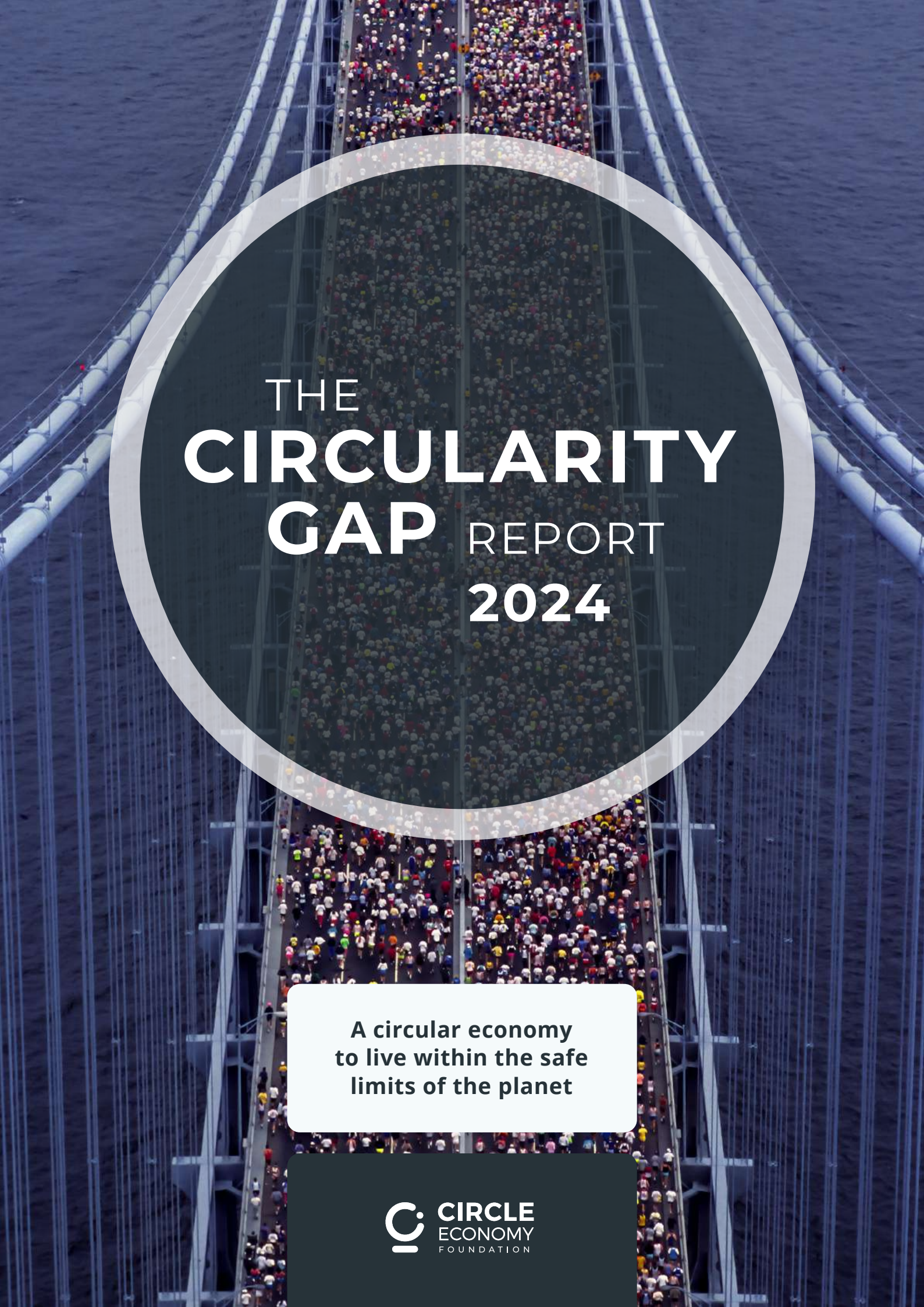

THE CIRCULARITY GAP REPORT 2024

A circular economy to live within the safe limits of the planet

CIRCLE ECONOMY FOUNDATION

BEHIND THE COVER

The image on the cover—depicting the New York City marathon—represents the need to start running: we must urgently progress towards our goals at the speed and scope necessary to prevent ecological breakdown. But doing so will require radical collaboration—the building of bridges—between political, financial and social actors, and strong support from change-makers around the world. This report aims to propel us forward in this journey: from theory to action.

CIRCLE ECONOMY

We are a global impact organisation with an international team of passionate experts based in Amsterdam.

We empower businesses, cities and nations with practical and scalable solutions to put the circular economy into action. Our vision is an economic system that ensures the planet and all people can thrive.

To avoid climate breakdown, our goal is to double global circularity by 2032.

In collaboration with:

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Deloitte provides industry-leading audit and assurance, tax and legal, consulting, financial advisory, and risk advisory services to nearly 90% of the Fortune Global 500® and thousands of private companies.

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IN SUPPORT OF THE
CIRCULARITY GAP REPORT

SMAIL ALHILALI

Chief Division of Circular Economy and Chemicals Management at UNIDO

‘Collectively, we have no other choice than adopting circularity to achieve broad-based welfare and decent jobs through sustainable industrial development, while addressing the triple planetary crisis caused by business as usual. This year’s *Circularity Gap Report* gets to the heart of the matter: how to make a just transition happen.’

RACHNA ARORA

Programme Manager Circular Economy Solutions at GIZ India

‘The transition towards a circular economy can only be just if it strengthens the perspectives and voices of society as a whole. Implementing circular business models requires concerted collaborative partnerships for innovative solutions and alternate financing measures within the *Build, Grow* and *Shift* countries. For the past seven years, the *Circularity Gap Report* confronts nations to take stock and implement locally-driven solutions to accelerate the transition.’

NAUREEN CHOWDHURY

Head of Labour Rights Programme at Laudes Foundation

‘The *Circularity Gap Report 2024* makes an important step in building the connection between circular economy and the just transition. The report provides critical examples that can help ensure that transitions across industries are just and people centred.’

JON CREYTS

CEO at the Rocky Mountain Institute

‘As we put fossil fuels in our rear view mirror, we must also tackle the linear throughput economy of material waste and undermanaged pollution that they signify. The latest *Circularity Gap Report* offers practical solutions for how we can close the loop on material management and operate a vibrant global economy within planetary boundaries. The time to pursue the necessary policy and market solutions is now.’

MRS. ALBINA RUIZ

Minister of the Environment of Peru

‘The *Circularity Gap Report 2024* makes an urgent call to move from speech to action. Today, more than ever, the Peruvian government makes the circular economy real by financing circular businesses, working with local actors, promoting the regeneration of ecosystems, and making clear proposals in international negotiations on plastics, climate change, biodiversity conservation and Amazonian development. Our ambition is aligned with that of this report: to recover the harmonious relationship with our Mother Earth.’

HEIKE VESPER

Chief Executive, Transformation Politics & Markets at WWF Germany

‘This year’s *Circularity Gap Report* calls for action to make circularity a global reality. WWF urges *Shift* country leaders to listen to the call to radically reduce material consumption by creating an ambitious policy roadmap. A circular economy is the prerequisite to operate within planetary boundaries, thus we must also integrate circular approaches into climate action and financial system transformation.’

ATTE JÄÄSKELÄINEN

President at SITRA

‘In the past five years, circularity has moved into the mainstream but the declining Circularity Metric shows us another story. It is clear that we need to do more and dig deeper to bring about systems change. I am inspired to see the *Circularity Gap Report 2024* call out the hard truths: we need to fix our economics, our policies and unleash a wave of skilled people in order to truly scale the circular economy.’

IN SUPPORT OF THE
CIRCULARITY GAP REPORT

SR. WALTER VERRI

Undersecretary of Industry, Energy and Mining Uruguay

‘Despite the growing global evocation of the circular economy, the *Circularity Gap Report 2024* reveals a discordance between the discourse and the measurements of circularity that are being recorded globally. For countries like Uruguay, with an economy so strongly linked to the use of its natural resources, we recognise the circular economy as an imperative for economic development and call on our fellow nations for the international collaboration that is needed to make this a reality.’

