate, this study gives a clear signal that our efforts to create a new, circular economy needs to step up because we are still missing out on a lot of business opportunities with a societal benefit. As MVO Nederland we fully support the importance to accelerate our impact. The New Economy Index (NEx) of 12.1% shows we still have a lot to do. We are looking forward to working together on this with many of you."

KEES AARTS
CEO at Protix

"Life is circular, therefore, if you desire a work-life balance you should want a circular future. It's that simple. However, creating this circular future is less simple and it needs work. This report identifies opportunities to get there as soon as possible."

MARJOLEIN DEMMERS
Director at Natuur & Milieu

"We cannot solve climate change and biodiversity loss by only making the energy system more sustainable. With this report, Circle Economy confirms that a second crucial task for our society is the smarter and more economical use of resources. We need policies that make circular entrepreneurship and business more competitive to reverse this trend.
Natuur & Milieu will continue to work towards this goal."

ANNE-MARIE RAKHORST
Chair of the transition team Consumer Goods, and Entrepreneur, Investor and Founder at Duurzaamheid.nl

"Today a quarter of the Dutch economy is circular. This offers a beautiful opportunity for entrepreneurs and society to bridge the gap. This report provides useful directions and perspectives on how to move forward. Collaboration will be central, in and across sectors. Tremendous news in the country of the polder model!"

MICHIEL DE WILDE
Member executive board at Goldschmeding Foundation for People, Work and Economy

"This report introduces a much-needed national yardstick for the transition towards 50% circularity in 2030. It also highlights the urgent need to start thinking differently about 'work' in the circular economy. The fact-based scenarios provide an interesting outlook on circular jobs and skills, and highlight the need for new training and education programs. Goldschmeding Foundation is proud to be the funding partner of Circle Economy for this first edition of the Dutch Circularity Gap Report."

EXECUTIVE
SUMMARY

The Dutch economy is 24.5% circular. This means that of all the materials needed to fulfil societal needs such as for Housing, Mobility and Nutrition, a quarter of these come from non-virgin, secondary sources. The global Circularity Gap Report 2020[1] found that global circularity stands at 8.6%, just under a third of the Netherlands' Circularity Metric. While this number seems remarkably high for a growing, industrialised nation heavily engaged in trade, this study will shed light on the underlying dynamics in the economy where hardwired, linear conduct is embedded; leading to a still massive circularity gap of 75.5%. The Netherlands has aligned itself with ambitious circular economy plans that will require intense change and adaptation; a systems overhaul on multiple platforms.

Material footprints behind the Netherlands' societal needs and wants. Uniquely, this study provides a first approximation towards how resource use is allocated across the Netherlands' societal needs and wants. We can crystallize the outcomes of this analysis into key takeaways. The need's material footprint originates to a large extent from outside of the Netherlands, which is typical for a developed trade nation. Mobility and Nutrition are the biggest contributors to the Netherlands' societal need footprint, taking up almost half of the entire consumption footprint. This study differentiates itself from others in its field in that it takes a consumption approach. A comparison of approaches to measurements is part of the study.

Closing the Netherlands' Circularity Gap. To boost the circularity of Netherlands, four explorative "what-if" scenarios which can partially transform the economy to become less reliant on linear processes have been explored: (1) Advanced construction practices, (2) Circular agriculture and food system, (3) Shifting from fossil fuels to renewable sources, and (4) Repair, remanufacturing and high-value recycling. Each scenario boosts the circularity of the country, but when combined, these four scenarios bolsters the Netherlands' Circularity Metric from 25% to a staggering 70%. However, these scenarios are theoretical; free from the constraints of political, social or behavioural (change) realities.

The circular economy as a means to an end. Closing the Circularity Gap serves the higher objective of preventing further and accelerated environmental degradation and social inequality, on both a local and global level. Ultimately, the end goal is to establish an ecologically safe and socially just operating space for humankind.[2] Transformative measures to cut greenhouse gas emissions are inherent in the circular economy; the circular agenda and low-carbon agenda are complementary and mutually supportive. Circular business models and improved resource efficiency are means to enhance emission abatement, reduce extraction and improve supply security when materials are kept in the region.

No circular economy without human power. Importantly, a labour market that anticipates the transition to a circular economy can accelerate it. As the government shapes its strategies to support investment towards specific circular economy agendas, we must take the time to apply a holistic lens and consider the people behind the transition. Our study investigates how the circular economy will shape the Dutch jobs and skills landscape; how may the profile of some jobs transform; what kinds of jobs will increase and which may be phased out? By attempting to provide a complete picture of the Netherlands' current position in its transition to achieving full circularity by 2050, we aim to inspire, coordinate and steer action.

SAMENVATTING

De Nederlandse economie is 24,5% circulair. Om in de maatschappelijke behoeften te voorzien van alle Nederlanders, zoals voor huisvesting, mobiliteit en voeding, is slechts een kwart van de materialen afkomstig uit non-virgin, secundaire bronnen. Dit betekent dat er een circularity gap bestaat van meer dan 75%. De wereldwijde economie is slechts 8.6% circulair, iets minder dan een derde van de Nederlandse Circularity Metric, bleek uit het in januari 2020 gepubliceerde Circularity Gap Report 2020[1]. Het doel van deze studie is om inzicht te geven in de dynamiek van de Nederlandse economie om zo te duiden waar lineair gedrag in onze economie is ingebed en hoe we circulaire interventies kunnen implementeren om de benodigde systeemverandering tot stand te brengen. Met het Rijksbrede programma Circulaire Economie 'Nederland circulair in 2050' heeft Nederland een ambitieuze visie neergezet en bestaan er vele initiatieven om de circulariteit in de praktijk vorm te geven.

De grondstoffenvoetafdruk van het voorzien in de behoeften van alle Nederlanders. Deze studie geeft een uniek inzicht in welk van zeven maatschappelijke behoeften in welke mate bijdragen aan de grondstoffenvoetafdruk van Nederland. De belangrijkste uitkomsten laten zich samenvatten als: de voetafdruk die samenhangt met onze consumptie is grotendeels afkomstig uit het buitenland. Dit is typisch voor een ontwikkelde handelsnatie. Mobiliteit en voeding zijn verantwoordelijk voor meer dan de helft van de grondstoffenvoetafdruk. Deze studie vergelijkt diverse aanpakken om te komen tot het monitoren van circulariteit waarbij zowel gekeken wordt vanuit een productie als consumptie optiek.

Het dichten van de Circularity Gap van Nederland. Om de circulariteit van Nederland te vergroten, zijn vier 'wat-als' scenario's verkend die de economie gedeeltelijk kunnen transformeren: (1) circulair bouwen, (2) circulaire landbouw en voedselsystemen, (3) duurzame energietransitie, en (4) reparatie, remanufacturing en hoogwaardige recycling. Wanneer deze scenario's worden gecombineerd dan is er de potentie om de Nederlandse circulariteit van de huidige 24.5% naar maar liefst 70% te vergroten.

Deze 'wat-als' scenario's zijn echter opgesteld zonder rekening te houden met beperkingen die samenhangen met politieke besluitvorming, economische haalbaarheid of benodigde gedragsverandering van consumenten.

De circulaire economie is een middel tot een doel. Het dichten van de Circularity Gap dient het hogere doel om de voortgaande druk op het milieu en sociale ongelijkheid te stoppen, zowel op lokaal als op mondiaal niveau. Het uiteindelijke doel is het creëren van een ecologisch veilige en sociaal rechtvaardige wereld voor de mensheid[2]. Maatregelen gericht op het verminderen van de uitstoot van broeikasgassen zijn een integraal aspect van de circulaire economie. De circulaire opgave en de klimaatagenda zijn onlosmakelijk verbonden en vullen elkaar aan. Circulaire businessmodellen en verbeterde materiaal efficiëntie zijn manieren om emissies te reduceren, grondstofontginning te beperken en de leverzekerheid van materialen te verbeteren.

Geen circulaire economie zonder mensen. Tijdige aanpassing van de arbeidsmarkt aan de veranderende economie heeft de potentie de overgang naar een circulaire economie te versnellen. Met de ambitieuze overheidsaanpak voor de circulaire economie is het cruciaal ook stil te staan bij de bedrijven en de mensen die de transitie zullen moeten vormgeven. Deze studie onderzoekt welke impact de overgang naar een circulaire economie zal hebben op het type banen, benodigde (nieuwe) vaardigheden en welke banen komen te vervallen op korte of langere termijn. Door te laten zien waar de Nederlandse economie nu staat in de transitie naar een volledig circulaire economie in 2050 hopen wij te inspireren en richting te kunnen geven aan benodigde acties.

CON-
TENTS

1. INTRODUCTION

For the first time in history, the amount of material consumed by our global economy has passed 100 billion tonnes.[1] Only a fraction—220 million tonnes—of these materials are used by the Dutch to provide societal needs like Housing, Healthcare and Nutrition. This low material use, however, is solely due to a low population. The ecological footprint of an average Dutch citizen exceeds healthy planetary boundaries; if all people on the planet lived like the Dutch, it would take three Earths.[3] Increasing signs of environmental damage, including climate breakdown, are visible symptoms of damage caused by human activity. These impacts reveal the true cost of linear growth. In 2019, this became apparent in the Netherlands as the country experienced its so-called nitrogen crisis where levels were found to be above legal limits. This halted construction projects and demanded rigorous future changes in other sectors like agriculture. While in Spring 2020, the covid-19 pandemic swept the country and further exposed the limits to linearity; an economy that is fragile and not resilient to shocks and crises. In building back the economy, circularity must be firmly on the national, and global, agenda. However, despite public and private circular economy initiatives being developed, our Circularity Gap Report 2020 found that the circularity of the world is going in reverse. Despite circularity being firmly on the global and national agendas, and many public and private initiatives being developed, our Circularity Gap Report 2020 found that the circularity of the world is going in reverse. Its economy is only 8.6% circular, compared to 9.1% two years ago.[1]

THE LINEAR ECONOMY

What has fuelled global progress in prosperity and propelled the Netherlands to where it is today, in every sense, is the linear economy. Over the twentieth century, the linear economy has delivered tremendously high standards of living. This has, however, been achieved at great cost to the planet and many of its inhabitants. Take, for example, the Netherlands' discovery of its Slochteren gas field in 1959. This earned the nation more than 400 billion euros from natural gas exploitation.[4] While this has provided investment capital into Dutch knowledge and physical infrastructure, it also resulted in emissions and even ground tremors which led to housing and infrastructure damage.

A FALTERING RESPONSE

In response to adverse environmental impacts, the Netherlands has deployed a wide range of environmental policies since the 1970s.
This is in line with Europe, which has established itself as a frontrunner in the race to circularity. A key example here is the recent European Green Deal—which aims to create the first carbon-neutral continent in the world—as well as crucial global agreements.
On the international stage, two landmark pillars of strategic and ambitious collaboration guide direction; the United Nations Sustainable Development Goals (SDGs) and the Paris Agreement. Related to the latter, 2020 is a pivotal year for countries to deliver the progress of their efforts toward keeping the globe on a 1.5°C pathway; the Paris Agreements' main objective. In the early stages of the covid-19 pandemic, government priority understandably shifted to social basic welfare—such as unemployment support—but we hope that as we enter the post-pandemic age, attention will not shift from the crucial circular and green agenda. Today, all of these country-wide plans together—called National Determined Contributions (NDCs)—are not yet enough to get us on a trajectory below a 2°C warming, let alone a 1.5°C pathway. Circular economy strategies have a large part to play in making this happen. A 1.5°C world can only be circular.

As it stands, the Netherlands is furthest from achieving its renewable energy target in Europe with a share of just 7.4% (2018).[5] The agreed aim is to make this share at least 14% by the end of 2020.

THE POWER OF COUNTRIES

As the NDC example illustrates, countries are critical facilitators and core enablers of the circular economy. The Netherlands was among an initial cohort of countries to engage with the circular agenda, ranging from 13[6] individual nation states in Europe to the giant economy of China. Recent years have witnessed a steady stream of new players adopting circular economy policies and roadmaps. The Netherlands has cemented its position as a trailblazer in circular economy initiatives; circular approaches are increasingly ubiquitous in high impact areas such as construction and agriculture. Ultimately, the Dutch government has the ambitious aim to be 50% circular by 2030 and fully circular by 2050.

NO CIRCULAR ECONOMY WITHOUT HUMAN POWER

However, we need to move beyond only speaking about natural resources in circular economy narratives. We must consider the practical scale-up in terms of human capital, as well as the circular economy as a means to an end in reaching a safe and just space. As we drive the transition, there will be an impact on the labour market. In the Netherlands, the strong economy is mirrored in its strong labour market. But the country also has significant inequalities; migrants from non-western countries, women and older workers are the most likely to have low job security.[7] The circular economy presents opportunities for not only the economy and the environment, but also for us to redefine work, rebalance power and reimagine the way we use and value resources—including labour.[8]

OPPORTUNITIES FOR THE ECONOMY

Several defining aspects of the Dutch economy can be leveraged to contribute to the move to circularity, but there are also several limitations that decisively lock in linearity. The Netherlands already ranks consistently high on circular economy analyses, largely due to its robust recycling system and efficient waste reuse. The Netherlands is in Europe's top three for its recycling rate, which stands at 1.7 thousand kilograms per capita, per year.[9] But it's weighed down by high levels of municipal and food waste on a per person, per year basis—520 kilograms and 514 kilograms,[10] respectively, as well as continued reliance on fossil fuel energy and trading.