CARLOS ISAAC PEREZ

Vice Minister of Strategic Management of the Ministry of Environment and Energy of Costa Rica

‘The report highlights the need to reduce material extraction and adopt the circular economy to safeguard global wellbeing. It advocates for sustainable policies, fiscal adjustments, development of circular skills, the importance of transforming food systems, construction and manufactured goods to address this challenge globally.’

JENNIFER STEINMANN

Global Sustainability and Climate Practice Leader at Deloitte

‘The *Circularity Gap Report 2024* underscores the urgent need for bold, innovative solutions that can drive the global shift towards a circular economy. Organisations have the opportunity to look beyond the current linear model of extraction, and this research outlines how to establish circular pathways that optimise resources and build sustainable value chains. Importantly, the report emphasises the role that circular solutions play in the just transition by balancing the planet’s resources with human wellbeing and livelihoods.’

STIENTJE VAN VELDHOVEN

Vice-President and Regional Director for Europe at the World Resources Institute

‘In simple terms, imagine our economy as a big circle where materials, by design, are reused and recycled. We urgently need to make this circle tighter and more efficient in every part of our lives and apply a systems change—to make progress for people, climate and nature. The *Circularity Gap Report* is like a yearly wake-up call, reminding us of this pressing need. It not only highlights the urgency but also offers practical guidance on how we can make both what we produce and what we consume more sustainable.’

DR AFKE VAN RIJN

Director-general for the Environment and International Affairs at the Ministry of Infrastructure and Water Management of the Netherlands

‘To effectively address the triple planetary crisis the circular economy stands out as the most potent tool in our arsenal. The headline indicator in the mobilising *Circularity Gap Report* serves as a stark reminder of the current trajectory veering off course. I commend the report's enhanced focus on policy, finance and jobs to unlock a just transition at the necessary speed and scale.’

MILAGROS RIVAS

Managing Director of Advisory Services at IDB Invest

‘Urgent action is critical for transitioning towards a more sustainable, inclusive, and regenerative economy. Embracing circular economy provides environmental and social solutions for driving development, resilience, and sustainable work and livelihoods. IDB Invest actively drives awareness and collaborates with the private sector to identify market opportunities and potential investments in circularity. This report takes a people-centric approach to implementing the circular economy, identifying enabling conditions and frameworks for smoother transition, and prioritising targeted solutions and systems.’

EXECUTIVE SUMMARY

Despite the circular economy entering the mainstream, global circularity is still in decline.

Over the past five years, the volume of discussions, debates, and articles addressing this topic has almost tripled, reflecting a heightened awareness and interest in circularity.[1] However, the vast majority of extracted materials entering the economy are virgin, with the share of secondary materials declining steadily since the *Circularity Gap Report* began measuring it: from 9.1% in 2018 to 7.2% just five years later in 2023. Meanwhile, the total amount of materials consumed by the global economy continues to rise: in just the past six years alone we have consumed over half a trillion tonnes of materials—nearly as much as the entirety of the 20th century. These statistics display the cold, hard truth: despite the circular economy reaching 'megatrend' status, lofty speeches and targets are not yet translating into on-the-ground actions and measurable impacts. Without bold, urgent action to shift to a circular economy, we'll miss out on achieving broader social and environmental goals—ranging from emissions reductions to boosting the use of secondary materials—putting industries and governments at risk of sleepwalking into circular washing and missing out on much-needed impact.

The *Circularity Gap Reports* have provided crucial analysis and theory on the global state of circularity since 2019. Now, it's time to put this theory into action.

Today, six of the nine key 'planetary boundaries' that measure environmental health across land, water and air have been broken—largely due to the impacts of the linear 'take-make-waste' economy. Our *Circularity Gap Report 2023* found that adopting 16 circular economy solutions could not only reverse the overshoot of planetary boundaries but also slash the global need for material extraction by one-third. This reduction is rooted in the circular economy principles of using less for longer, using regenerative materials and cycling materials at their end-of-life. At this moment in time, we've never needed a circular economy more. While material consumption has been instrumental in raising living standards over the past century, we've reached a unique point in history where its continued acceleration—in high-income countries—no longer *guarantees* increases in human wellbeing. Meanwhile, the unequal distribution of wealth and materials hugely destabilise society and strains Earth's life support systems. The world's wealthier nations can no longer use progress as an excuse for unrestricted material consumption. The global economy needs to adopt circular principles to boost development and resilience and to safeguard people's wellbeing in this time of uncertainty and transition.

To walk the talk, governments and industry must break free of flawed development patterns that continue to fuel industries and practices known to be socially and environmentally exploitative.

They can do this by unlocking capital, rolling out bold, contextually-appropriate policies and closing the sustainable and circular skills gap. In this year's Report, we shift from exploring the *what* to the *how*: exploring the different ways that we need to 'change the rules of the game' and create a set of conditions that discourage the overshoot of planetary boundaries and 'undershoot' of human development. This process has resulted in us spotlighting 12 of the original 16 solutions, highlighting the country profile that they are most relevant to, as well as placing people at the centre of this story for the first time. Based on extensive interviews and desk research, this Report aims to show governments and industry leaders that if they want to turn theory into action and scale an economy that delivers on needs within the safe limits of the planet, they need to dismantle harmful entrenched processes and align enabling elements:

- **Create a level policy playing field:** Set the 'rules of the game' through policies and legal frameworks that incentivise sustainable and circular practices while penalising harmful ones, thereby shaping the nature and scale of economic activities across industries and nations.
- **Get the economics right:** Adjust fiscal policies and leverage public investment to create true prices and ensure that circular solutions become more valuable instruments and begin to replace linear norms.
- **Build circular expertise and skills:** Ensure people are skilled and trained to ensure a just transition where opportunities and decent livelihoods are fairly distributed across and within societies.

For a just transition, we must take a systems-thinking approach in real-life applications of the circular economy—both because systems change must meet people's needs and because people and their skills are necessary to implement the solutions themselves.

Although human wellbeing is a broad concept that encompasses a range of social, emotional and physical factors, this Report specifically focuses on how the circular transition can support wellbeing through the provision of decent work. Jobs act as a robust proxy for human wellbeing as it speaks to many dimensions of the human experience: jobs fulfil concrete needs like financial security while also providing a sense of meaning and fulfilment, community and social mobility. Decent and meaningful livelihoods are the bedrock of thriving societies. This is why circular solutions must be designed with the world's most vulnerable in mind. Done right, the circular economy can do more than create jobs and deliver on people's basic needs—it can elevate job quality and safety and reduce inequalities across entire workforces and, with this, populations.

A future-proof system must galvanise wellbeing by funnelling materials into industries and practices that lift people up and repair the damage done to the ecosystems upon which we depend, while degrowing harmful ones—especially in higher-income countries.

Key global systems put the most pressure on key Earth systems, driving us past the safe limits of six planetary boundaries. However, these systems are vital for fulfilling people's needs. In this report, we focus on transformative circular solutions across three key systems:

THE FOOD SYSTEM nourishes populations and employs 50% of the global workforce, but:

- it currently drives a quarter of the overshoot on the climate change planetary boundary due to its greenhouse gas (GHG) production,
- animal farming alone uses over one-quarter of all land, equivalent to the size of the Americas,[2]
- nearly a quarter of freshwater resources are lost due to rampant food waste, and
- it is the single largest driver of biodiversity loss.[3]

THE BUILT ENVIRONMENT, including housing, commercial buildings and the necessary infrastructure for mobility, is essential for our livelihoods, but:

- the extraction of minerals used to produce construction materials is responsible for a quarter of global land use change,
- approximately 40% of global GHG emissions can be attributed to buildings' construction, use and demolition, and
- construction and demolition processes drive nearly one-third of all material consumption.

MANUFACTURED GOODS, such as vehicles, textiles, appliances and equipment and their associated production processes are big employers but:

- production processes often rely on fossil fuels and currently drive one-third of the overshoot on the climate change planetary boundary due to its GHG production,
- material- and energy-intensive industrial activities are linked to deforestation and drive 15% on both the land use and freshwater planetary boundaries,
- manufacturing goods results in substantial amounts of hazardous industrial waste and leaks chemicals into the environment.

To achieve global wellbeing within planetary boundaries, we must prioritise circularity-based development in lower-income *Build* countries, promote circular industrial processes in *Grow* countries and shift consumption patterns in higher-income *Shift* nations.

Ultimately, different countries will have different priorities in scaling a global circular economy and ensuring that materials funnel into systems and practices that boost wellbeing within the safe limits of the planet.

Higher-income *Shift* countries should radically reduce their material consumption while upholding wellbeing.

On average, residents of *Shift* countries—including the US, Japan, the UK and Canada—enjoy affluent, comfortable lifestyles, and perform well on social indicators, but they consume far more than their share of materials. Despite housing around 17% of the global population, they consume one-fourth (25%) of raw materials, and consume the most non-metallic minerals and fossil fuels per capita of all country profiles. On average, *Shift* countries' per capita material footprint of 22.6 tonnes is 4.6 times that of *Build* countries (largely due to the overconsumption of consumer goods imported from *Grow* countries) and 1.6 times that of *Grow* countries. They also generate 43% of global emissions. This country profile's mission will be to reduce its material consumption and ultimately, lessen its impact on planetary boundaries, which currently comes at the expense of the global majority.

Although much of their infrastructure is already built up, *Shift* countries still contribute heavily to planetary boundary overshoot:

42% of the overshoot of the climate change boundary

27% of nitrogen

18% of phosphorus

16% of freshwater use

38% of land use change

Middle-income *Grow* countries should stabilise their material consumption.

Grow countries—including, for example, China, Indonesia, Brazil, Mexico, Vietnam, Myanmar and Egypt—need to continue improving their people's quality of life, but in a way that is much more sensitive to planetary boundaries. Globally, they account for 51% of the material footprint, while housing around 37% of the global population. Their average per capita material footprint is 17 tonnes per year. While these countries contribute 41% of global emissions—almost as much as *Shift* countries—their share of the global population is double that of *Shift* countries.

Increased growth and incomes have led to a nutrition transformation: diets are increasingly shifting in favour of more animal-based proteins—such as meat and dairy—and processed foods. While many countries are and will likely remain key manufacturing and industrial hubs for the rest of the world's—and their own—consumption, this necessitates a shift to make this sustainable environmentally and supportive and safe for workers.

Grow countries make a large contribution to the overshoot of planetary boundaries—largely by producing materials to feed the demand of higher-income (Shift) countries:

50% of the overshoot of the climate change boundary

62% of nitrogen

60% of phosphorus

53% of freshwater use

42% of land use change

Lower-income *Build* countries should increase their material consumption to fulfil their populations' needs.

Build countries, such as Bangladesh, Ethiopia, Nigeria, Pakistan, the Philippines, and some small island states, for example, account for 18.5% of the global material footprint, despite being home to almost half (46%) of the population. Their material footprint per capita is just 5 tonnes per year—less than the estimated sustainable level of 8 tonnes per person per year. Similarly, they contribute a relatively small share of global emissions: just 17%.

As these countries generally struggle to meet basic needs for healthcare and education, their primary objective is to improve living standards. This necessitates increased material use to provide the infrastructure, goods and services needed to improve wellbeing. It will also require uplifting workers in nations with prevalent informal economies, which are especially common in the agricultural, forestry and waste management sectors.

Build countries make a minimal contribution to the overshoot of planetary boundaries, contributing:

8% of the overshoot of the climate change boundary

11% of nitrogen

23% of phosphorus

30% of freshwater use

20% of land use change boundary

The transition calls for radical collaboration and concerted efforts to avoid burden-shifting among industries, regions and resources—striving for a structural transformation of production and consumption. No one actor can spur change alone:

1. Ministries of Economy, Finance and the Environment, Business leaders, Multilateral organisations and International Financial Institutions (for example, the IMF and Development Banks) can **SHIFT THE GOALPOSTS** by placing materials at the centre of the story of achieving wellbeing within boundaries.

How?

Develop and apply holistic indicators. We must move beyond GDP and other traditional economic metrics to incorporate indicators that measure the things that matter to people

Set mission-oriented targets. New targets are needed to shift the goal from maximising economic output to maximising human wellbeing within planetary boundaries.

2. Ministries of Economics, Finance and Trade, Multilateral organisations and International Financial Institutions can **WORK TOGETHER** to reform international financial and trade architecture to ensure all nations have the means to invest in sustainable development.

How?

Reform financial and trade patterns to promote circular solutions. This can unlock the potential of the circular economy to improve social outcomes and the environment.

Increase fair access to affordable circular technological innovations. Technological transfer can improve access to existing technologies, and rethinking trade policy can foster innovation in Build Countries.

Roll out measures for debt cancellation and relief. Debt cancellation and relief for Build and Grow countries is essential because it enables them to invest in the circular economy transition.

3. Ministries of Economics, Finance, Educational Institutions, Multilateral organisations and International Financial Institutions must **GET THE ECONOMICS RIGHT SO FINANCING CAN FOLLOW** by rolling out fiscal measures and new redistribution mechanisms and redesigning the system.

How?

Redesign taxation to ensure that prices reflect and include all costs. This should include those linked to environmental and health impacts, and can be done through carbon pricing and resource taxes.

Dismantle incentives for excessive material consumption. We can not only curb excessive consumption but also channel the generated revenue into public goods.

Complement pricing signals with fee-and-dividend schemes. Other mechanisms can also complement and reinforce better pricing, with the ultimate aim of limiting inflation and fostering social support.

4. Ministries of Economics, Labour, Educational Institutions, Multilateral organisations, Labour agencies and unions and Business leaders can **FORGE GLOBAL COLLABORATION FOR A JUST TRANSITION** by aligning environmental goals with social and economic ones across the world.

How?

Ensure the circular economy transition is people-centric. Working towards a just transition means leaving no one behind.

Build substantial support and leadership among governments around the world for this social transition to take place. Transitioning towards a circular economy requires state planning, strong social policy and the implementation of specialised public labour agencies that manage the transition of workers.

Harness policymakers' creativity to achieve results within a tight timeframe. In *Shift* countries, job guarantees and Just Transition Funds can be used to support workers in resource-intensive industries that will undergo changes, both in their own countries and in partner *Grow* and *Build* countries.

Ensure education addresses the inevitable shift in jobs and skills. It is vital that the right basic education, Vocational Education and Training (VET) and lifelong learning opportunities are made available now.

Ensure that circular, green employment means better employment. This includes better representation, decent pay and improved working conditions. No matter what corner of the world or the value chain we find ourselves in, it is crucial that people everywhere have the opportunity to lead dignified lives.

Let us set the stage for a global economy that operates by new rules—ones that promote a level playing field and propel us toward a more sustainable and equitable future.

CONTENTS

1 INTRO-DUCTION

How can we ensure people's wellbeing while operating within our planet's key boundaries across air, land and water? This is the ultimate question of our time. At present, the global economy under-delivers on many counts: the past years saw the emergence of the word 'polycrisis': the complex entanglement of global geopolitical, economic, environmental and social dilemmas.[4] And as these multiple crises emerge, interact and worsen, we're failing to reverse their impacts and secure a strong social foundation for much of the world's population. Rising material consumption and excessive waste drive profound—and increasing—disparities in the distribution of wealth, materials and opportunities around the globe. But there is another way: our *Circularity Gap Report 2023*[5] found that through circular economy solutions, we can meet people's needs with one-third fewer materials than we use today, reversing the overshoot of five planetary boundaries. This Report takes the next step to uncover the *'how'*: building on last year's 16 solutions across four key systems—food, the built environment, manufactured goods and mobility—it speaks to governments and industry leaders about how they can turn theory into action. It considers how enabling elements—policy, finance shifts and the role of the workforce—can be leveraged to support the circular transition in all corners of the globe, raising living standards in some places while lowering environmental impact. People are central to this story: we envision a transition in which no one is left behind, that is safe and just for workers, citizens and consumers. This Report is a guide: a practical action plan for solutions that support wellbeing within the planet's healthy boundaries.