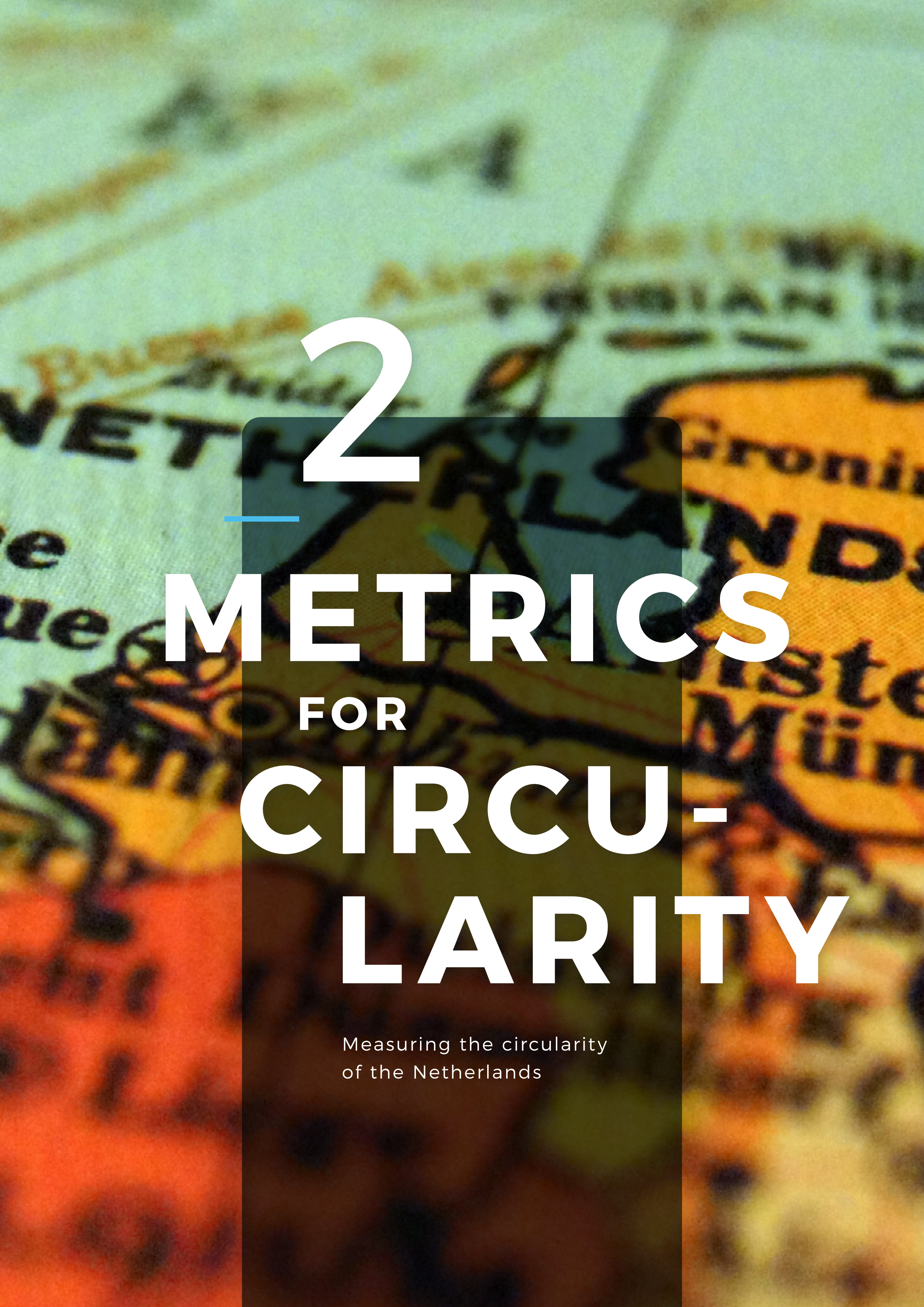
THE BOLD VISION FOR CIRCULARITY

As our declining global Circularity Metric shows, we are in desperate need of transformative solutions. In the Netherlands, a bold vision of full circularity by 2050 is firmly in place. This includes the interim objective of a 50% reduction in the use of primary raw materials—minerals, fossil fuels and metals—by 2030. Transition agendas for five priority areas of the Dutch economy have been implemented. These cover construction, plastics, consumer goods, biomass & food, and manufacturing. Interventions include an emphasis on resource efficiency, a shift to renewable and recycled resources and creating new markets and business models.[11] Complementing this policy with on the ground action is the project *Het Versnellingshuis Nederland Circulair!*, an intervention birthed by a collaboration including the government's Ministry of Infrastructure and Water Management.[12] It seeks to create circular impact by galvanising multilevel collaboration for business and entrepreneurs.
Our study does not exist in a vacuum and is informed by several studies. We have witnessed an increase of investigations around measuring circularity, particularly in the past five years. A recent study by the Netherlands Environmental Assessment Agency (PBL)[13] found that the use of secondary materials constitutes 13% of total Dutch material use. Whilst a study by MVO Nederland posited that 12.1% of the Dutch economy is sustainable.[14] Statistics Netherlands (CBS)[15] have also offered key insights on material flows to, from and within the Dutch economy. Regarding European material circularity, Eurostat recently indicated that the rate stands at 11.2% for 2017, up 3 percent points from 2004.[16]

Clearly, the circular economy transition in the Netherlands has begun. But it needs guidance. The bold ambition for full circularity needs to be accompanied by a baseline analysis and a framework to measure and monitor progress. To know if the Netherlands is moving in the right direction and to enable targeted interventions, we need to apply metrics and measurements, such as our Circularity Gap Metric; from here, a steering framework can be developed. Without measurement, how can circular economy ambitions translate into concrete, circular success?

AIMS OF THE NETHERLANDS CIRCULARITY GAP REPORT

1. Provide a snapshot of how circular the Netherlands is by applying the Circularity Metric to the country's data.
2. Based on our results, identify how materials flow around the country's economy and how they may limit or boost the current Circularity Metric.
3. Spotlight possible interventions within significant industries that can aid the Netherlands' transition to be fully circular by 2050, as well as increase its Circularity Metric.
4. Explore and analyse how the transition to a circular economy will impact the labour market, and jobs and skills for workers of all levels.
5. Communicate a call to action based on the above analysis, in the hope it can inform future goal setting and agendas.



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METRICS FOR CIRCU-LARITY

Measuring the circularity of the Netherlands

Measurements are critical to understanding the world around us. As it becomes more urgent for us to adapt our systems to be more circular, we need to provide a tactical approach to measuring something so abstract and complex. This section explains how we assessed the Netherlands' circularity using our measurement: the Circularity Gap Metric. In the first edition of the global Circularity Gap Report, in 2018, we launched the Circularity Metric on a global level, but this current analysis adapts the metric to suit a country profile. Measuring the Netherlands' circularity should also provide an answer to how the Dutch economy is progressing towards its ambition to be fully circular by 2050. By measuring circularity in this way, businesses and governments can track their circular performance over time and put trends into context, as well as engage in uniform goal-setting and guide future action in the most impactful way.

MEASURING CIRCULARITY: A MEANS TO AN END

At the heart of the circular economy is the idea of moving away from the linearity that has dominated value chains for more than 200 years. It means breaking with the "take-make-waste" tradition and transitioning towards a circular approach under which we refrain from material extraction and optimise the use of existing materials by minimising and eliminating waste.

Closing the Circularity Gap thus serves the higher objective of preventing further and accelerated environmental degradation and social inequality. The end goal is to establish an ecologically safe and socially just operating space for humanity. In recent years, two examples of strategic and ambitious international collaboration have guided global movement towards the safe and just space: The United Nations Sustainable Development Goals (SDGs) and the Paris Agreement.

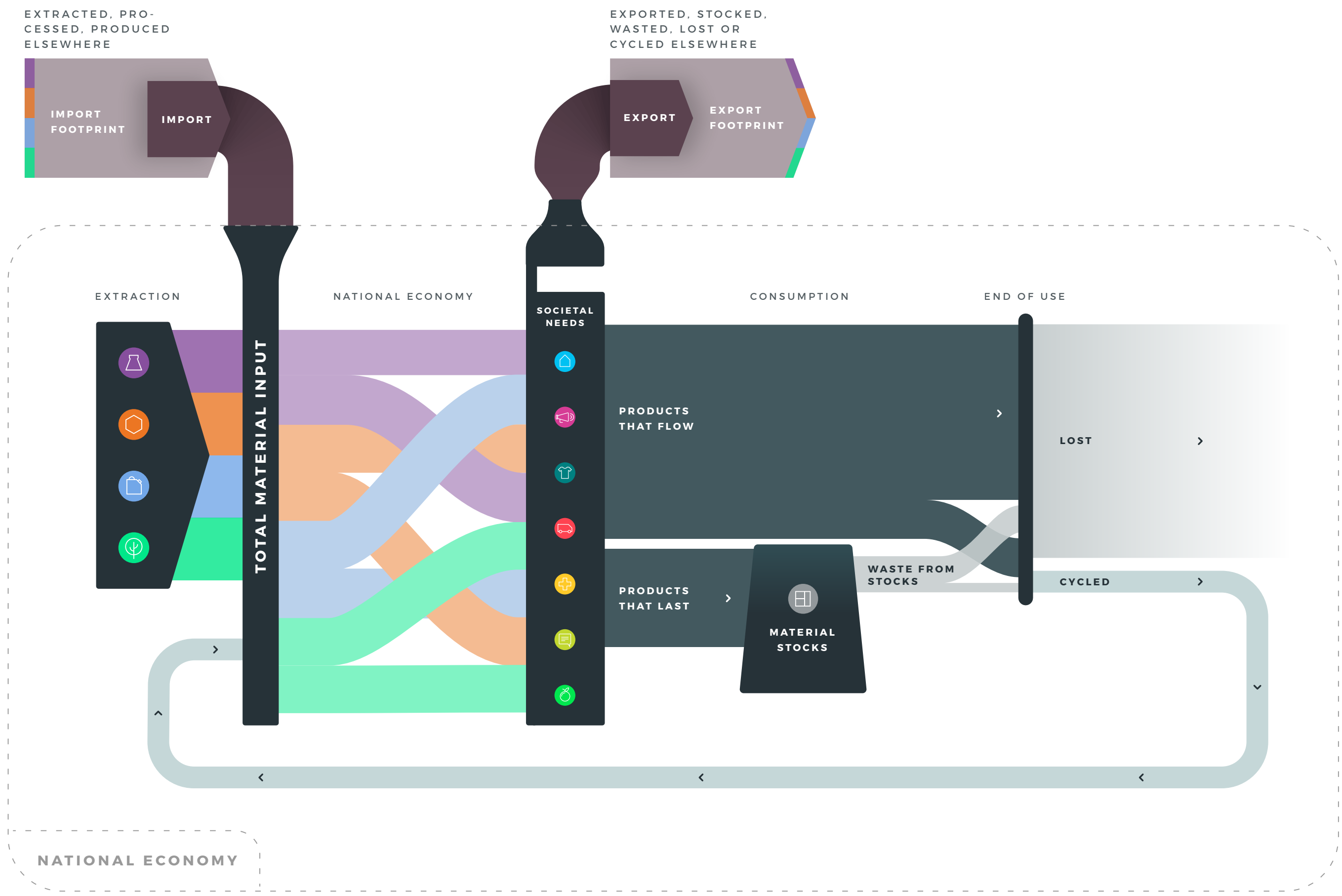
The circular economy is a big picture idea and it's complex. Exactly how the circular transition can deliver more beneficial social outcomes is not a question with just one right answer. There is no simple straight-line solution and the feedback loops in the system run in all directions[17]. In particular, three connected spheres need to be taken into account; how resources are put to work to deliver social outcomes via provisioning systems.

Provisioning systems are comprised of physical systems such as road infrastructure, technologies, and their efficiencies,[18] and social systems include government institutions, communities, and markets.[19] Provisioning systems are the essential link between biophysical resource use and social outcomes. For example, different forms of transportation infrastructure (railways versus highways) can generate similar social outcomes, but at very different levels of resource use.[17] However, in this analysis, we take the material footprint of a country as the starting point for measuring and capturing its level of circularity.

MATERIAL FLOWS AND FOOTPRINTS

Figure one, on the next page, provides a schematic depiction of the material footprint of the Netherlands. It essentially details the amounts of materials in physical weight (excluding water and air) that are available to the economy. The left side shows four resource groups—minerals, ores, fossil fuels and biomass—that are the result of domestic **extraction**. We also see on the left the volume of resources entering the national economy through **import**. Because the imported volumes are manufactured elsewhere and transported to the country, the actual material **import footprint exceeds** the amount of direct imports as shown in the shaded colour. Together, the domestic extraction and the import comprise the **total material input** into the **national economy**.

Within the national economy, the materials undergo a set of processes to convert them into end products. Beginning with the extraction, the resources are **processed**—such as metals from ores—and are manufactured into products in the **produce** stage. The finished products **provide** satisfaction to **societal needs** such as Nutrition and Healthcare, or they are **exported**. Of these materials entering the national economy every year, the majority are utilized by society as short-lived **Products that Flow**—reaching their end-of-use typically within a year, such as an apple or a pair of jeans. Their end-of-use resources are typically either lost or cycled back into the economy. The remaining aforesaid materials enter into long term stock—referred to as **Products that Last**. These products are namely capital equipment, buildings and infrastructure.



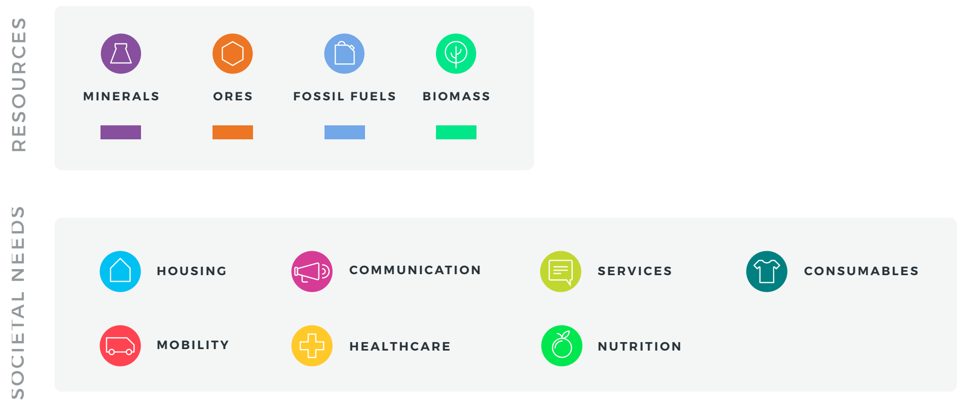


Figure 1 A schematic overview of the material footprint of a country. Note: material stock and cycled material flows are not scaled to proportion.

THE CIRCULARITY METRIC EXPLAINED

Taking the material footprint schematic, in Figure one, as a starting point, we now move to how we can measure and capture the level of circularity of a country. This approach builds on and is inspired by, amongst others, the work of Haas et al..[20] It also borrows from the first Circularity Gap Report performed for a country;[21] Circle Economy's 2019 report on the Austrian economy. Ultimately, from the schematic, we can identify six fundamental dynamics of what the circular economy transition aims to establish and how it can do so. This translates into two objectives and four related strategies. The core objectives are:[22]

- **Objective one**: Resource extraction from the earth is minimised and biomass production and extraction is regenerative;
- **Objective two**: The dispersion and loss of materials is minimised, meaning all technical materials have high recovery opportunities, ideally without degradation and quality loss; with emissions to air, dispersion to water or land prevented; and biomass is optimally cascaded.

The four strategies we can use to achieve these objectives are:[18]

- **Strategy one—Slow flows**: The utilisation of stocks is optimised by, for example, extending the functional lifetime of products and buildings. Long-life products are designed using durable materials;
- **Strategy two—Narrow flows**: Material use efficiency is optimised by deploying circular design strategies that aim to minimise material use in delivering a product or service, it also increases the usage rate of products;
- **Strategy three—Regenerate flows**: Fossil fuels and toxic materials are replaced with regenerative sources. The natural capital of ecosystems is maintained and increased in the process;[23]
- **Strategy four—Cycle flows**: Material cycling for reuse is optimised. This includes improving the collection of materials used in infrastructure, and the wide-scale adoption of best-available technologies for (re)processing of resources, such as optimised cascading, which uses residues and recycled materials for extending biomass.

When we measure the combined effect of the above strategies, the cycling of materials comes to the fore as crucial. If we effectively deploy strategies focussed on slowing, narrowing and regenerating the flow of materials, we require fewer materials to provide similar needs, materials used by the economy have a longer lifespan, can be reused more effectively and take longer to become wasted. So, for our Circularity Metric to capture this crucial process, we thereby define it as measuring the share of cycled materials as part of the total material inputs into a national economy every year.

We capture circularity in one number; the Circularity Metric. The value of this approach is that it allows us to track changes over time, measure progress and engage in uniform goal-setting, as well as benchmark countries' circularity against the global rate and each other. Additionally, it should provide direction as to how the Netherlands' economy scores against the government's ambition to be fully circular by 2050. When considering other elements of the transition, it may prove helpful to develop additional metrics to measure progress and steer action.