THE ULTIMATE CHALLENGE OF THE 21ST CENTURY

Material consumption has been instrumental in raising living standards over the past century: globally, a flood of goods, services and energy has enhanced life expectancy, increased employment and improved education. The visual below, however, also shows that as living standards—measured by the Human Development Index (HDI)—rise, so does ecological impact.[6,7] We know now that material consumption is a solid proxy for environmental damage[8] with material handling and use contributing 70% of global greenhouse gas (GHG) emissions[9] and extraction and use driving more than 90% of biodiversity loss and water stress, for example.[10]

WHILE **MATERIALS** ARE VITAL FOR **HUMAN DEVELOPMENT**—TO BUILD UP CRUCIAL INFRASTRUCTURE AND FULFIL **HUMAN NEEDS** FOR NUTRITION, SHELTER AND MOBILITY, FOR EXAMPLE—**THIS DEVELOPMENT PATTERN IS FUNDAMENTALLY FLAWED FOR FOUR KEY REASONS.**

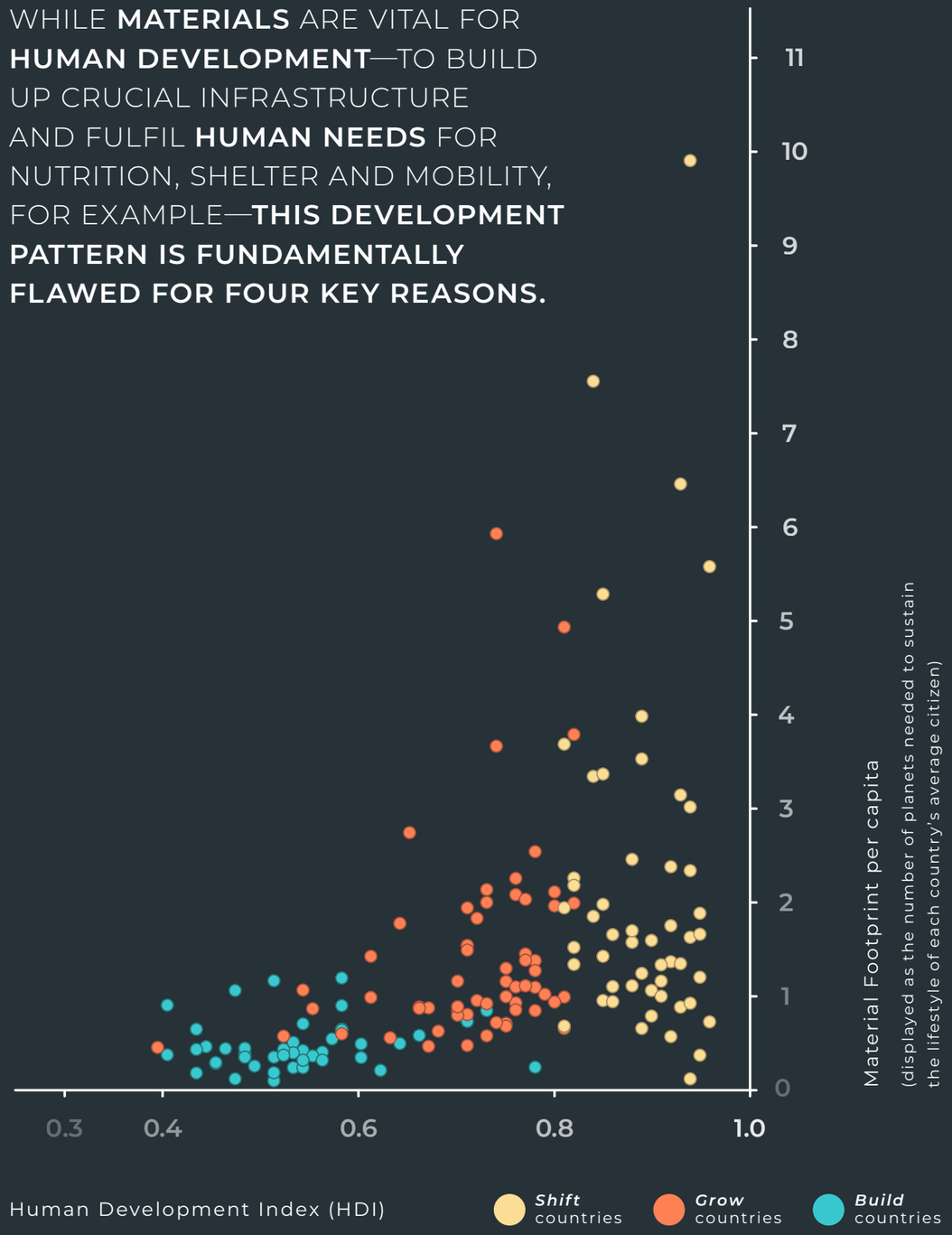


Figure one shows countries plotted along their Human Development Index and Material Footprint. As HDI rises, so do environmental impacts. We need a new economic model for the 21st century: one that maximises benefits for people and minimises the pressure on the planet's life support systems.

1. THE EARTH CAN'T SUSTAIN INFINITE GROWTH IN MATERIAL CONSUMPTION

The modern economy is underpinned by linear practices that have driven exponential growth in material consumption, pollution and waste generation. Between 2016 and 2021, the global economy has consumed 582 billion tonnes of materials—nearly as many materials as the 740 billion consumed in the entire 20th century. This puts unsustainable pressure on Earth's ecosystems and biocapacity, far more than we need to equitably fulfil many societal needs.

2. RESOURCE DISTRIBUTION AND DRIVERS OF ENVIRONMENTAL IMPACTS ARE INCREASINGLY UNEQUAL

A shrinking minority of people are driving the majority of environmental impacts, both between and within nations. High-income nations are key drivers of ecological breakdown: EU nations and US alone are responsible for more than half of the globe's material consumption,[11] despite housing just around one-tenth of the world's population. The world's wealthiest 1% are responsible for the carbon emissions of the poorest two-thirds, and have accumulated nearly double the money of the bottom 99%.[12]

3. THE UNEQUAL DISTRIBUTION OF WEALTH AND MATERIALS PUTS IMMENSE STRAIN ON EARTH'S SYSTEMS AND DESTABILISES SOCIETIES

By exacerbating inequality, spurring political unrest and heightening social tension, the global economy's production and consumption patterns are resulting in social unrest, war and mass migration. Climate breakdown is only serving to worsen this by further straining access to resources, and shrinking the area of liveable land on Earth.

4. THE CONTINUED ACCELERATION OF MATERIAL CONSUMPTION NO LONGER DELIVERS WELLBEING AND DESIRABLE PROGRESS

Many high-income nations are at a saturation point: a unique time in history where increasing material consumption no longer delivers guaranteed increases in human wellbeing.[13] More unequal societies are also unhappier ones. The world's wealthier nations can no longer use progress as an excuse for unrestricted material consumption.[14]

BENDING THE CURVE: PROMOTING PEOPLE'S WELLBEING WITH SMART MATERIAL USE

Rethinking material consumption is crucial for 'bending the development curve' towards a more environmentally safe and socially just future. Many countries need to expand their economies to build more solid social foundations—often resulting in the need to grow or stabilise material consumption. In order to free up ecological space for these countries, those with already strong economies and social infrastructure should reduce their material footprints. Redistributing material resources is a critical step to ensuring universal access to basic needs while staying within Earth's safe limits.[15] If countries prioritise wellbeing, and better align material consumption with a good quality of life—and make decisions accordingly—it is possible to bend development pathways towards the 'ecologically safe and socially just' space for humanity.[16]

The Circularity Gap Report 2023's research,[17] in which we explored the data of 148 countries between the years of 2005 and 2015, aptly illustrates this point. Our analysis identified outlying countries that have taken three distinct development pathways (refer to Chapter two for more information). For one, some countries expanded their ability to deliver social needs without sharp increases in material demand: countries such as Angola, Eswatini, Togo, Nepal, the Gambia and South Africa, for example, made strong progress on several wellbeing indicators—such as life expectancy, nutrition and access to energy—yet had stable, and even declining, material footprints.[18] Meanwhile, others injected significant volumes of materials into their economies without any discernible change in quality of life.