A COMPLEX UNDERTAKING: SCOPING AND TRADE DYNAMICS

Applying the Circularity Metric to the global economy is relatively simple, largely because there are no exchanges of materials in and outside of planet earth. For countries, however, the dynamics of trade introduce complexities to which we must adapt our metric to, resulting in certain methodological choices.[13]

Firstly, in assessing a country, we can either take a production or consumption perspective. In a production perspective, we consider all the materials involved in any sort of processing of production activity, regardless of whether they are exported or consumed domestically. In a consumption perspective, we can only consider the materials that are consumed domestically. Whether we apply the metric to a consumption or production perspective will yield different results. In this study, we take a consumption perspective in a bid to generate actionable insights for the economy and consumption on the ground.

Secondly, when considering what Dutch citizens consume to satisfy their needs, we must apply a nuanced lens to the direct imports; meaning we work out the full material footprints of the products. To account for the material footprint of raw materials is straightforward, but this is not the case with semi-finished and finished goods. A motor vehicle, for example, may weigh 1 tonne when imported, but, all the materials used to produce and transport it can be as much as 3.4 tonnes. To represent actual material footprints in imports and exports, we apply so-called raw material equivalents (RMEs) in this study.

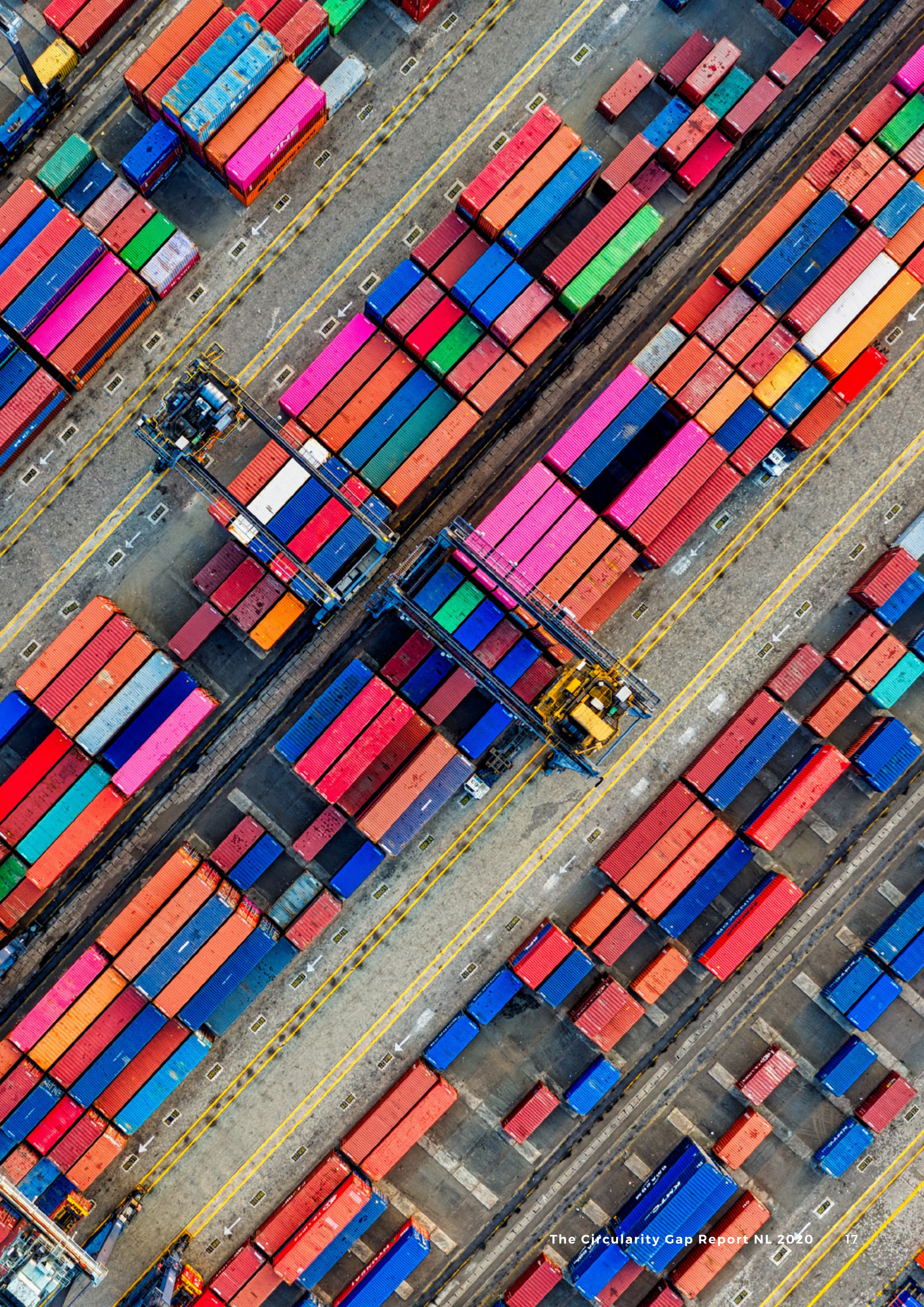
Thirdly, the Circularity Metric considers all secondary materials as adding to a country's level of circularity. These secondary materials can be part of those cycled within the country, as well those that are imported or exported, either as waste destined for recycling or as secondary materials embedded in traded products. However, estimating the shares of traded secondary materials is a difficult undertaking, so we introduce two important assumptions. First, to estimate the volume of secondary materials imported, we apply an average global share of secondary materials per resource group that is equal to the global Circularity Metric, to all imports. We further assume that some low-value, recyclable waste (mainly nonmetallic minerals waste such as aggregates and rubble) is only consumed within the national economy. In our global Circularity Metric, these low-value resources were included in the total figure of 8.6% (there are no imports or exports in a global perspective); without them, that figure would be 2.8%. To understand the amount of secondary materials that are consumed domestically, rather than are exported, we make our second assumption. This is that the share of secondary materials in the total consumption of raw materials is equal to the share of imported and domestically cycled secondary materials in the total input of raw materials.[24]

PRACTICAL CHALLENGES IN QUANTIFYING CIRCULARITY

Providing a year-zero baseline measurement of the circularity of a national economy based on resource flows offers many advantages. It can be used as a call to action and to aptly communicate progress on achieving the goal of full circularity, for example. But the circular economy is full of intricacies. Therefore, simplifications are necessary for the benefit of having an updated and relevant figure of circularity to guide future legislative action. This results in limitations that must be considered.

- **There is more to circularity than cycling.** A circular economy strives to retain the value and complexity of products for as long as possible, minimizing degradation. The cycling back of resources measured in the metric is only one component of circularity. The metric does not explicitly consider other strategies that are core to building a circular economy such as asset sharing, reuse or remanufacturing. These reduce the necessity for new product creation, thereby preventing waste volumes and slowing down material flows, but they are difficult to measure in this model.
- **Lack of consistency in data quality.** Whilst data on material extraction and use are relatively robust, data on the end-of-use stage are weak, thereby presenting challenges in quantifying global material flows and stocks. The weak data is in part due to the complexity of waste. It is heterogeneous, geographically spread out and categorised differently across statistical sources.
- **Quality loss and material degradation.** The metric does not consider the composition or level of quality of cycled materials. As such, any quality loss and degradation in processing goes unconsidered. In this way, a plastic bottle made from PET may re-enter the economy as a secondary material—recycled PET. Its quality will determine whether it is to be utilized building park benches or to manufacture food-grade plastic products. This variance would not be documented in the metric but has strong implications regarding material degradation.
- **Relative compared to absolute numbers.** The Circularity Metric offers a percentage of the total circularity performance from start to finish by considering the relative size of cycled materials as a share of the total material input. This means that as long as the amount of cycled materials increases relative to the extraction of new materials, we see the statistic improving, despite the fact that more virgin resources are being extracted. The statistic, in this case, would show progress, despite a key objective of the circular economy not being met. In order to avoid these uncertainties, it must be accompanied by contextual numbers.

For a more exhaustive look into the methodology behind the circularity gap, you can visit our website: www.circularity-gap.world/methodology



3

SIZING THE NETHERLANDS' GAP

Surpassing the global average

The Netherlands is 24.5% circular. This section investigates the specificities of the resource footprint of the national economy. This includes how resources are used and at what volumes, as well as how it serves key societal needs and wants, such as Nutrition and Services. It also assesses how raw materials are processed and assembled to become the products that address local needs. Visualising what happens at end-of-use sheds light on the accumulation of materials in products, goods and the built environment around us. Furthermore, it reveals that the Netherlands is a heavy trader in the international scene, an efficient user of materials, but also particularly resource-intensive in areas such as Construction and Agriculture. These observations provide a clear starting point to identify where different sectors and supply chains should focus their strategies going forward.

GLOBAL CIRCULARITY GOES FROM BAD TO WORSE

Our 2020 edition of the global Circularity Gap Report identified that, for the first time in history, more than 100 billion tonnes of materials are entering the global economy every year. But as global resource use has reached new heights, the Circularity Metric has wilted from its 2018 rate of 9.1% to 8.6% in 2020. The reasons for this on the global stage are threefold. Namely, high rates of virgin material extraction; ongoing stock build-up to feed a ballooning population; and, low levels of end-of-use processing and cycling.

The consumption of resources varies across continents and geographies, however. In light of the analysis in the 2020 Report, we see that the Netherlands fits the *Shift* country profile—alongside most other high-income countries in the global North (see textbox on the right). This means that it scores very highly on the United Nations' Human Development Index (HDI), between 0.8 and 1, but its Ecological Footprint—an indicator that accounts for human demand of biological sources—reflects its mammoth level of consumption. Since the Netherlands is small compared to its population size, the Netherlands has, as of 2016, only about half the amount of biocapacity per resident than the world. Given the Netherlands' high level of consumption (three Earths), this means that currently, the Netherlands demands six times more from nature than their ecosystems can renew.[25] In this way, the classic profile of a *Shift* country is one of high impact: these countries produce 66% of gross domestic product (GDP), while having only 20% of the global population. They also consume the largest share of the 100.6 billion tonnes of materials globally and are major world-traders. The pressure is on them to shift away from over-consumption of the planet's resources, in servicing their relatively affluent and comfortable lifestyles. Their role in terms of global circularity is also prominent—the true impact of *Shift* countries extends far beyond their national borders, with much of the environmental and social costs incurred elsewhere.

NOT THE SAME BUT SIMILAR: DIFFERENT COUNTRIES COMMON NEEDS

Despite clear divergences between countries, suitable circular economy strategies can be developed based on discernible common needs. Based on the two dimensions of Social Progress—indicated by an HDI score—and Ecological Footprint, countries fall into three broad profiles:

Build— A low rate of material consumption per capita means *Build* countries currently transgress few planetary boundaries, if any at all. But they are struggling to meet all basic needs, including HDI indicators such as education and healthcare. Country examples: India, Bangladesh, Ethiopia.

Grow—These countries are manufacturing hubs, hosting an expanding industrial sector and leading the way when it comes to building. This rapid industrialisation, as well as a growing middle class, have occurred concurrently with rising living standards. Country examples: Latin American and Northern African nations, China, Indonesia.

Shift—Home to a minority of the global population, material consumption in *Shift* countries is 10 times greater than in *Build*. Their extraction of fossil fuels is relatively high, as is their participation in global trade. So despite high HDI scores which result in comfortable lifestyles, these countries have a way to go in consuming resources in line with the planet's resources. Country examples: United States of America, EU member states, Middle Eastern nations.

7 SOCIETAL NEEDS & WANTS

Societies need to not only survive, but thrive, and resources are needed to fuel the living. Here we describe the 7 key societal needs and wants and which products and services they include, as well as the volume of materials it takes to fulfil them in the Netherlands. Since various products can be allocated differently, here we make our choices explicit. For example, "radio, television and communication equipment" can be classified either as part of the societal need "communication", or as "consumables". We decided to subsume it under "communication".

HOUSING AND INFRASTRUCTURE

The need that represents the third largest resource footprint, with **32 million tonnes**, is for construction and maintenance of houses, offices, roads and other infrastructure.

NUTRITION

The biggest category in terms of resource use is nutrition. Agricultural products such as crops and livestock require **60 million tonnes** per year. Food products have short life cycles in our economy, being consumed quickly after production.

MOBILITY

A considerable resource footprint is taken up by the need for mobility; **36 million tonnes**. In particular, two resource types are used: the materials used to build transport technologies and vehicles like cars, trains and airplanes; plus, predominantly, the fossil fuels used to power them.

SERVICES

The delivery of services to society ranges from education and public services, to commercial services like banking and insurance. The material footprint is modest, **24 million tonnes**, in total and typically involves the use of professional equipment, office furniture, computers and other infrastructure.

CONSUMABLES

Consumables are a diverse and complex group of products—such as refrigerators, clothing, cleaning agents, personal-care products and paints—that generally have short to medium lifetimes in society. Textiles including clothing also consume many different kinds of resources such as cotton, synthetic materials like polyester, dye pigments, and chemicals. These account for **26 million tonnes** worth of resources.

HEALTHCARE

With an expanding, ageing and, on average, more prosperous population, the need for healthcare services is increasing globally. Buildings aside, typical resource groups include use of capital equipment such as X-ray machines, pharmaceuticals, hospital outfittings (beds), disposables and homecare equipment. This accounts for **25 million tonnes** in the Netherlands.

COMMUNICATION

Communication is becoming an evermore important aspect of today's society, provided by a mix of equipment and technology ranging from personal mobile devices to data centres. Increased connectivity is also an enabler of the circular economy, where digitisation can make physical products obsolete, or enable far better use of existing assets, including consumables, building stock or infrastructure. Resource use in this group is less intense, standing at **18 million tonnes**.

THE MATERIAL FOOTPRINT SATISFYING SOCIETAL NEEDS IN THE NETHERLANDS

The figure on the next page builds on the schematic material footprint diagram in figure one on page 14. It dives into the material footprint of the Netherlands; linking how four resource groups (minerals, metal ores, fossil fuels and biomass) satisfy the seven key societal needs and wants shown on page 20. From left to right, the figure shows the domestic extraction of resources (Take) which amounts to **116 million tonnes**, through the mining of minerals or the production of crops in agriculture or forestry to produce timber for construction, for example. These extraction processes result in raw materials like wood or sand. However, in a national context, domestic extraction represents only one of the inputs to the economy, which include also gross direct imported products, **402 million tonnes**, and their relative global footprint, **939 million tonnes**, as well as imports of waste, **27 million tonnes**, and of secondary materials, **6.8 million tonnes**. Re-exports—products that are imported and without any processing are exported again—make up a consistent share of all Dutch imports, namely **145 million tonnes** of direct products and their associated footprint, **403 million tonnes**.