The specific factors contributing to each country's individual development pathway are complex and unique, yet these few examples demonstrate the important point that raw material consumption, and thus environmental pressures, can be decoupled from a high quality of life and standards of wellbeing.[19] This is where the circular economy comes in: its principles of *using less, using longer, making clean* and *using again* can be implemented at the product, service, process and system levels to deliver a high quality of life to a growing and increasingly urbanised global population within the safe limits of the planet.

The *Circularity Gap Report 2023* findings show that this is possible: we can deliver on societal needs such as housing, nutrition, mobility and manufactured goods with 30% less of the materials we use now, reversing the overshoot of five planetary boundaries.

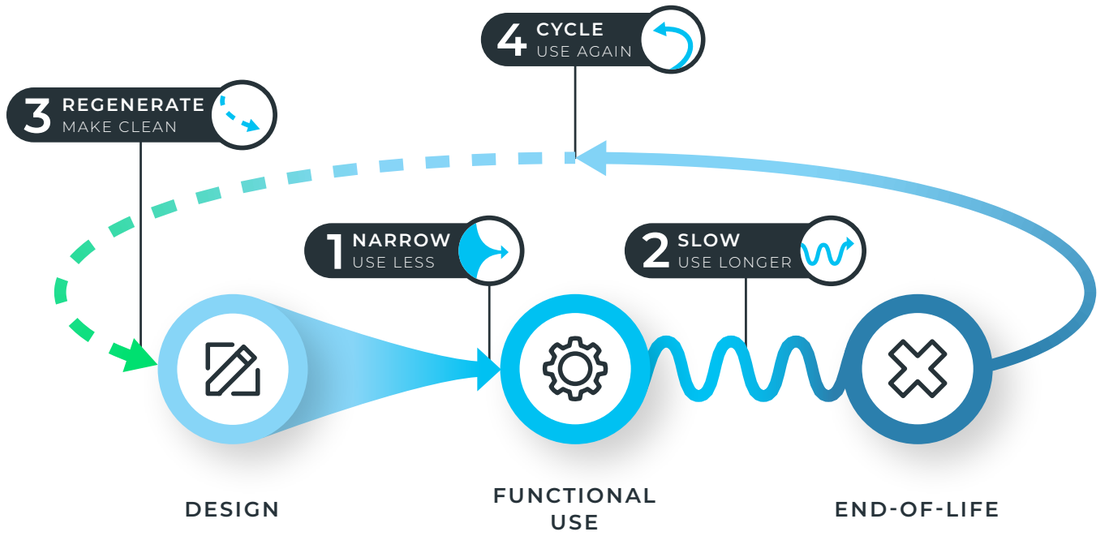


Figure two depicts the four flows of the circular economy: a comprehensive framework for managing resource flows in a circular economy by using less (Narrow), using for longer (Slow), using again (Cycle), and using clean, regenerative materials and energy (Regenerate).[20]

THE GLOBAL TRANSITION MUST BE JUST AND PUT PEOPLE'S WELLBEING AT ITS CENTRE

The circular economy offers a means to provide for people's needs with much less environmental impact, but is not socially just by default—it must be designed that way. People-centric solutions are vital, both because systems change must meet people's needs and because people and their skills are necessary to implement the solutions themselves. Citizens, workers and consumers must all be considered in the design of circular solutions, to ensure no person, community or nation is left behind. The shift towards a 'circular society'[21]—in which wellbeing is centre-stage—will not be simple, however. Ambitious circular strategies, while well-intentioned, may be prone to certain negative effects—implementing plastics bans without integrating measures to protect informal recycling workers can generate unforeseen negative impacts on livelihoods and workers' ability to provide for their families, for example.[22] Social justice must be embedded in policy- and decision-making processes to minimise these impacts for those most vulnerable, or to find alternate solutions that benefit people just as much as the planet.

Although human wellbeing is a broad concept that encompasses a range of social, emotional and physical factors, **this Report specifically focuses on how the circular transition can support wellbeing through the provision of decent work**.[23] Jobs act as a powerful proxy for human wellbeing as it speaks to many dimensions of the human experience: jobs fulfil concrete needs like financial security, while also providing a sense of meaning and fulfilment, community and social mobility. Decent and meaningful livelihoods are the bedrock of thriving societies. This is why circular solutions must be designed with the world's most vulnerable in mind. Done right, the circular economy can do more than simply create jobs and deliver on people's basic needs—it can elevate job quality and safety, and reduce inequalities across entire workforces and with this, populations.

Workers are also *consumers*. The average citizen should have easy access to affordable solutions—be they in the form of goods or services—that provide greater value than their linear counterparts. To this end, this report also explores some consumer-centred solutions that support citizens in making more sustainable choices, holding politicians accountable and championing bottom-up initiatives. This is not to shift responsibility from businesses and governments to the every-day consumer, but rather to highlight the importance of aligning incentives with people's needs: engineering a circular economy with and for people.

Drawing on the findings of the *Circularity Gap Report 2023*, this report identifies impactful circular solutions tailored to different country profiles based on their environmental impact, their potential for positive socio-ecological impact, and—ultimately—the unique makeup of their economies, which feeds into what their people need and want.

AIMS OF THE *CIRCULARITY GAP REPORT 2024*

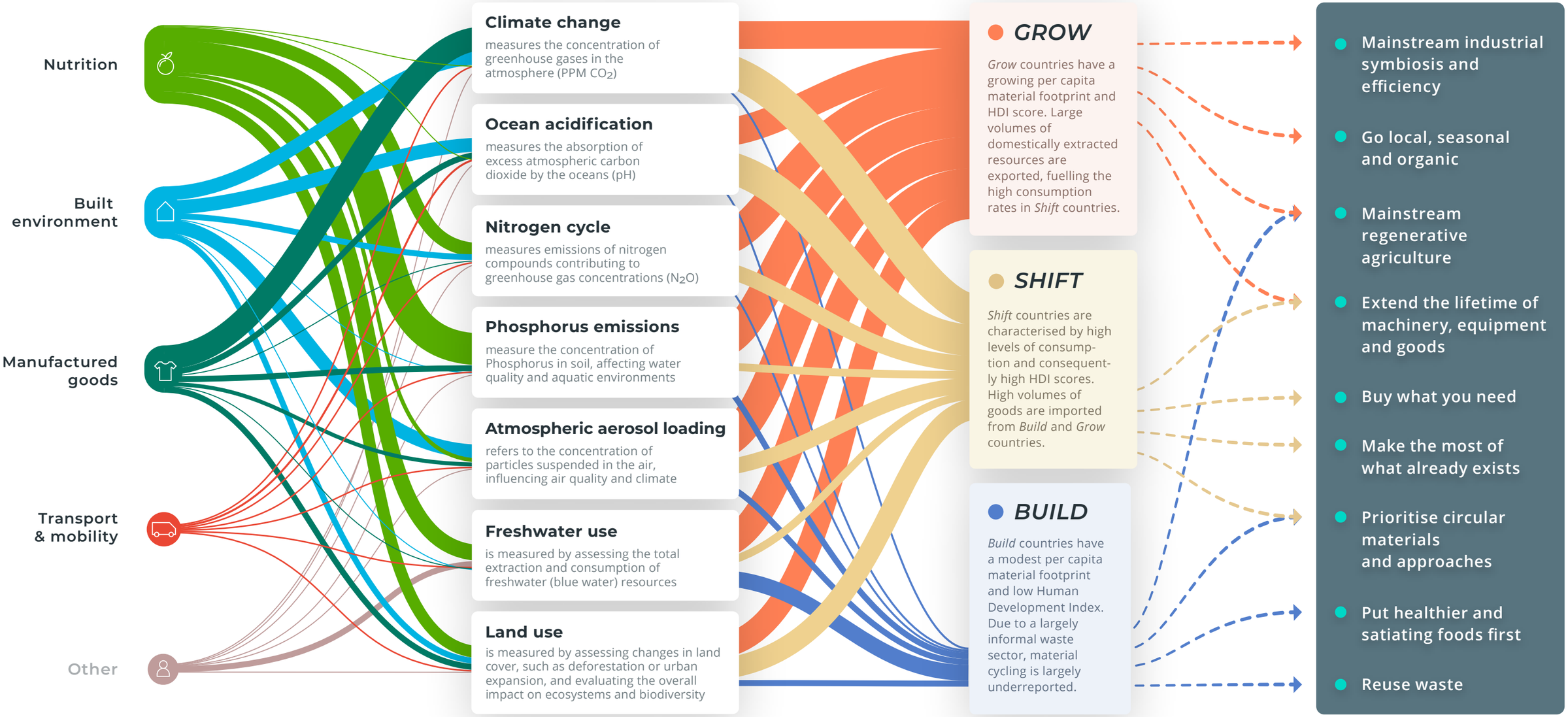
1. **To pinpoint key leverage points for each country profile.** *Build*, *Grow* and *Shift* countries all have a role to play in the transition—but these roles will look different. This report uncovers the most important value chains to transition to a circular economy across these three country profiles.
2. **To move from theory to action:** previous *Circularity Gap Reports* have defined the '*what*'—this report lays out the '*how*' to put these solutions into action.
3. **Explore and raise awareness for circular enablers.** We know which solutions must be rolled out at scale to transform our economic system and boost circularity around the world. This report explores the underlying political, financial and social conditions these solutions need to succeed.

2

WHERE TO FOCUS AND WHY

BRINGING POWERFUL CIRCULAR SOLUTIONS TO LIFE

Four Global Systems → account for the majority of → Planetary Boundary Overshoots → which are distributed across → Three Country Profiles → that can prioritise → Twelve Circular Solutions



FROM THEORY...

Four global systems—food, the built environment, manufactured goods and mobility—put the most pressure on key Earth systems, driving us past the safe limits of six planetary boundaries. However, these systems are vital for fulfilling people's needs. To determine how circular economy solutions can help, we must first understand the processes taking place in each of these systems—and their impact.

...TO ACTION!

By uncovering high-impact 'hotspots', next steps are made clear, although the safe limits of the planetary boundaries are crossed and cannot be retuned to normal.

FOUR VITAL GLOBAL SYSTEMS
DRIVE THE MAJORITY OF ECOLOGICAL OVERSHOOT

Last year's *Circularity Gap Report* found that by applying just 16 circular solutions across four global systems, we can reverse the overshoot of five planetary boundaries and limit warming temperatures to 2-degrees. While each of these 16 solutions is applicable to all nations, certain solutions may have higher impact and relevance in certain geographies.

We can identify which circular solutions are the most applicable to each country profile by looking at the locations of global production and consumption, trade patterns, labour market characteristics, the way in which countries consume materials and the way in which future socio-economic trends will shape material consumption.

In doing so, we can single out leverage points in the global economy where specific activities, practices and materials create a disproportionate level of impact. This process has resulted in us spotlighting 12 of the original 16 solutions, highlighting the country profile that they are most relevant to.

**The mobility system has not been included in this selection: this is because the kinds of circular solutions that address mobility assets—vehicles like cars and bicycles to trains and aeroplanes—fall under the manufacturing system, while solutions that address mobility infrastructure—such as roads, bridges and railways—are considered in the built environment.*

FOOD SYSTEM

Globally, the food system employs half of the global workforce and is a key driver of the overshoot of many planetary boundaries, responsible for: **a quarter of greenhouse gas (GHG) emissions, 44% of global land use, 61% of freshwater withdrawal and 90% of phosphorus emissions to soil.** Animal agriculture, intensive land management practices and food waste contribute the vast majority of these impacts. Animal farming alone uses more than a quarter of all land, releases almost 15% of GHG emissions and is responsible for two-thirds of all phosphorus emissions and one–third of all nitrogen emissions—enough to tip us past the boundary for nutrient overload. And while we technically produce enough food to feed everyone, around 800 million people still live in hunger.[24] The production of food that is either lost or wasted accounts for nearly a quarter of global cropland, up to 10% of GHG emissions, and nearly a quarter of the total freshwater resources used for food production.

A circular food system must address the whole value chain, from production to consumption to waste management. The four key solutions for the food system are:

PUT HEALTHIER, SATIATING FOODS FIRST

Prioritise satiating and healthy foods with a lower environmental impact—ideally shifting calories from meat, fish and dairy towards cereals, fruits, vegetables and nuts.

MAINSTREAM REGENERATIVE AGRICULTURE

Scale up agricultural practices that regenerate ecosystems, recirculate nutrients and sequester carbon by design.

GO LOCAL, SEASONAL AND ORGANIC

Prioritise the production and consumption of local, seasonal and organic produce (sometimes in combination with GMO to reduce pests and disease loss on crops), which can lead to a significantly reduced need for chemical inputs, fuels, and processing services that contribute most to environmental impacts.

END AVOIDABLE FOOD WASTE

Minimise food loss and valorise waste following the food waste hierarchy along the supply chain and at the consumer level through better management of transport and storage, more refrigeration and smart planning, and technology at the consumer and food service levels.

BUILT ENVIRONMENT

Encompassing houses, buildings and the roads we use to get from A to B, the built environment is a massive sector with high impact. While cities occupy just 3% of the globe's total land surface, the extraction of minerals used to produce construction materials is responsible for a quarter of global land use change. And what's more—**construction, building use and demolition are responsible for over one-fifth of global nitrogen emissions and more than half of atmospheric aerosol loading.**

Making the built environment more circular must prioritise a heavy reduction in material use—while also closing the loop on materials and bringing secondary and renewable material choices to the fore. Our four key solutions for the built environment are:

MAKE THE MOST OF WHAT ALREADY EXISTS

Make the most of existing materials by reusing, repurposing, upgrading and renovating following circular approaches. Where new builds are needed, use secondary materials and be as efficient as possible with urban planning solutions that follow circular design principles so that buildings can be reused, repurposed and easily disassembled in the future.

BE AS ENERGY EFFICIENT AS POSSIBLE

From the design phase, utilise circular strategies to create material- and energy efficient buildings. Couple these designs with a roll out of clean energy solutions, and prioritise energy efficient appliances and retrofitting.

UTILISE SECONDARY MATERIALS

Maximise the high-value reuse of buildings and components where possible. Ideally, enable the utilisation of construction and demolition outputs and ensure that as much of it as possible is recycled to avoid the need for virgin materials, such as sand and gravel.

PRIORITISE CIRCULAR MATERIALS AND APPROACHES

Transition to using renewable wood, timber or cross-laminated timber instead of steel and concrete, or move to other locally available materials. Utilise mainstream modular construction and prioritise lightweight frames and structures to reduce cement and steel use, as well as green roofs where possible.

MANUFACTURED GOODS

Manufacturing makes the world go round: we need it to produce vehicles, clothing, appliances and equipment. Its contribution to the overshoot of planetary boundaries is far from negligible: **it is responsible for about one-third of global GHG emissions, and around 5% of global freshwater and land use**. The sector boasts a large material footprint—and similarly produces substantial amounts of industrial waste.