The Netherlands imports **554 million tonnes** of raw material equivalents for a total raw material input of about **670 million tonnes**. The raw materials typically undergo processing (Process), for example in the production of metals from ores, cement from limestone, or refined sugar from beets. The total amount of processed materials, which on top of raw material inputs also includes local and imported secondary materials, amounts to **735 million tonnes**. Subsequently, these refined materials can be used for the manufacturing (Produce) and assembly of products like automobiles from metals, plastics and glass, or the construction of roads and houses, or the production of fashion garments. These finished products can, in turn, be consumed to provide services (Provide) and access to products that can satisfy societal needs and wants locally or be exported. In 2016, the Netherlands exported some **210 million tonnes** of final products with an associated footprint of **487 million tonnes** and **14 million tonnes** of waste. According to our estimates, a total of **12.6 million tonnes** of secondary materials were exported in the same year, which leads to a total volume of approximately **221 million tonnes** of materials that was driven by Dutch final demand, of which little less than **53 million tonnes** were either secondary materials, **6.4 million tonnes**, or reused waste, **46 million tonnes**.

Essential to identifying and addressing opportunities for a more circular economy is what happens to products and materials after their functional use in our economy (End-of-use). In the Netherlands, the total amount of waste treated amounted to **69 million tonnes**, of which **62 million tonnes** came from Products That Last and **7.1 million tonnes** from Products That Flow.

Of the total amount being treated, **59 million tonnes**, that is 84.6%, are either recycled or directly reused, whereas the other **10.6 million tonnes** are lost indefinitely. Of the latter, the majority, or **9.5 million tonnes**, ends up incinerated while only **1.1 million tonnes** is landfilled. Aside from materials going to waste, **84 million tonnes** are added to stock (Net Stock Additions) in the form of capital investments such as buildings and infrastructure, machinery and equipment. Another **62 million tonnes** are released into the environment as emissions mostly of fossil origin. Finally, the remaining **64 million tonne**s are dispersed into the environment as a deliberate, or unavoidable consequence of product use. This includes fertilisers and manure spread on fields, or salt, sand and other thawing materials spread on roads, erosion of metals.

UNCOVERING THE MANUFACTURING FLOWS IN THE DUTCH ECONOMY

The Netherlands is—and for centuries has been—a key player in global trade. Its import and export rates are amongst the highest in Europe. The material footprint diagram is essentially employed to assign all of the resource use by the Dutch population to final consumption; but in a trading nation such as the Netherlands, we cannot ignore the massive impact of imports and exports on the material flows of the country. Import and export commodities can range from raw materials used earlier in the value chain, such as sand and clay, up to highly processed goods ready for consumption and use, like medical equipment or food products.

THE MATERIAL FOOTPRINT
SATISFYING SOCIETAL NEEDS IN THE NETHERLANDS

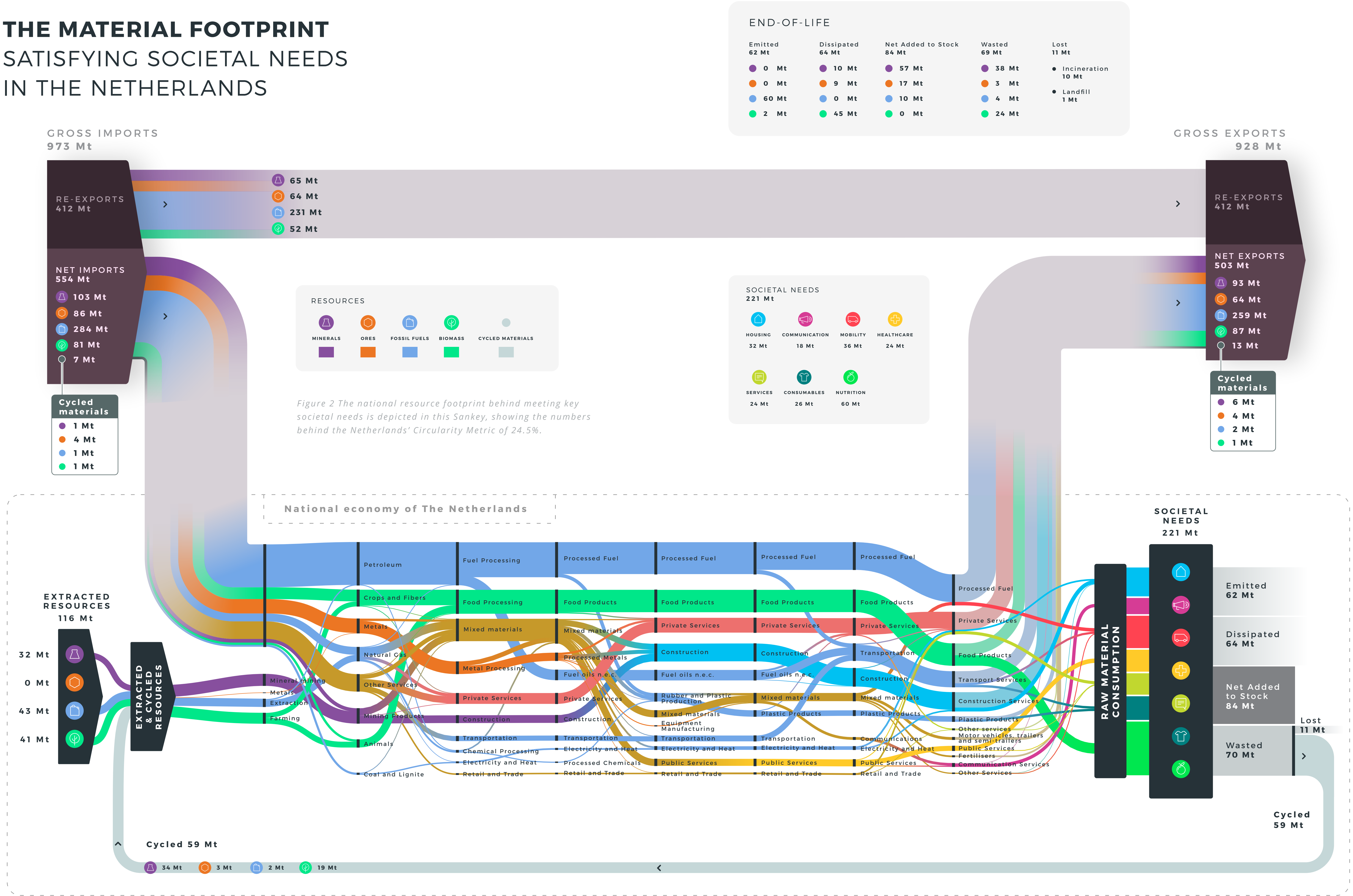


Figure 2 The national resource footprint behind meeting key societal needs is depicted in this Sankey, showing the numbers behind the Netherlands' Circularity Metric of 24.5%.

A PROMINENT GLOBAL TRADER

From the material footprint figure, we can see how significant (direct) imports are, standing at **402 million tonnes**. In reality, goods cross many borders before reaching their final destination and consumer. In the Netherlands, over a third of imports, **145 million tonnes**, are directly re-exported; they simply utilize the Netherlands' ideal geographic location to the European hinterland before being shipped off to their final destination. This number increases to **412 million tonnes** when you consider the total material footprint of re-exports. This essentially inflates Dutch trade, as they greatly shape the Netherlands' economy in terms of flows of resources, but they don't feed into Dutch consumption.

From the total material footprint of **735 million tonnes** (excluding re-exports), the majority—**514 million tonnes**—are used for satisfying societal needs and wants outside of the Netherlands; refined petroleum products, services and food products are leading in terms of Dutch exports. Of the total amount of processed materials which can be used to produce final products, about a third, **221 million tonnes**, are driven by in-country demand, while the remaining two-thirds are exported. This correlates to **487 million tonnes** of raw materials embodied in exported finished goods. The numbers back up what we already know; the Netherlands is a trading nation that excels globally, particularly in supplying agricultural products and feeding fossil fuels to the world.

A RESOURCE-INTENSE CONSTRUCTION SECTOR UNDER PRESSURE

From our analysis, we see that of the seven key societal needs and wants, Housing requires **32 million tonnes** of resources, the third most resource-intensive societal need after Nutrition and Mobility. This is, in fact, quite low for a country with densely packed urban centres. It translates to the relative value of **14.6%**, which is well below the global average of **38.8%**. Although the higher global rate includes the resource-intensive realities of rapidly urbanising *Grow* countries. In the Netherlands, there is no domestic ore mining and a relatively low level of nonmetallic minerals mining in comparison with biomass and fossil fuel extraction. This again reflects how the Dutch economy is rather focussed on the petrochemical and agriculture spaces.

However, the Netherlands is home to a dense and growing population, 18 million people by 2035, and a clustering of inhabitants into urban areas. This has translated into a very real housing shortage. But with increased urbanisation comes an increase of stock build-up. Globally, of the **100.6 billion tonnes** of materials entering the global economy, **48 billion tonnes** enter into long-term stock; Products that Last, such as buildings, infrastructure and capital equipment. In the Netherlands, of all materials not being wasted, **84 million tonnes** are added to stock; buildings and infrastructure or machinery and equipment, for example. In such products, materials—namely minerals and ores—become embedded and unavailable as secondary feedstock for as long as they remain stored in use. So, although resource flow into the built environment in the Dutch context is moderate, demand is on the upswing.

EFFICIENT USER OF MATERIALS

The Netherlands is small but efficient; as demonstrated by its position as a global supplier of food far beyond its apparent means. This efficiency can also be detected in its use of resource waste. This has partly been steered by comprehensive government policy, technical innovation and investment directed at increasing material efficiency, extending and intensifying use and enabling end-of-life recovery. These rates may explain why the Dutch circularity rate is significantly higher than the global rate of 8.6%.

An incredibly high share of waste is reused in the country. This is, to a large extent, due to mineral aggregates that are reused in useful applications, such as under road construction. But this is regarded as downcycling. The remaining reuse areas include composting/land application waste. Only **2.7%** is landfilled and **13.3%** incinerated. Its production of recycled, secondary materials over total waste generated is more modest, at **17%**. However, although a high rate of waste reuse may bolster the country's circularity rate, it's important to note that the Netherlands also produces a lot of waste in the first place.

4 BRIDGING THE NETHERLANDS' GAP

Exploration of “what-if” scenarios for key sectors

Now that we have presented how the metric is derived and investigated the message it portrays, it's time to analyse the findings to arrive at a diagnosis and subsequently suggest a remedy. We use this diagnosis to identify some of the most impactful sectors of the economy, which we procure based on either a Mass, Value or Carbon level; as well as contribution to the labour market and impact on the country's material footprint. For the chosen sectors, we then formulate scenarios that are purposefully constructed to explore and entertain the "what-if"; free from the constraints of feasibility from a political, social or behavioural (change) standpoint. They serve as an exploration of a potential path forward but also sketch which type of sectors and interventions are most impactful in terms of steering the Circularity Metric. Such interventions are also integral to rebuilding a more resilient economy in the post-covid-19 age. We employ Circle Economy's DISRUPT framework, presented on pages 30-31, to cover all essential elements of a circular economy.

FULLY CIRCULAR VERSUS A CIRCULARITY METRIC OF 100%: LIMITATIONS IN BRIDGING THE GAP

The Dutch government plans to be fully circular by 2050, but the strategies on how to achieve this are still being explored. Yet it is clear that in our aim to reduce the Circularity Gap of the Netherlands with our recommendations, the metric will never reach 100%.

There are four fundamental reasons for this. Firstly, to fulfil the societal need for Nutrition, we require agricultural production to provide food. In the cycle, food products are consumed and agricultural residues are generated; we can try to optimally cascade the residues, but 100% cyclability will not be reached. Secondly, a share of materials is always added to stocks. This is the case with infrastructure and in capital equipment and even in the build-up of a renewable energy system using solar and wind. These materials are essentially locked into place and are not available for cycling. Thirdly, fossil fuels used for energy purposes result in greenhouse gases upon combustion; they are dissipative and unretainable. Lastly, on top of these flows, 100% circularity is also limited because high-quality recycled materials also require virgin materials and energy inputs to be processed and produced. These dynamics of the economy are inherently non-circular, but the extent to which they actually limit us from reaching a 100% target of circularity is unknown.
Therefore, we can interpret the ambition of becoming fully circular, as is the ambition of the Dutch government, in two ways. First, the ambition to be fully circular may relate to the whole economy but really would exclude fossil fuels, renewable energy and food because they are inherently non-circular. The strength of this approach is that all resources are considered, but it would include elements that can never be circular. Secondly, you can exclude non-circular elements and strive for full circularity with minerals and ores, which are circular. The upside of this is that you can effectively still monitor progress toward circularity, but only in regards to a portion of the economy, which is a drawback.

"BANG FOR THE BUCK": SCORING SECTORS ON THE MASS-VALUE-CARBON NEXUS:

When identifying key sectors and interventions to move the Dutch economy to circularity, we should also take into consideration the existing Dutch transition agendas that have been delivered in the plan to become fully circular by 2050. The agendas were formed around the five priority areas of construction, plastics, consumer goods, biomass & food, and manufacturing.

We have funnelled our energy into four key sectors; Construction, Food and agriculture, Fuel and energy and Manufacturing, repair and recycling. By focusing on a few key sectors, we can dive deep and apply a diagnostic lens to identify where we can best apply interventions to increase the circularity of the Netherlands. In making our decision, we zoomed into the material flows associated with different areas and sought to complement this information with data on how the sectors score on their material extraction (Mass), financial value creation (Value) and greenhouse gas emissions (Carbon); the Mass,[26] Value[27] and Carbon[28] (MVC) nexus. This multi-dimensional tool allows us to identify the key areas which can deliver the highest possible environmental impact when applying circular strategies. It is also worth noting that in our use of the term sector, we move beyond strict definitions and encompass a range of related areas under one umbrella "sector".

When combined, it's clear that the four sectors are very significant in their influence on the total economy; in terms of adding value and their climate impact. Combined, they represent 67% of all domestic

SUMMARIZING THE **MASS-VALUE-CARBON NEXUS**

extraction, including almost three-quarters of all imports and more than three-quarters of all exports. The four sectors emit 80% of the 224 million tonnes of CO_2 equivalents attributed to the Dutch territory.
The remaining 20% are largely emitted from passenger transportation and electricity consumption from service sectors. They also provide 35% of Value, this is somewhat lower than the other two indicators of Mass and Carbon because service industries (banking, trade and real estate, for example)—which are not considered in this MVC analysis— typically exhibit higher value-added. Aside from their substantial combined impact, what stands out is the sheer diversity of the MVC profiles per sector.

Construction has the highest level of raw material consumption of all the sectors, with its Mass standing at 28.9 million tonnes. The sector's mammoth consumption is made up mainly from nonmetallic minerals (45%) and metals (31%), but it also shows a considerable share of fossil fuels (23%). The Value of Construction, €95.6 billion, is also the largest of the four sectors.
It is mainly attributable to the "broad" construction sector. This is the supply chain of materials, products and assemblies, and professional services, as opposed to the "narrow" sector, defined as on-site work,[29] which accounts for less of the sector's Value, as well as Carbon.

Food and agriculture is the second-largest producer of greenhouse gas emissions; 35 million tonnes of CO_2 equivalents. However, the largest proportion of this pollution, 86%, stems from the agricultural component of the value chain due to the methane and nitrous oxide from cattle farming and fertilizer use. In a similar dynamic to the construction sector, the vast majority of the value is created at a more advanced stage in the chain; by the food and beverage industries which are responsible for two-thirds of the sector's value.

Fuel and energy, unsurprisingly, represents almost half, 47%, of all Dutch emissions. This is allocated between the petrochemical industry, 14%, the energy industries, 21% and the logistics industry, 12%. The Value of Fuel and energy is also the second-largest after Construction in our analysis and represents nearly 10% of the entire economy. However, this value is not evenly distributed across the subsectors; €25 billion (38%) to petrochemical, only €8 billion (12%) to energy and the remaining €33 billion (50%) to logistics. Overall, the lowest hanging fruit in terms of impacting circularity is clearly the petrochemical space with its large mass volumes, moderate emissions and moderate added value. Meanwhile, energy is also significant to consider in that it has a similar Mass to logistics but a higher Carbon rate.

The **Manufacturing, repair and recycling** economy supplies the lowest numbers in all three indicators, making up only 4.6% of total Carbon, 6.3% of all Value and just 0.5% of all Mass. The latter can be explained by two factors. Firstly, the Dutch manufacturing industry specializes in small-volumes of large-value products, such as high-tech equipment. Secondly, the two largest manufacturing industries, namely food and chemical, were not included in this sector. Nonetheless, this is a sector with large potential, as well as a substantial impact on the labour market in terms of jobs created in the move to circularity.

DISRUPT: SEVEN KEY ELEMENTS OF THE CIRCULAR ECONOMY

The circular economy assumes dynamic systems, meaning there is no specific end-point, but it is rather a process of transformation. The DISRUPT model describes seven key elements that give direction to this transformative process. Ultimate aims include slowing the flow of resources, closing the loop and narrowing resource flows, while switching to regenerative resources and clean energy. The seven elements describe the full breadth of relevant circular strategies and will be used throughout the report.

This model also illustrates how a large range of jobs and skills can be circular, and in turn, drive the transition. An example of a circular job is included in each of the seven key elements.

Chapter five is a detailed analysis of how moving to circularity may impact the Dutch labour market.

D

DESIGN FOR THE FUTURE

Account for the systems perspective during the design process; use the right materials, design for appropriate lifetime and for extended future use.

Circular job: Circular equipment engineers design products to enable parts and resource recovery after the product's use phase.

I

INCORPORATE DIGITAL TECHNOLOGY

Track and optimise resource use, strengthen connections between supply chain actors through digital, online platforms and technologies.

Circular job: Building information managers maintain data on construction components. They understand how to integrate and interpret virtual information management systems.

S

SUSTAIN & PRESERVE WHAT'S ALREADY THERE

While resources are in-use, maintain, repair and upgrade them to maximise their lifetime and give them a second life through take back strategies when applicable.

Circular Job: Repair technicians repair appliances, machines or vehicles. They possess strong technical and manual skills which can be acquired through a formal and informal education and training.

R — **RETHINK** THE BUSINESS MODEL

Create greater value and align incentives through business models that build on the interaction between products and services.

Circular job: Demand planners oversee supply and demand to make refurbishment a profitable business model. This role requires logical thinking and reasoning.

T — **TEAM UP** TO CREATE JOINT VALUE

Work together throughout the supply chain, internally within organisations and with the public sector to increase transparency and create shared value.

Circular job: Procurement professionals stimulate the demand for secondary materials and discern and connect new suppliers in order to do so. This profile points to the need for entrepreneurial, interpersonal skills.

U — **USE** WASTE AS A RESOURCE

Utilise waste streams as a source of secondary resources and recover waste for reuse and recycling.

Circular job: Process operators sort waste for sellable products. Although classed as practical-skill work, knowledge of the quality of incoming raw materials is crucial.

P — **PRIORITISE** REGENERATIVE RESOURCES

Ensure renewable, reusable, non-toxic resources are utilised as materials and energy in an efficient way.

Circular job: Agronomic advisors support healthy soil with organic fertiliser from composted manure and crop remnants. They combine strong interpersonal skills with ecological knowledge.

BRIDGING THE CIRCULARITY GAP

We will now sketch future scenarios for the four sectors accompanied by proposed interventions. These will explore their impact on the Circularity Metric, as well as on the material footprint of the economy. The developed scenarios are deliberately not time-specific, nor have we considered the specific actors or policies necessary for their real-life materialization. The scenarios rather serve as the exploration of a potential path forward and sketch which type of interventions and levers are most impactful in terms of steering the Circularity Metric.

We are aware that measuring the effects of the suggested interventions in terms of their effect on the Circularity Metric and material footprint is a crude simplification which must ignore other relevant aspects, such as additional ecological parameters. However, we see the value of this analysis in contributing to the dynamic debate on where to place our bets for enhanced circularity in the Netherlands and beyond.

For the development of the scenarios, we use the DISRUPT framework, on pages 30-31, to consider the many relevant strategies for the systemic changes needed for the sketched scenarios to materialise.

SCENARIO 1: ADVANCED CONSTRUCTION PRACTICES

"The construction industry makes it" is the Dutch construction sector's slogan. And there is a robust appetite to make it circular; 50% circular by 2030[30] and fully circular by 2050. One recommendation put forward by the Circular Construction Economy Transition Agenda is that the government should require 100% circular execution—all government procurement will be circular—for contracts from 2023 onwards.[31] Building renovation is also one of the flagship programmes of the European Green deal, hoping to double, or triple, the renovation rate of existing buildings.[32]

The construction sector is not timid in its resource use; it accounts for 50% of raw materials used, 40% of total energy consumption, and 30% of total water consumption in the Netherlands. An estimated 40% of national waste involves construction and demolition waste, while the sector is responsible for approximately 35% of CO_2 emissions.[33]

So, circular gains will require tangible system-wide changes and attitude shifts. It will also require skilling of the workforce, from construction workers to architects and material suppliers, to power the transition and shake-up of traditional processes.

The growing Dutch population means that this year there is expected to be a shortage of 300,000 housing units.[34] This necessitates an increase in the supply of housing. A circular economy for construction, use of buildings and infrastructure is urgently needed. At this time, the Dutch economy is also confronted with a nitrogen crisis. This has led to many construction projects being halted because of their contribution—alongside agricultural practices and fine dust from car travel—to the deposition of nitrogen concentrations (far) above norms set by the European Commission.[35] In meeting the goal of 50% reduction of material input of abiotic resources by 2030 and full circularity by 2050, the Dutch construction sector must innovate its approach, with circularity as a main driver.

1.1 NO DEMOLITION, BUT PRESERVE AND EXTEND

To fulfil new housing needs, the proposed intervention suggests keeping the current (residential) housing and (commercial property) offices in good order through renovation, refurbishment, upgrading and repurposing where possible. As a result, no buildings that currently form the housing stock will be demolished. The most important gain of the scenario is that building fewer new buildings will reduce the demand for newly extracted and imported building materials.

This intervention should **sustain and preserve** what is already there, first of all through the optimal maintenance, service and repair of current houses, while also looking into options to repurpose and upgrade the current housing stock. This could include transforming vacant office buildings into student housing. Optimal maintenance can be further enhanced by leveraging the possibilities available when **digital technology** is incorporated through predictive maintenance and digital material tracking. An example of this is material passports, such as the ones offered by Madaster.[36] As is the typical performance of a passport, these integrate information about the type, configuration, length, lifespan and height of materials in a building.

MATERIAL PASSPORTS, INCREASING DIGITIZATION, ALL-ROUND CIRCULAR BUILDINGS

The circular revolution in construction has started.[38] "Urban miners" can look at buildings as raw material banks; their materials can be collected, cleaned and used in other construction projects as secondary materials. Digitisation is playing an increasingly important role in the construction sector and greatly serves the ambition of more sustainable operations. Madaster, for example, operates an online public library to which stakeholders along the construction chain upload building information modelling (BIM) on various buildings.[39] This information generates correlating material passports, which can inform sustainable design, as well as disassembly and reuse. Such material passports can also be made for existing buildings, through techniques such as digital 3D scanning.

As an example of tangible circular construction, the Circl building from bank ABN AMRO stands in Amsterdam's financial district. It was "born from a circular vision that centres on high-quality recycling of materials, energy-neutral consumption and a bare minimum of waste".[40] The walls in the basement of Circl were made from window frames from an old Philips building, for example, while the parquet floor is made from residual wood from other projects.[38]

Designing for the future by being more space-efficient is another useful strategy. This aligns with the broader trend of micro-living, where amenities like washing are shared, thereby driving efficiencies and potentially service levels for the inhabitants. Finally, co-working spaces fit into the trend of a mobile workforce that shares high quality office spaces rather than owning their own.

As a result of the proposed intervention, construction waste would no longer become available for cycling back into the economy. Presently, this stream is mostly downcycled, for example in the form of road and backfilling materials. So, if we removed demolition, this would decrease the volume of cycled materials by 30.0 million tonnes, which would decrease the country's Circularity Metric from **24.5% to 16%**. From the eight proposed interventions this is the only one that decreases the Circularity Metric. With regard to the material footprint, the effect would be favourable as it would decrease the material footprint of consumption by **20% to 177 million tonnes**. Although not quantified, greenhouse gas emissions would be considerably reduced. This is due to the reduction in the material footprint, which means that the materials would not require processing, transport or installation in the actual construction.

1.2 CYCLE BETTER AND STOP EXTRACTING NEW RESOURCES

This intervention suggests that we streamline and enhance how we cycle construction materials and demolition waste. As a result, no virgin materials would need to be extracted, which would alleviate the negative environmental repercussions of mining and processing to produce materials such as cement and steel for construction. A further benefit would be that the amount of cycled materials in the Netherlands would greatly increase.

This intervention will **use waste as a resource** and **sustain and preserve** what's already there, by, for example, applying reverse construction and advanced sorting which allows for structured disassembly of buildings. This ideally keeps building components and materials intact and ready for reuse, rather than reverting it back to the material level, as is the case with recycling. The methods incorporate **digital technology**, such as Building Information Management (BIM) systems and material passports.

This process will be further bolstered by **rethinking the business model**. When it comes to using secondary materials, standardisation of required quality levels and accurate measurements will be important to attain price points that are competitive with those of virgin materials, thereby enhancing demand and resulting in a less fragmented marketplace. Secondary materials also need to be integrated into design, thus also placing some responsibility on designers and architects. Platforms such as the Excess Material Exchange,[37] which finds new high-value reuse options for materials, can play a crucial role in facilitating a solid market opportunity for cycled materials.

In this intervention, the Netherlands would source all materials required for new buildings from secondary sources, leading to a reduction in virgin material extraction and import. If this was implemented, we would see the Netherlands' Circularity Metric increase from **24.5% to 37.2%**. This is the largest boost of the Circularity Metric of any of the explored interventions. It would also significantly impact the Dutch economy's material footprint with a reduction from 221 to **171.5 million tonnes; a reduction of 22.6%**.

SCENARIO 2: CIRCULAR AGRICULTURE AND FOOD SYSTEM

The Netherlands is known for its mighty role in the worldwide agrifood trade.[41] Agriculture represents around 10% of the economy in its value-added, uses more than half of the land and produces the third-largest share of waste.[42] It grows and exports 94.5 billion euros worth of produce per year (2016) consisting of plant-based products, livestock, poultry, meat and eggs.[43]

But in facilitating this large share of the economy, measures to increase production, such as drainage of wet areas and the use of chemical fertilisers, has slashed biodiversity rates.[44] Also, large nitrogen deposits from, amongst others, animal husbandry have also contributed to the national nitrogen crisis. The inefficient use of biomass, from feed to fertilizer, in the agricultural process has brought proponents of circular agriculture to the fore, attesting that it can reduce the environmental impact of farming, while producing good yields from crops. Thereby enabling the Netherlands to retain its spot as a leading global agrifood player. Key here is Wageningen University's concept of circular agriculture (*Kringlooplandbouw*), which has been crafted to fit the Dutch context.
An important aspect of reducing the ecological footprint of the industry is in steering dietary habits. Of particular relevance here is the balance of dietary proteins; animal versus plant-based. Over the past 60 years, typical western diets have incorporated ever-higher shares of animal proteins, shifting from around 60/40 plant/animal composition 60 years ago, to 40/60 today.[45]

Yet there has been pushback on diets heavy with animal protein. Increasing knowledge around the environmental impacts of animal-based foods has robustly fed into the public's consciousness. We have seen a swell in consumers reducing their meat intake, as well as the food industry funnelling funds into research in the plant-based protein space.[46] The "protein revolution from farm to fork"[46] was even a theme at this year's World Economic Forum in Davos, with sessions being led by Nestlé and DuPont. However, livestock, and their meat for consumption, can play a crucial role in circular food systems. Pigs, poultry, farmed fish or insects, for example, can utilise unavoidable farm food waste and convert it into valuable food and manure. In this way, farm animals recycle nutrients into the food system that otherwise would have been lost in the process of food production;[47] a core component of circular agriculture. So, it may not be a question of eliminating meat from our diets, but reducing it.

In light of these major developments, this report aims to shed light beyond production orientated agriculture considerations and will dive into the final consumption of produce. Therefore, the following section investigates the potential of a set of interventions that cater to both production and consumption of agricultural products.

2.1 STOP IMPORTS AND EXPORTS OF ANIMAL PRODUCTS AND FEED

If the Netherlands were to stop importing and exporting animal products, as well as feed for the animals, it could localize all of its current animal cultivation. Importantly, the Netherlands has hordes of local agricultural waste products and domestic crops which can be used for livestock feed and fodder. Regional and local production processes are core to a circular vision for agriculture.[48] The production of crop-based feed for animals presents environmental challenges in many countries; for example, internationally traded variants based on soy typically come from countries where land-use changes, such as deforestation, are real concerns.[49]

This intervention would require players along the value chain to **collaborate to create joint value**. From the government, tax regulation that disincentives the procurement of imported feeds and animal products could be implemented. This could be a carbon tax to decrease the competitiveness of imports that involve a high level of transportation; increased import tariffs and export taxes or subsidies to support local farmers. Trade bans applied to imports of specific resource groups or origin countries could also contribute to the goal.

As a result of this intervention, the Netherlands would no longer import or export animal products or feed. This would decrease the total imports by 18.2 million tonnes, corresponding to a decrease in import volume for the agricultural sector of 26%. It would only marginally increase the Circularity Metric from **24.5% to 26%**, as the volume of cycled materials would not increase, but it would have a modest impact on the material footprint, which would shrink by **12.0 million tonnes**, which corresponds to 5.4%.

2.2 ELIMINATE FOOD WASTE AND MAKE BETTER USE OF BIOWASTE

This intervention suggests that we reduce the level of food wasted from farm—agricultural production processes—to fork—the consumer's plates and beyond—and make optimal use of food waste across all parts of the chain by reusing it in other applications. The Netherlands is currently the biggest producer of food waste in all of Europe, with an estimated 514 kilograms of food being wasted per capita every year. This is not only a missed opportunity for the economy and food security, but also a huge waste of resources that has a damaging environmental impact. If food waste were a country, it would be the third-largest greenhouse gas emitting country in the world.[50]

This intervention should **incorporate digital technology** to allow for deeper insight into the types of food we waste and generate information on why. The hospitality sector, for example, could reap benefits from food waste technology such as Winnow Vision, which employs Artificial Intelligence to offer rich insight into food waste and, in turn, reduce it by half.[51] The elimination of food waste can be further optimized by tapping into the core tenets of circular agriculture and **use waste as a resource**. Food waste from municipalities can be widely used in animal feed, replacing the large amounts of biomass that funnel into feeding livestock instead of being used for direct food consumption. Residual organic streams from food production can be recycled to become lipids and acids to make biobased materials and fuel the move to clean energy. Biobased packaging can be made from mycelium from mushrooms, for example.[52]

Our analysis shows that the Netherlands' food waste amounts to 8.3 million tonnes of resources that could be avoided. As a result of this intervention, food waste would be at 0kg per person. Also, improving the recycling of biowaste would increase the number of cycled materials to 8.8 million tonnes. Overall, the Circularity Metric would increase from **24.5% to 27.5%**, while the material footprint would decrease by 1.1% to **219 million tonnes**.