Here, circular solutions must tackle the full value chain, but material demand must also shrink: this will necessitate a societal shift to favouring sufficiency over excess and reducing consumption to sustainable levels. Our four key solutions for manufactured goods are:

MAINSTREAM INDUSTRIAL SYMBIOSIS AND EFFICIENCY

Achieve process improvements, scrap diversion and reduction in yield losses through greater industrial symbiosis and efficiency. Foster tighter collaboration within and between industries to deliver powerful material and emissions savings.

EXTEND THE LIFETIME OF MACHINERY, EQUIPMENT AND GOODS

Maximising the lifetime of goods that serve our daily needs can bring a number of environmental benefits.

BUY WHAT'S NEEDED

Reduce the purchases of common electronic goods, appliances and other equipment to sufficiency levels.

ESCHEW FAST FASHION IN FAVOUR OF SUSTAINABLE TEXTILES

Drastically reducing new clothing purchases, all used clothing should go on to be repaired, reused or, if needed, recycled appropriately. Prioritise natural and local textile manufacturing, as well as higher-quality and more durable garments.

DIFFERENT COUNTRIES, DIFFERENT PRIORITIES

While true systems change implies a holistic approach, exploring the economic character of each of the world's regions and how they develop over time allows us to identify the most impactful material flows and sectors. Despite clear divergences between countries, we can still discern which circular economy interventions will be most suitable in certain contexts based on clear common needs and structural parallels. We have used the country profiles *Build*, *Grow* and *Shift*—first developed in the *Circularity Gap Report 2020*[25]—to select the most relevant two key systems and two circular solutions for countries to focus on.

SHIFT COUNTRY PROFILE

These countries are home to around a quarter of the global population, yet consume over one-third (34%) of raw materials.

Shift countries' material footprint per capita is 4.6 times that of *Build* countries (largely due to the overconsumption of consumer goods imported from Grow counties) and 1.6 times that of Grow countries.

These are high-income countries in the Global North, as well as in the Gulf, Australia and Oceania. Examples include Member States of the EU, the US, Japan, the UK, Canada and Argentina.

While much of their infrastructure is already built, they still contribute heavily to the overshoot of planetary boundaries: they contribute 42% of climate change, 27% of nitrogen, 18% of phosphorus, 16% of freshwater use and 38% of land use change.

Key development pathways: High-income *Shift* countries on average enjoy affluent, comfortable lifestyles and perform well on social indicators—but they consume far more than their fair share of materials. While they house a minority of the world's population, they generate close to half of global emissions and consume the most (per capita) across all material groups. These countries must focus on reducing material extraction and use to lighten their environmental burden.

POPULATION

RAW MATERIAL CONSUMPTION

To achieve the above, the most impactful circular solutions across Manufactured goods and the Built environment are:

1. BUY WHAT YOU NEED AND EXTEND THE LIFETIME OF MACHINERY, EQUIPMENT AND GOODS.

Exceeding their fair share of material use,[26] these countries are responsible for the bulk of ecological overshoot.[27] Demand for raw materials and finished goods—largely imported from *Grow* countries—means they often offshore environmental impacts. *Shift* countries must rethink their consumption patterns and transform their lifestyles, eschewing consumerism in favour of sufficiency-based approaches.[28]

2. MAKE THE MOST OF WHAT ALREADY EXISTS AND PRIORITISE CIRCULAR MATERIALS AND APPROACHES.

In 2018, stock build-up alone represented 40% of *Shift* countries' material footprint. This would increase even more if we were to include materials used to operate buildings post-construction—those used for heating and cooling, for example. Applying circular solutions to the already built-up built environment will therefore be a key lever to reduce *Shift* countries' impact.

GROW COUNTRY PROFILE

Grow countries globally account for 55% of all raw material extraction and 52% of the material footprint, while housing around 37% of the global population.

These are larger Southeast Asian countries and countries in Latin America and Northern Africa, as well as those with an economy in transition in Eastern Europe, the Caucasus and Central Asia. Examples include China, Indonesia, Brazil, Mexico, Vietnam, Myanmar and Egypt.

Large contribution to the overshoot of planetary boundaries—largely due to the consumptions of local materials in higher-income (*Shift*) countries: these countries contribute 50% of climate change, 62% of nitrogen, 60% of phosphorus, 53% of freshwater use and 42% of land use change.

Key development pathways: Largely middle-income, Grow countries need to continue growing to meet their peoples' needs, but in a way that is much more sensitive to the various planetary boundaries. Increased growth and income levels have led to a nutrition transformation: diets are increasingly shifting in favour of more animal-based proteins—such as meat and dairy—and processed foods.[29] While many countries are and will likely remain key manufacturing and industrial hubs for the rest of the world's—and their own—consumption, this necessitates a shift to make this sustainable environmentally and supportive and safe for workers.

POPULATION

RAW MATERIAL CONSUMPTION

To achieve the above, the most impactful circular solutions across the Food system and Manufactured goods are:

1. MAINSTREAM REGENERATIVE AGRICULTURE AND GO LOCAL, SEASONAL AND ORGANIC.

As *Grow* countries constitute half of the world's population, they are important food consumer[30] and are also the globe's biggest producers. As well as increased meat and processed food consumption, food waste is also on the rise, especially in the post-consumer stage.[31]

2. EXTEND THE LIFETIME OF MACHINERY, EQUIPMENT AND GOODS AND MAINSTREAM INDUSTRIAL SYMBIOSIS AND EFFICIENCY.

Decades of rapid, export-driven industrialisation and low-cost labour have made their mark on these countries: now, transforming their manufacturing systems will be key to reducing environmental impacts while advancing social progress. They account for around half of the raw materials used annually—often driven by demand from wealthier nations.

BUILD COUNTRY PROFILE

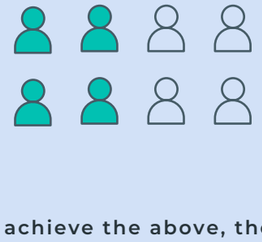
Build countries consume 13% of the global material footprint, while they account for almost 50% of the population.

Countries in Sub-Saharan Africa and South Asia such as Bangladesh, Ethiopia, Nigeria, Pakistan and the Philippines, and some small island states, for example.

Minimal contribution to the overshoot of planetary boundaries: these countries contribute 20% of land use change, 30% of freshwater use, 23% of phosphorus emissions to soil and 11% of nitrogen emissions.

Key development pathways: As these countries generally struggle to meet basic needs for healthcare and education, their primary objective is to improve living standards. This necessitates increased material use to provide the infrastructure, goods and services that deliver on human needs. It will also require uplifting workers in nations with prevalent informal economies, which are especially common in the agricultural, forestry and waste management sectors.