SCENARIO 3: SHIFTING FROM FOSSIL FUELS TO RENEWABLE SOURCES

The Netherlands' economy is intensively fossil fuel-based,[53] and despite policy aimed at increasing the adoption of renewable energy, its percentage of energy coming from renewable sources is the lowest among EU member states.[54] Aside from the domestic consumption of fossil fuels, like coal, oil, and natural gas, the country also depends heavily on imported fossil fuel goods and exports a vast amount.

The country is also a logistics hub, boasting some of Europe's and the world's largest logistics centres; Schiphol is the 11th biggest global airport and the Port of Rotterdam is Europe's largest port. These contribute to its substantial gas and fossil fuel consumption and trade, as well as greenhouse gas emissions. But, importantly, a fossil fuel economy can never be circular. Shaking off this reliance on non-regenerative energy sources is in line with the government's ambitious targets of a carbon-neutral economy by 2050 and the immediate renewable energy targets of 14% in 2020 and 16% in 2023.[55]

3.1 LEAPFROGGING THE ENERGY TRANSITION

To transition away from fossil fuel dependency, the proposed intervention calls for the Netherlands to decarbonize its energy generation by moving toward renewable sources such as solar and wind energy. Since fossil fuels are inherently non-renewable resources—their combustion means loops can never be closed—there is no place in a circular economy for them.

At the same time, renewable energy technologies often require vast amounts of raw critical materials, such as tellurium—one of the world's rarest elements[56]—in solar panels. In the transition to a circular economy, it is important to understand, plan and design for this energy-material nexus.[57]

This intervention would require action on multiple pillars of the Dutch economy. Firstly, the energy grid needs to transform its infrastructure to generate, deliver and store renewable energy at a greater scale. This would entail **prioritising regenerative resources**, as well as parties across the production chain **teaming up**; from extraction, product design, production processes, repairs and recycling.[58]
The current generation capacity of renewable energy sources needs to be boosted to meet the growing energy demand, the network needs to be adjusted to allow for easy export and import outside of the Netherlands' borders and large storage capacity is necessary to safeguard against weather fluctuations. There are existing ambitions for a cross European "super grid" to propel the transition to renewable energy across the continent in an economically competitive and technologically feasible way—consistent with targets of the Paris Agreement.[59]

Beyond this, industrial activities would also need to be adjusted to be compatible with de-fossilisation. Processes that require high heat, such as for cement or metal, would need to shift to functions that can be powered with a renewable energy supply, such as electric furnaces. Activities such as mobility are also fossil fuel dependent and would need to explore alternative methods. This could include shared mobility services, fossil-free power trains and the use of hydrogen and synthetic fuels produced with renewable electricity.[60] Residual heat from the Port of Rotterdam can be used to heat homes, greenhouses and offices. This is already a focus of the South-Holland Heat Alliance.[58]

As a result of the intervention, the Netherlands would shake off its reliance on fossil fuels and move to regenerative sources for energy. Assuming that it can achieve 100% renewable energy, 11.6 million tonnes of fossil fuels currently consumed for electricity generation would no longer be needed. This would also decrease the, largely imported, amount of fossil resources by 25%. These actions would increase the Circularity Metric from **24.5% to 30.2%**, and massive gains can be seen in how much the material footprint would decrease; **41.2 million tonnes**, a decrease of 18.6%, not to mention the considerable reduction in greenhouse gas emissions as over a quarter of materials would not require processing, transport and use—which is inherently carbon-intensive.

3.2 SLASH FOSSIL FUEL RAW MATERIAL IMPORTS

This intervention suggests that all raw material imports and exports of fossil fuels are halted. As a result, domestic energy would be de-fossilized, thereby facilitating the shift to clean energy. But given the Netherlands' role as a heavy importer and exporter of fossil fuels, simply the de-fossilisation of its trade alone would also have a large impact on the circularity of the country.

This would require **teaming up** to apply drastic regulation on imports and exports. For example, broad bans on polluting fossil fuel-based products could galvanize regulatory push factors for additional research into alternative, **regenerative sources** for products typically produced by the petrochemical sector, such as plastics and fertilizers. Most importantly, this measure would mean that the significant refining activities in the Netherlands would be terminated. In part, accelerating growth in the production of biobased chemicals and fuels can be an important element in this transition.[60] Fostering business support in the biochemical sector will be instrumental to the above points; **collaboration** can propel the removal of fossil fuels from the equation. Public-private sector partnerships like DSM at the Brightlands Chemelot Campus in Sittard-Geleen,[61] as well as collaboration among companies in industrial clusters[60] where all stages of the value chain are concentrated together, such as the Port of Rotterdam or Port of Amsterdam.

As a result of the de-fossilization intervention, domestic energy consumption would be free of fossil fuels, as well as the country's trade profile. This would boost the Circularity Metric from **24.5% to 27.3%**, whilst shrinking the material footprint to **199 million tonnes**, a 10.3% decrease. Additionally, in line with the previous intervention (3.1 Leapfrogging the energy transition), this measure would strongly reduce the carbon profile of the Dutch economy.

RENEWABLE BIOFUEL, A WASTE-TO-VALUE PORT

A number of innovations have sprung up amid the Netherlands' bid to decarbonise its major logistical hub; the Port of Rotterdam. Although a lot of the industrial waste within the Port is recycled or used as fuel, there is still value to be created from residual flows. An advanced "waste-to-chemical" installation is being developed by Enerkem, Air Liquide, Nouryon, Shell and the Port of Rotterdam Authority. The plant will apply Enerkem's technology to convert 360 kilotonnes of non-recyclable residual waste into methanol, which will be suitable for use as biofuel or feedstock for the chemical industry. The facility is a major step forward in the port's move toward circular waste management.[62]

Also located at the Port is the largest renewable fuel plant in Europe. Neste is producing renewable diesel based on refined vegetable oils and residual organic wastes.[63] The renewable diesel can be mixed with fossil diesel or can fully substitute fossil diesel. The NEXBTL technology is also applied to the production of renewable gasoline. As a next step, Neste is working on the production of renewable kerosene, thereby contributing to clean transportation. The company has also partnered with LyondellBasel, a plastic, chemical and refining company, to produce biobased polypropylene and low-density polyethene at a commercial scale. Suitable for use in food packaging materials, the polymer products contain 30% renewable content.

SCENARIO 4: REPAIR, REMANUFACTURING AND HIGH-VALUE RECYCLING

The growing demand for products and services across a range of sectors, such as electronics and the automotive industry, is leading to more and more raw material extraction.[64] Transitioning manufacturing away from linear material consumption patterns could prove to be a major innovation engine; as much as the renewable energy sector is today.[65] Repair, reuse, refurbishment and recycling are key elements in making the manufacturing system more circular. Fiscal system adaptations in the Netherlands are already facilitating this; the country offers VAT reduction on minor repair services, in line with the EU VAT directive, particularly for bicycles, shoes and leather and second-hand goods.[66]

Extended Producer Responsibility (EPR) schemes are in place for a variety of products and waste streams—cars, tyres, electronic goods, packaging, batteries—bringing the concept of sustainable and circular design to the forefront of industry.[67] With suppliers being responsible for the waste they produce, industries have the opportunity to explore circular design innovation, as well as reuse, repair, remanufacturing and recycling avenues.

Overall, the Dutch manufacturing industry is strong; it created over €71 billion in value-added in 2015, of which nearly €50 billion were due to exports, and Dutch manufacturers also provided 700,000 full-time jobs, of which 426 thousand were due to exports.[68] In this way, the industry is a huge enabler of circularity locally and abroad.

4.1 STRENGTHENING THE REPAIR ECONOMY

To extend the useful life of manufactured goods and equipment, the intervention suggests that we double the current material use of the repair sector. In this way, products that have already been manufactured, and the materials used to build them, stay in the system longer and create less waste. This is core to the concept of circularity; the idea of maximising the lifecycle value of products and materials. Significantly, this would reduce the number of imports necessary, and the stronger repair economy would mean that the domestic production of new products would decrease.

This intervention would require a shift toward **designing for the future** and **teaming up**, effectively eliminating designed obsolescence and instead stressing designing for repair and refurbishment. **Rethinking the business model** would facilitate the scale-up of these economies. The whole sector would benefit from further fiscal system adaptations. For example, tax burdens can be shifted from labour to resource use. Implementing circular processes takes time and effort[69] and so, this tax reform could level the playing field for more labour intensive, but less resource-intensive practices—such as repair.

A stronger repair economy would result in fewer imports and less domestic production of goods. It would also greatly boost the number of jobs available locally. This would have a substantial impact on multiple platforms; the Circularity Metric would increase from **24.5% to 29%**, and the material footprint would decrease to **186 million tonnes**; a decrease of 15.8%.

4.2 RAMP UP HIGH-VALUE RECYCLING

This intervention suggests doubling both the processed volume of high-value recycling and the share of recycled materials in imports. As a result, material inputs from virgin sources decrease due to the increase in recycled amounts of material. The circular economy requires us to close material loops and improve waste treatment through recycling. And although the Netherlands already has a strong recycling rate, nonetheless, the remainder of this waste ends up incinerated and landfilled. At the same time, a lot of materials that are currently being recycled are of low quality and cannot be applied in high-value applications.

This intervention would require **teaming up** along the, often complex, value chains of materials, from producers to recyclers, retailers and consumers. Tax exemptions and reductions could be imposed to encourage recycling. Gains have been made in this space and the EU has already pledged to ensure that all plastic packaging is recyclable by 2030; a clear incentive for member states to increase the attention to this space to avoid higher taxation. Another key avenue is in **designing for the future**, as recyclable packaging begins with design. This includes designing for disassembly and using high material purity. This could include striving for mono-material designs in plastic packaging, for example, which makes it easier for the sorting and processing of packaging waste.

As a result of the proposed intervention, the doubling of the share of recycling materials in imports would increase the total recycling volumes to 82 million tonnes, up by 15%, while the Circularity Metric increases from **24.5% to 26%**. At the same time, the material footprint would decrease to **216 million tonnes**, a decrease of 2.2%.

COMBINED INTERVENTIONS: LEVERAGING SYSTEM DYNAMICS

We have now demonstrated the impacts that individual interventions can have on the Circularity Metric; illustrating the range of platforms that can be leveraged to increase circularity. The impact of each intervention is somewhat limited, but we can leverage the dynamics of the system and combine different interventions to see huge impacts.

This yields a promising output, taking into account the nature of our study which paints a broad “what-if” image for the economy. Harnessing the cross-intervention synergies, the Netherlands can reach a circularity metric of **70%**. Also impressively, the material footprint of consumption in the Dutch economy could be lowered by a remarkable **57%** to merely **95 million tonnes**.

When combining the interventions, it is crucial to be aware of potential overlaps across the different interventions. In particular, the scenarios on repair, recycling, as well as fossil resource consumption, are applied across sectors, thereby also influencing the industry-specific interventions on construction and agriculture. Therefore, we prioritise interventions according to the principles of the circular economy. We begin with strategies that aim to **reduce** inputs, secondly applying **repair** and **reuse** focused scenarios and only lastly applying those focused on **recycling**.

RELEVANCE OF CIRCULAR STRATEGIES ACROSS SCENARIOS

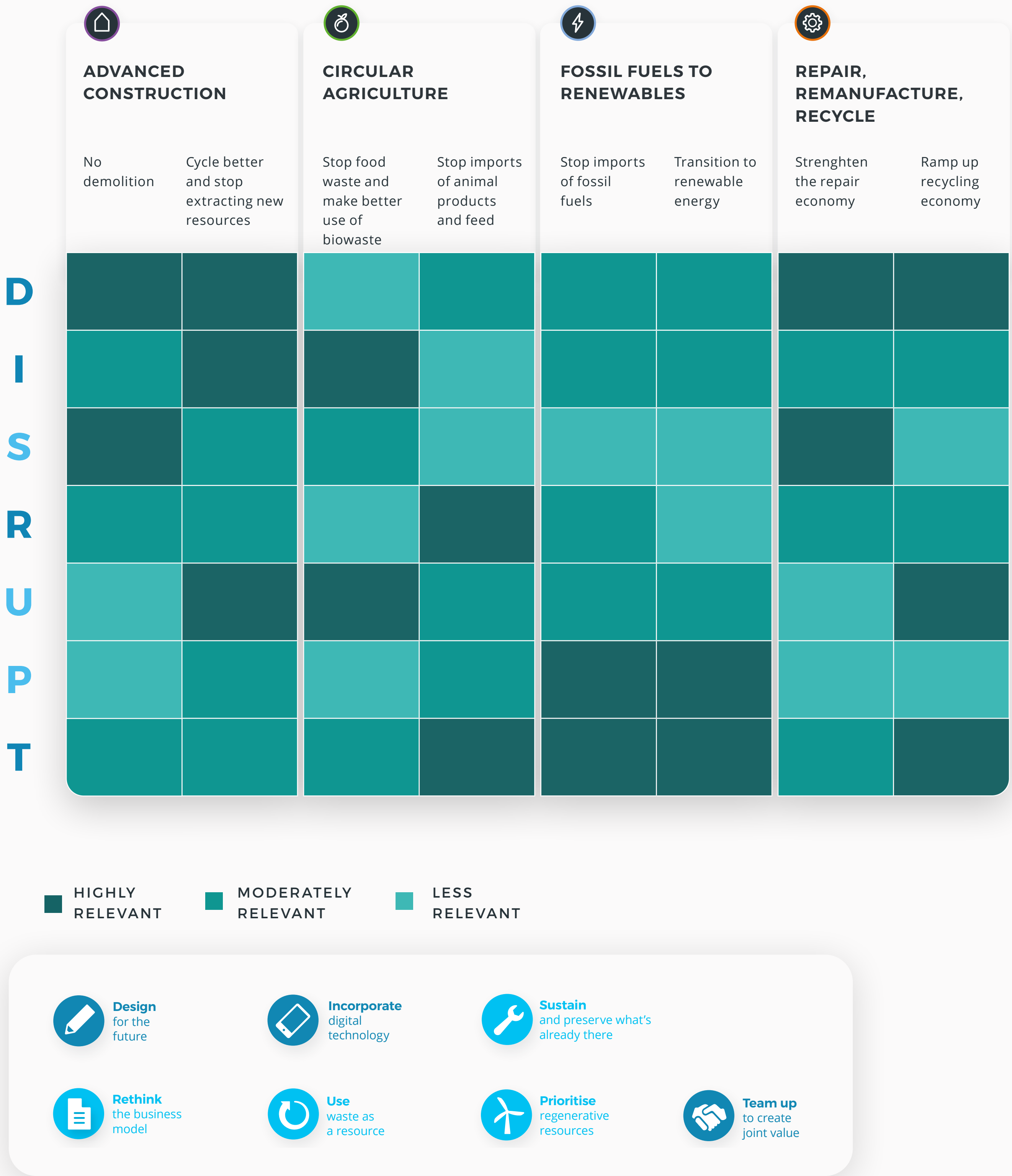


Figure 3 The relevance of specific circular strategies, taken from our DISRUPT model, in the chosen sectors in closing the circularity gap.

SCENARIOS, INTERVENTIONS & STRATEGIES

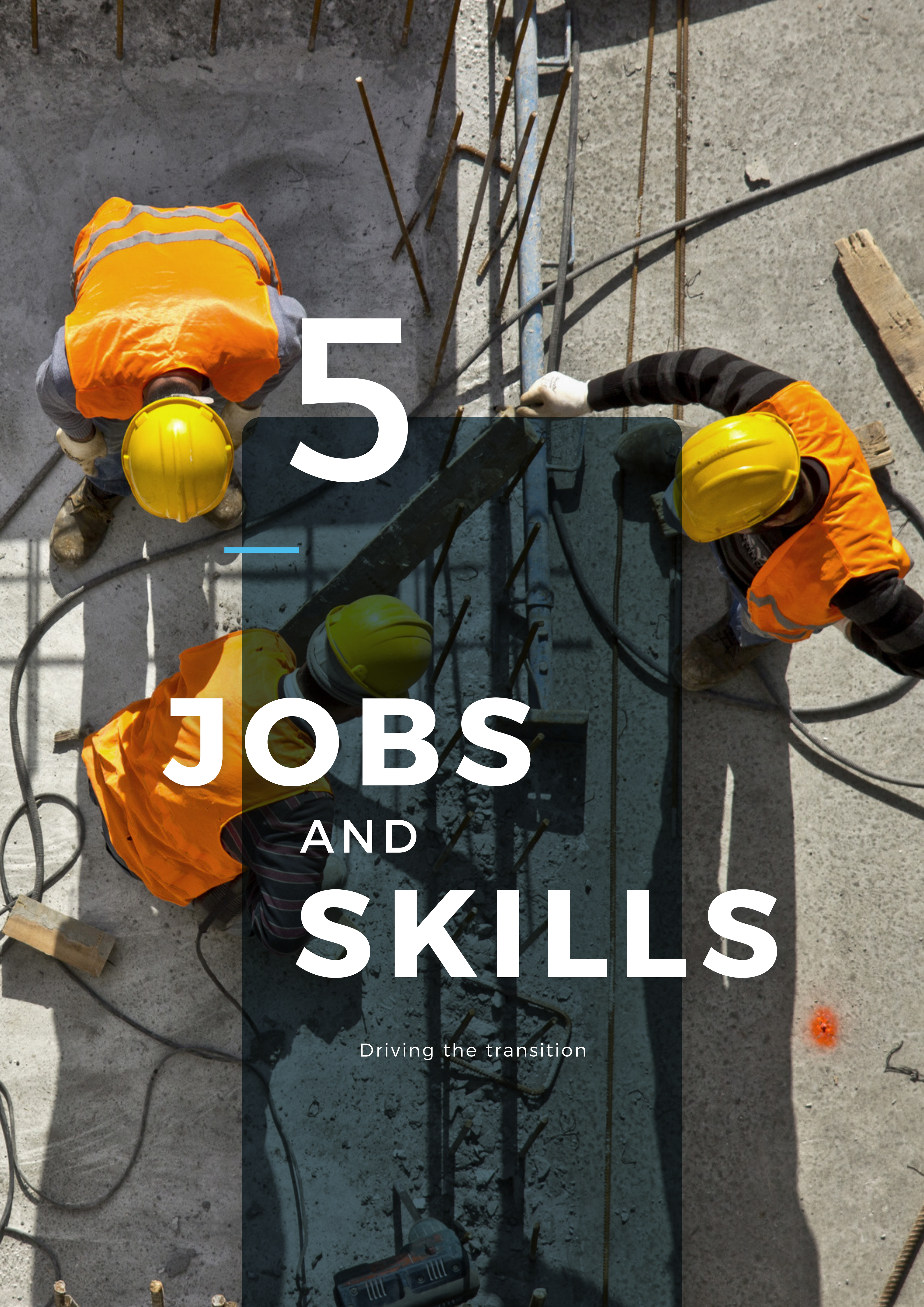
	INTERVENTIONS	STRATEGIES	IMPACT AND MATERIAL FOOTPRINT
1. ADVANCED CONSTRUCTION	**1.1 No demolition, but preserve and extend**	• Extend lifetime of buildings and design for longevity • Upgrade, expand and repurpose • Efficient use of space	- Circularity from 24.5% to **16%** - Reduction of material footprint by **20%**, decrease to **177.2 million tonnes**
	1.2 Cycle better and stop extracting new resources	• Reverse construction and sorting • Reuse, refurbish, recycling and reprocessing • Enable environment for smart material management	- From 24.5% to **37%** - Reduction of construction sector material footprint by **22.6%**, decrease to **171.5 million tonnes**
2. CIRCULAR AGRICULTURE	**2.1 Stop imports of animal products and feed**	• Team up to create joint value through trade regulation • Team up to create joint value chain collaboration	- From 24.5% to **26%** - Reduction of material footprint by **5.4%** to **209.5 million tonnes**
	2.2 Stop food waste and make better use of biowaste	• Understanding why food gets wasted in the first place • Recovery strategies for biobased waste	- From 24.5% to **28%** - Reduction of material footprint by **1.1%**, decrease to **219 million tonnes**
3. FOSSIL FUELS TO RENEWABLES	**3.1 Leapfrogging the energy transition**	• Transforming the energy grid to generate, store and deliver renewable energy • Adjust industrial activities to be compatible with de-fossilisation	- From 24.5% to **30%** - Reduction of material footprint by **18.6%**, decrease to **180.3 million tonnes**
	3.2 Slash fossil fuels raw material imports	• Drastic regulations on imports and exports • Fostering business support in biochemical sector	- From 24.5% to **27%** - Reduction of material footprint by **10.3%**, decrease to **198.7 million tonnes**

	INTERVENTIONS	STRATEGIES	IMPACT AND MATERIAL FOOTPRINT
4. REPAIR, RE-MANUFACTURE RECYCLE,	**4.1 Strengthen the repair economy**	• Strengthen repair sector through tax exemptions/reductions • Design for repair • Collaboration between product designers and repair sectors	- From 24.5% to **29%** - Reduction of material footprint by **15.8%**, decrease to **186.4 million tonnes**
	4.2 Ramping up high value recycling	• Strengthen recycling sector through tax exemptions/ reductions • Design for recyclability • Advanced sorting technologies for high quality recycling	- From 24.5% to **26%** - Reduction of material footprint by **2.2%**, decrease to **216.5 million tonnes**

THE POWER OF COMBINED INTERVENTIONS

REDUCE	**1.2** · **2.1, 2.2** · **3.1, 3.2**	- From 24.5% to **57.7%** - Reduction of material footprint by **52.2%**, decrease from 221 million tonnes to **106 million tonnes**
REPAIR	**4.1**	- From 57.7% to **62.4%** - Reduction of material footprint by **56.6%**, decrease from 106 million tonnes to **96.2 million tonnes**
RECYCLE	**4.2**	- From 62.4% to **69.6%** - Reduction of material footprint by **57.2%**, from 96.2 million tonnes to **94.7 million tonnes**

The table above shows the scenarios, interventions and strategies for the four sectors. It explores the impact on the Circularity Metric and the material footprint of the country.



5 JOBS AND SKILLS

Driving the transition

A labour market that anticipates the transition towards a circular economy can accelerate it. At the same time, anticipating the change and preparing for it will enable the Netherlands to maximise the potential opportunities that circularity presents the labour market with. The right competencies on the ground must be developed to translate the notion of circularity into reality; the systemic shift will require human capital. But what kinds of jobs and skills will the move to circularity require? Beyond jobs that directly relate to the management of materials, understanding of circular jobs is limited. And, arguably, profit and planet often receive more attention than people's role in the circular economy. Based on qualitative data from 17 expert interviews with stakeholders in the Netherlands, this section explores some emerging professions and skills necessary to accelerate the bridging of the circularity gap, based on the requirements of the Dutch labour market in reaching full circularity by 2050.

The transition to a circular economy is anticipated to initially be labour intensive. This is because the core pillars behind preserving a material's maximum value, for as long as possible (reuse, repair, remanufacture and recycling), hinge on processes that typically require more labour than in the linear economy where resources are often wasted and incinerated.[70,71] In the introduction of new design strategies, production processes and business models, the type of work that will be undertaken will be reshaped, thereby creating new jobs, transforming existing ones and phasing out others. This change will require skills from across the spectrum, where we need to pay equal attention to both practically- and theoretically-skilled workers.

The circular economy is a means to an end. Not only is employment a key driver of a strong economy, but safe and secure livelihoods are a vital component of a thriving society, and so, it must be a consideration in the transition to circularity. It is also important to note that employment in the circular economy is not a separate entity to the existing labour market. Research, collaboration, and policies are needed to translate the opportunities the circular economy presents into real benefits for both current and future workers and communities.

In our analysis, we translate how circularity can impact the Dutch labour market and what kinds of job opportunities it will present through three descriptive lenses; **Transformation (+/-), Increase (+/++) or Decrease (-/--)**. It spotlights a few skill sets and specific jobs that could be created or transformed in the transition to a circular economy, aligned with our scenarios: Advanced construction practices, Circular agriculture and food system, and Repair, remanufacturing and high-value recycling. This is valuable as it contributes to the conversation for policymakers and employers to better understand, and thereby prepare for, the impact of the circular shift on the labour market.

Our analysis is based on qualitative data collected from a series of expert interviews, and defines circular jobs along the DISRUPT framework, as presented on page 30-31. It demonstrates the width and breadth of the circular labour market, encompassing sectors ranging from waste management to the creative industries, as well as a broad range of skills.

SCENARIO 1: ADVANCED CONSTRUCTION PRACTICES

Current positions are transforming (+/-) to accommodate the use of secondary materials and digitisation, as well as spurring an increase in new job opportunities (+). Transformation and increasing complexity will be seen across the board. Architects will need to be educated to design for disassembly rather than demolition. Construction workers will need to use bolted over welded connections to aid the reuse of components, as well as take responsibility for separating waste on-site so that high-value materials can be returned or reused. Spanning practically- and theoretically-skilled workers, these transformations call for a combination of technical skills and a greater degree of creativity, and require thinking responsibly about how everyday practices support the lifecycle of materials.

Indeed, creating a future proof built environment will require a progressive approach that prevents the depletion of raw materials. But this will likely require a large attitude shift, rather than simply bridging a knowledge gap. The sector is typically, and understandably, driven by a risk-averse mindset, which seeks to limit costs, is bound to tight regulations, such as safety, and is not traditionally required to hold responsibility for projects past the point of delivery. These conventions do, however, contrast the extended responsibility component of the circular economy.

1.1 INCREASING THE QUALITY OF SECONDARY MATERIALS USED IN BUILDINGS

The utilisation of secondary materials in construction projects is already underway in the Netherlands—and it's growing, largely motivated both by standing circularity commitments and resource efficiency. An approach coined "urban mining" presents an opportunity to create jobs in the sourcing, sorting, testing and supply of high-quality secondary materials, whilst concurrently reducing the waste produced by the sector.

Transforming positions, job creation (+/-,+)

As the approach becomes more ubiquitous, **Urban Miners** working in companies that procure secondary materials will increase. These professionals look at buildings through a lens of possibility; grasping the potential of materials for reuse or recycling, while applying a holistic understanding of the carbon footprint of recycled materials to measure value. The highest impact comes from entire components that are reused in the same form and function. Technical knowledge, detail orientation, creativity and systems thinking are prominent skills, and the workers are likely to be highly educated in the field of Civil Engineering, Environmental Engineering, or Industrial Design.

Circularity can be integrated into existing roles, such as **Procurement Staff** in construction companies, that are needed to stimulate the supply of secondary materials into fresh construction projects and building renovations. Embracing the innovative nature of the role will be important for encouraging suppliers to be more forward-thinking in using waste as a resource in their products. Connecting the want, or need, of suppliers to adopt more circular practices to the relative environmental, social and business benefits can also accelerate conversion. Discerning new suppliers and opportunities in both the private and public sectors will be necessary. This profile points to the need for entrepreneurial, interpersonal skills. Such workers are likely to be highly educated, but also benefit from specific training, such as in socially responsible procurement practices, that can be delivered on the job.

1.2 DIGITISATION TO OPTIMIZE BUILDING MAINTENANCE, DEMOLITION AND MATERIAL REUSE

A method gaining traction is digitally tracking materials in new buildings and in the maintenance and renovation of existing ones. Aligning with the general trend of upskilling towards incorporating digital technology in construction, the use of material passports can be incorporated into the design, maintenance and management of buildings.

Transforming positions, job creation (+/-,+)

The increasing shift to digitisation in construction will lead to more **Building Information Management (BIM) teams** in larger construction companies, and BIM-related companies working with SMEs to aid the integration of the system. The demand for such talent is high. Although workers may typically come from MBO or HBO[72] level Architecture, Civil Engineering, Engineering, Mechanical Engineering, Electrical or Installation Engineering, companies are increasingly recruiting from outside of their typical talent pool due to high demand. This includes recruiting from the gaming industry. The overarching skill necessary is an understanding of how to integrate, interpret and maintain virtual information management systems.

Digital adeptness is a skill set that is also being added to traditional job profiles. This includes the integration of BIM into existing roles such as construction company **Project Coordinators** or building maintenance company **Facility Managers**. Such staff may be trained on how to use BIM for the purpose of their role on the job and through additional training provided by building information providers, such as Madaster—provided they have some digital skills and a background in construction.

SCENARIO 2: CIRCULAR AGRICULTURE AND FOOD SYSTEM

Transitioning to circular agriculture will boost employment through the business network that surrounds farming. It may also reduce the overall number of farmers and land used by the sector (-,+). This will create more localised economies of scientists, suppliers, producers and farmers through clusters of closed-loop value chains. Communication, collaboration and empathy will be vital in ensuring land and food waste is used more efficiently and biodiversity is promoted.

The Netherlands has proven itself to be the Silicon Valley of agriculture. It boasts front-running agricultural research from facilities such as Wageningen University & Research and Netherlands Institute of Ecology (NIOO-KNAW), but this top-tier knowledge must be crystallized and transmitted into practical application. Dispensing knowledge from the proverbial ivory tower to reach practical farming, most probably galvanized by government funding, will help to ensure a fast application of scientific knowledge to move the sector to circular agriculture. The dichotomous nature between cutting-edge scientific methods and practical work must also be bridged, and workers of all levels need to feel part of a wider circular shift geared toward a final ecologically safe and socially just space; thereby boosting job-value and motivation.

2.1 PROMOTING AND MAINTAINING SOIL AGRO-BIODIVERSITY

In a circular agriculture model, waste can nourish soil through a combination of good quality, animal-based fertiliser-composted manure and crop remnants. Healthy soil promotes biodiversity, which leads to high yields and crop resistance to extreme weather. This makes it a foundation of agricultural production and a core tenant of circular agriculture.

Increasing job opportunities (+)

The ascent of circular agriculture will lead to an increased demand for **Agronomists** and **Advisors** on soil health and ways to monitor and maintain it. Technical, ecological knowledge of soils and their functioning is necessary, as well as scientific command and reasoning on how to maintain soil agro-biodiversity. Consultants working in circular agriculture will need interpersonal skills and empathy to relate and understand the position of different farmers. Innovation skills and pragmatism are ideal to provide practical advice on implementing soil-friendly practices and translate this advice into low-cost solutions and tools that can be implemented by farmers themselves. These advisors also need to be connected to the national overview. In this way, farmers and advisors can learn from what is working in other habitats in the Netherlands, as well as from cutting-edge research.

Some additional jobs will also be created as cutting-edge research is translated into practical tools and training for farmers. The tools and indicators currently being developed by leading institutions are highly expensive, opening up a market for jobs in the development of practically applicable tools for monitoring soil quality. For this undertaking, a background in Soil Ecology or Crop Sciences would be suitable.

2.2 RESIDUAL FLOWS FROM CITIES AND AGRICULTURE USED AS LIVESTOCK FEED

Residual flows from agriculture, horticulture or the food industry can be used for livestock feed. This can include residuals that are not yet fully utilised, such as protein rich beetroot leaves, or those that are under the current legislation not permitted to be used now, such as insect and worm meal grown on biomass waste and “swill” (food scraps that have been cooked down).[73]

Increasing job opportunities and transforming positions, job creation (+/-,+)

This shift is expected to increase employment opportunities, especially for practically-skilled workers and operatives, within companies producing, supplying and selling livestock feed made from waste flows. It is also expected that practically-skilled workers from more traditional feed producers will move into circular businesses as demand for working in this way increases. These workers will see a transformation in their roles. A relevant example here would be **Process Operators**. Although classed as practical-skill work, knowledge of the quality of incoming raw materials, as well as creativity and proactivity concerning mixing and blending, is crucial when sorting waste for use in sellable products. A low-level of training is required as practical work on the job is sufficient, but cultivating the right attitude among workers is paramount. These jobs occupy a low-entry point, can be repetitive, may be part-time for many and often involve long working hours. However, these roles play a very important role in the wider system and therefore, as demand for livestock feed made from residuals increases, efforts towards increasing the quality of these jobs, through safe working conditions and more secure contracts should be prioritised.

CIRCULAR KNOWLEDGE SHARING AND BOOSTING JOB-VALUE AMONG WORKERS

Too often initiatives are tested scientifically and in practice, but lessons learned are not integrated for broader application, such as in education programmes.[74] Battling this is one drive of the Dutch government's Delta Programme for Biodiversity; an innovative collaboration with land-users, knowledge institutions and farmers, which seeks to enhance biodiversity and knowledge sharing. The platform's "Living Labs" trial measures that could facilitate the most effective methods for profitable agriculture and biodiversity. The government has funded three multi-stakeholder "Living Labs" to enable the exchange of knowledge in context-specific areas of the Netherlands, such as meadows or clay.

Climate-smart agriculture is at the heart of Nijsen Granico, which supplies animal feed for pigs and carbon-neutral egg-laying Kipster chickens,[75] made from foodstuff that would otherwise be considered waste. The foodstuff comes from a variety of streams including bakery and confectionery. The operatives working for Nijsen Granico typically transfer from more traditional feed producers which are more structurally top-down. In this way, the company seeks to give their employees more pride, responsibility and autonomy and illustrate to them how the work that they do plays into the wider regenerative system. This is done through training on the job. Nijsen Granico also works with their suppliers to provide similar training to their staff, such as operators in food plants.

SCENARIO 3: REMANUFACTURE, REPAIR AND HIGH-VALUE RECYCLING

Extending product life spans will create new jobs (++) in the different processes associated with repair and refurbishment. It will also result in a decline in the number of workers in forward manufacturing (--). As with construction, transformations will be needed in how product designers are trained to ensure that new products produced can be easily taken apart. This will facilitate their repair or reuse, or the refurbishment of their components. There will also be a need to promote existing skills which are at risk of decline, such as repair skills.

As global consumption continues to rise,[1] reducing and reusing what we already have and expanding the lifespan of products is of utmost importance. This applies across multiple product types, including capital equipment. Whether it is an MRI scanner in a hospital generating medical images or precision-farming robots optimising agricultural production, such equipment is at the centre of innovation in today's economy. But in catering to an array of societal needs, it is extremely resource intense. Capital equipment consumes more than half of all metal ores utilised globally.[76]

3.1 EXTENDING THE USEFUL LIFE OF MANUFACTURED PRODUCTS THROUGH REFURBISHMENT AND TAKE-BACK SCHEMES

Reconsidering the design, use and lifetime extension of resource-intense capital goods can have a disruptive impact on circularity. Metals used in capital equipment include rare and precious variants which are forecasted to be in scarce supply in the future.

Large increases in job opportunities (++)

Boosting the rate at which capital equipment is refurbished will lead to a wide range of employment opportunities. From the testing, separation and cleaning of parts for reuse, to the marketing of refurbished products and planning for their demand. This requires not only a shift in roles but also the business model, with more companies needing to place the resale of refurbished products at the centre of the business strategy and encourage the systemic thinking amongst staff that is required to maximise the opportunities this new market presents. Central to making refurbishment a core and profitable business stream will be **Demand Planners**.

This role requires logical thinking and reasoning, to oversee the supply and demand of different systems for different products in their totality. This includes various materials and their demand requirements. A solid understanding of circular business models will enable the employee to proactively handle supply chain issues and map scenarios. They must also keep a broad perspective on the impact of circular equipment on the company as a whole; from engineers operating in the factories to the teams responsible for marketing. A typical educational profile for Demand Planners would be at least HBO level Engineering, as well as more advanced degrees or experience in sales and operations planning.

Integral to refurbishment are **Test Engineers** who excel in complex problem solving on a technical level. Circular equipment engineering has more complexities than forward production, where many steps are already designed and prescribed. These workers need to have a thorough, in-depth understanding of the range of circular products they work with. This translates into these engineers requiring more prior experience and HBO education level, compared to engineers working in forward manufacturing. Experience of service engineering would also be an asset.

3.2 EXTENDING THE USEFUL LIFE OF MANUFACTURED PRODUCTS THROUGH REPAIR

Separate to take-back and refurbishment schemes, repairing products to extend their lifespan through the local repair economy and traditional repair and craft skills are also at the heart of a functioning circular economy. But to ensure the repair economy can sustain the shift to circularity, it needs to be as rich and as diverse as the current infrastructure for new products.

Promote existing skills

The transition to circularity not only includes the implementation of new processes and activities but also requires traditional skills to be promoted and revitalised. Of importance here are repair skills, which are absolutely in decline. The way in which we repair can be diverse; from going to a professional and paying a fair price for the repair of your bike, to visiting a Repair Café and tackling the repair of your coffee machine together with a volunteer, or repairing your phone yourself using information from the internet.

By encouraging this full landscape of repair, there will also be a need for more repair workers. Key skills here are of course technical, but the right mindset is also pivotal; curiosity in how things work, perseverance and resourcefulness.

LIFE-SPAN EXTENSION: DESIGN, REPAR, RECYCLING

The Diamond Select Program at Philips focuses on refurbishing pre-owned, large medical equipment, including MRI scanners, CT scanners, CAT labs and X-ray equipment. These products, once refurbished, are sold back into the market with full warranty, at a reduced price, and with a Circular Equipment tag. Since its start in 1990, Philips' program has become core to the company's business strategy and spurred the creation of jobs with a strong status within the company, due to its role in providing both revenue and impacting the company's circularity ambitions.

RePack provides a circular packaging service that employs delivery materials which can be returned by retailers and consumers for reuse.[77] Proprietary recycling technology developer, Ioniqa, partnered with the Coca-Cola company late last year to delivery the "first-ever" plastic bottle of food-grade quality made using marine litter.[78] In the repair space, US-based The Renewal Workshop raised $5.5 million to open its first European apparel renewal facility in Amsterdam.[79] Its services include on-site apparel renewal services.

To enhance designs for the future, the Dutch CIRCO programme targets industries or material flows with circular design classes. Subsidised by the government to reduce prices by around 75%,[80] these workshops often have a regional focus to allow for synergies across industries, whilst targeting specifics such as bike manufacturing or horticulture.

SCENARIOS, INTERVENTIONS & STRATEGIES

	LEVER	INTERVENTIONS	IMPACTS ON THE DUTCH LABOUR MARKET	RELEVANT ROLES
CONSTRUCTION	**Increasing the equality of secondary materials used in buildings**	• Use waste as a resource • Prioritise regenerative materials	- Transformation (+/-) of the existing roles of procurement staff in construction companies - Increase (+) due to emerging companies specialising in urban mining e.g. the sourcing and supply of secondary materials	Procurement Managers Urban Miners
	Optimise maintenance, demolition, and recovery through digital tracking of materials	• Design for the future • Incorporate digital technology • Sustain & preserve what's already there • Use waste as a resource	- Transformation (+/-), Integrating BIM into existing roles - Increase (+) in the size of BIM teams in larger construction companies and BIM-related companies providing services to SMEs	Project Coordinators; Facility Managers BIM & Virtual Modellers; Programmers
AGRIFOOD	**Maintain soil agro-biodiversity**	• Preserve and extend what's already there • Use waste as a resource • Incorporate digital technology	- Increase (+) in the number of agronomists and advisors advising farms on soil health and monitoring systems	Agronomists and Soil Advisors
	Residual flows from cities and agriculture are used as livestock feed	• Use waste as a resource • Prioritise regenerative resources • Team up to create joint value	- Increase (++) in the number of producers, suppliers, and sellers of livestock feed made from waste flows	Process Operators
MANUFACTURING	**Extend the useful life of manufactured products through refurbishment and take-back schemes**	• Use waste as a resource • Incorporate digital technology • Sustain & preserve what's already there	- Increase (++) in jobs in the refurbishment of products, including logistics, testing, cleaning, engineering, asset management, marketing, planning, sales and trading.	Demand Planners Test Engineers
	Extend the useful life of manufactured products through repair	• Sustain & preserve what's already there	- (0) No change - promote local repair economy and skills at risk of decline	Local repair workers

ANTICIPATING THE SHIFT TO A CIRCULAR ECONOMY FOR THE LABOUR MARKET

Understanding of how the circular economy will impact the labour market is growing. Our analysis demonstrates some concrete examples within relevant sectors of how new production processes will transform, increase or phase out certain jobs and skills.

Impact across sectors. Our investigation zoomed into three specific sectors, but impacts on jobs and skills will be mirrored across other sectors too. Aspects that will enable the transition to a circular economy, such as the use of secondary materials, will need to be applied to sectors beyond our consideration. This requires further research.

Consequence of local moves to circularity on global jobs. More research is also needed to fully understand the impact circular strategies employed in the Netherlands will have on local and global jobs. If the Netherlands stops exporting and importing biomass for animal feed, for example, this will impact global value chains and workers on the ground.

Research to facilitate sound training and reorientation for workers. Our analysis underlines the requirement for action via multiple avenues. Firstly, there is a need for increased collaboration with industrial stakeholders to map the skills needed to generate training programmes for workers, and the impact of subsidies and other policy levers on circular skills demand and supply. Furthermore, research is needed to facilitate the development of policies for the responsible reorientation of workers from carbon-intensive sectors to new opportunities presented by the circular economy.

Ensure workers' voices are heard. We cannot guarantee that all jobs in the circular economy will be of high-quality. Therefore, connections between trade unions, business and public authorities need to be strengthened. This can ensure that workers' voices are heard in the development of training and that working conditions for practical or theoretical workers are upheld.

6. THE WAY FORWARD

Our study conveys how the circularity of the country can be substantially increased from 24.5% to 70%. The explored scenarios will, however, entail fundamental shifts to the way the Dutch economy operates, encompassing major changes in how industries approach design and production and in how consumers enact their daily choices. This spans how infrastructure is built and maintained, how food is produced and how we design, manufacture and repair goods, to how we shape our future energy systems. In combining these scenarios we are met with the image of a society that has been fundamentally altered, yet touts a Circularity Metric of 70%. The chosen scenarios can help align the Dutch government and relevant stakeholders on how to achieve their bold ambition of full circularity by 2050, as well as rebuild a more robust and resilient post-covid-19 economy. The potential of these changes warrants exploration and scale-up, requiring multi-level engagement from government, business and civil society.

The Netherlands is a frontrunner in the race to circularity and has a real opportunity to contribute to a rich global knowledge bank on the circular economy. The country is host to a groundswell of positive bottom-up movement and importantly, these initiatives have largely been met with encouraging government activity and policy. There is now an opportunity to craft this knowledge into an export product to be shipped around the globe; transferring valuable insight, skills and technological solutions. The Netherlands is already a key global trader, but becoming a leader in circular knowledge could offer a win-win opportunity to contribute to global know-how on circularity. This *Shift* country can play a role in enriching and propelling the circular journeys of other nations, thereby contributing to closing the Circularity Gap of the globe.

All countries are critical change agents. There is a need for the Netherlands, along with other countries, to lead the way. We are all operating in a world that is only 8.6% circular, and although the Netherlands' Circularity Metric is well above the global average, the legacy of the linear economy is embedded deep in its society. National governments are key influencers in global coordination and this year, 2020, is a year of utmost importance. All countries need to deliver their National Determined Contributions (NDCs) and many have had their economies damaged by the covid-19 pandemic. But at the same time, no country is an island; the globe is interconnected. Other countries can also delve into their circularity transitions with a multidimensional lens, as the Netherlands has done.

The Netherlands can take a multitude of steps in accelerating circularity at home and internationally—now. For starters, the Dutch government has enormous spending power and can thereby accelerate demand by procuring projects across sectors circularly. Taxes can be aligned with Sustainable Development Goals and climate mitigation objectives, investment funds can be mobilised to prioritize sustainable impact, such as INVEST NL whose criteria places sustainability at its heart. Collaboration is needed with other countries to pull together on secondary resources; commoditizing them to smooth cross-border trade, along with the development of global environmental standards that regulate the design of products to allow for easy end-of-use processing. The path ahead is clear; ambitious vision must be matched with vigorous action. The time for action is now.

THREE STEPS TO BRIDGE THE CIRCULARITY GAP THROUGH LEADERSHIP AND ACTION:

1. **Drive national progress toward circularity forward with Circularity Metric revisions.** The metric presents a measurement of progress towards a circular economy which can be revised annually. This will fuel progress toward the Netherlands' ambitious goals. It will help to create the conditions necessary for the systemic transformation. Progress can be actionable and focused.

2. **Ensure a national coalition for action that is both diverse and inclusive.** This will bring together frontrunning businesses, governments, NGOs and academics to collectively boost capacity and capability to better serve societal needs more sustainably. It will work to ensure the labour market is both represented and protected in the transition to circularity.

3. **Strengthen global knowledge and pace toward circularity.** This will utilize the knowledge couched within the Netherlands' ambition and hard-hitting progress so far. The Netherlands can use its successful position to encourage or enable other countries to dive into their own circularity, thereby increasing global circularity. Practical pathways should be aligned to local contexts, incentives and mandates. We are all developing countries.

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