POPULATION



RAW MATERIAL CONSUMPTION

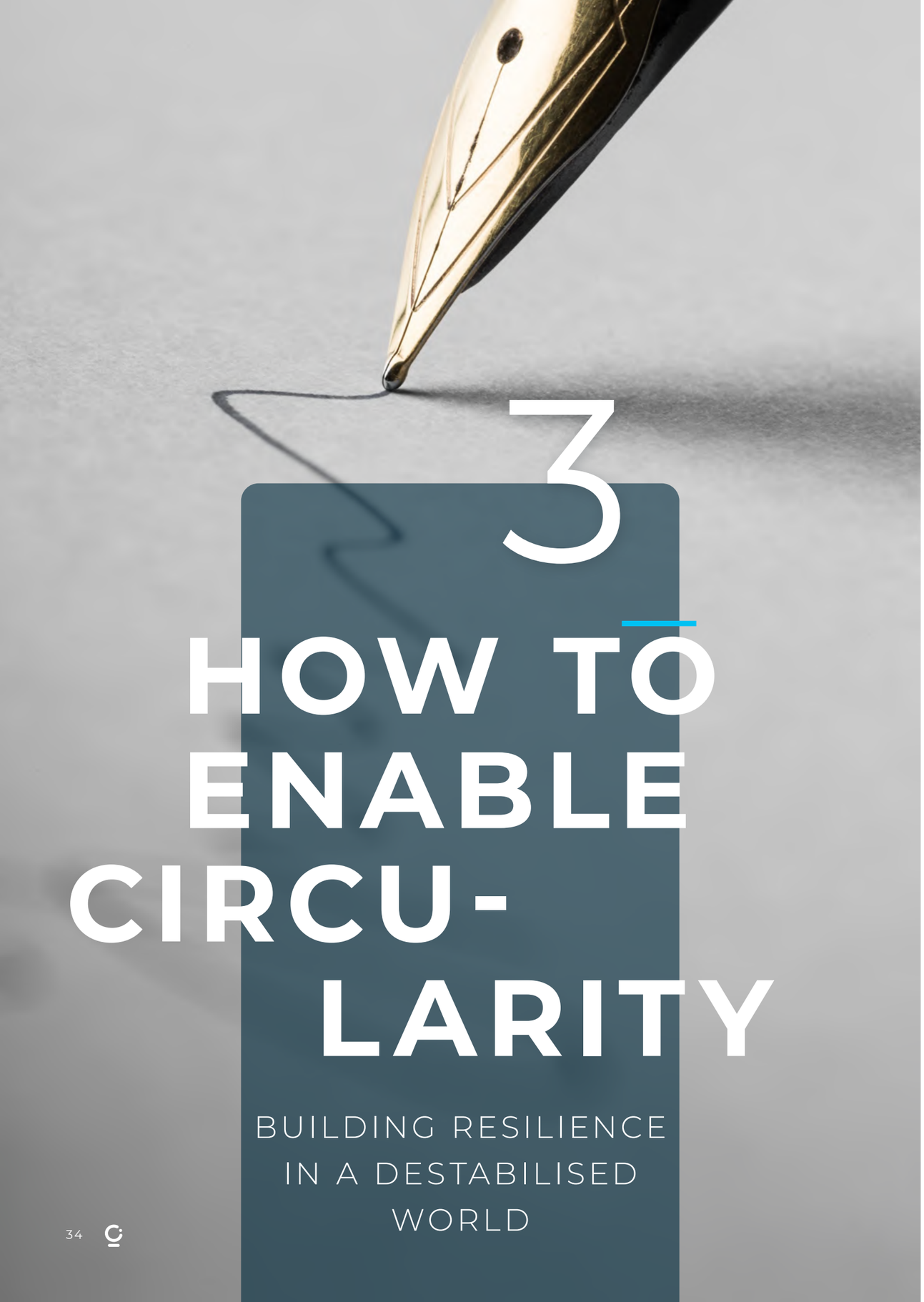
To achieve the above, the most impactful circular solutions across the Food system and the Built environment are:

1. MAINSTREAM REGENERATIVE AGRICULTURE AND PUT HEALTHIER AND SATIATING FOODS FIRST.

Build countries' food systems are an important lever to create environmental, social and economic benefits. The countries' economies are largely agricultural-based, with biomass accounting for nearly half of their total material consumption. Agriculture claims a large share of employment: four to six out of ten people are employed by the sector.[32,33]

2. PRIORITISE CIRCULAR MATERIALS AND APPROACHES AND REUSE WASTE.

The continued build-up of housing and infrastructure in Build countries—to accommodate their growing and urbanising populations—represents an opportunity to leverage circular solutions for better environmental and social outcomes. Unchecked urbanisation and the resulting urban sprawl of informal settlements is often linked to poverty, contaminated water, biodiversity loss, and more. Currently, almost one-third of urban residents live in slum households.[34]



3

HOW TO ENABLE CIRCU-LARITY

BUILDING RESILIENCE IN A DESTABILISED WORLD

Using circular solutions to reverse the overshoot of planetary boundaries sounds simple—but making deep changes across the systems that uphold the modern world is easier said than done. Circular economy is an upgraded operating system that can help tackle the complex and intertwined challenges humanity is facing, if approached well. But to go from theory to action, we must zoom out and look at the big picture rather than working in silos: the relationships between each part of the system must be mapped and new collaborations formed. No single department, business, industry, city or nation should work in isolation—and no intervention should be applied without understanding its potential ripple effects. Systems thinking shows us the merit of targeting structures embedded in a system—such as regulatory frameworks and value systems—rather than tackling symptoms. In other words, we must tackle problems' root causes to create lasting change. This Report takes this approach on a global scale. It identifies the most impactful circular solutions for industries across country profiles and shows how legal, regulatory and financial incentives can be shifted to unlock true structural change that benefits people.

SYSTEMIC CHANGE REQUIRES SYSTEMS THINKING

Today's world can be characterised by the 'polycrisis': the unfolding of multiple overlapping and interlinked economic, environmental, social and political crises and challenges. As these converge, billions of people around the globe are impacted on a day-to-day basis. Technology and innovation are often cited as the solutions to climate and environmental challenges. While necessary, they in and of themselves cannot tackle the multidimensional challenges of ecological breakdown. This is partly because of rebound effects stemming from efficiency gains that actually increase total material use,[35] but also because they are typically one-dimensional and reactive, solving a specific issue but failing to adapt the incentive structures required to influence entire systems. The challenge of the century will be to tackle these crises in an integrated manner: a systems-thinking approach can tackle complexity, deal with uncertainty, balance trade-offs, limit rebound effects and prevent embedding biases that can cause issues down the line.

Systems thinking must inform how we roll out circular economy solutions. This involves identifying root causes, key leverage points and systemic enablers, thereby shifting incentives:

1. **Uncover root causes.** We have to tackle the problem itself, not the symptom. Bringing human activity back within a safe operating space will require us to address the root causes of ecological breakdown—namely excessive material use, which has been supercharged by consumerism, the quantity of waste and pollution released, and the damage dealt to the planet's ecosystems.
2. **Identify leverage points.** These are spots in a system—be it a business, economy, city or ecosystem—where one small shift can trigger transformative change.[36] By using circular solutions to fine-tune the structures influencing our perceptions, motivations and behaviour, we can spur true systems change.
3. **Determine systemic enablers.** Systems change won't happen without political and financial backing—nor without the support of the workforce. Here, active government support for deep transformation will play a key role by changing 'the rules of the game' and 'levelling the playing field' to enable equitable circular solutions.

Ultimately, shifting incentives. Bringing the three points above together can help us shift incentives and encourage actors to rethink how materials, finance, knowledge and skills flow through their economies. By doing so, we can accelerate progress towards a global circular economy that improves wellbeing without overshooting planetary boundaries. Shifting incentives is crucial to changing behaviour and ultimately preventing material use from spiralling further.

POLICY, FINANCE AND PEOPLE

Successful systemic change hinges on support from governments, financial actors, businesses and citizens alike: connecting policies and laws, capital and business models and people will be crucial to the circular transition.

CREATING A LEVEL POLICY PLAYING FIELD

Policy encompasses the rules, guidelines and laws set by governments that have the power to shape the actions of citizens, businesses and whole economies alike. Policies and legal frameworks 'set the rules of the game', and can incentivise sustainable and circular practices while penalising harmful ones, thereby shaping the nature and scale of economic activities across industries and nations. In many cases, however, enforcing legislation remains a challenge: monitoring and penalties must be strict enough that individuals and businesses play by the rules.

GETTING THE ECONOMICS RIGHT

Finance is the lifeblood of the economy. Financial flows—managed by powerful financial institutions—determine which ideas are realised, and which activities and businesses are funded and scaled. Financing is necessary for circular solutions to replace linear practices, and should particularly be directed at activities that bring about positive impact, such as cuts to virgin material use and the provision of decent work. Furthermore, addressing key systemic levers—such as the uptake of consistent circular assessment metrics, environmental fiscal reform, true-cost accounting, alleviating the debt burden and transforming multilateral financing institutions—will benefit all.

BUILDING CIRCULAR EXPERTISE AND SKILLS

People are key agents and beneficiaries of change: their skills, jobs, awareness and choices can help to achieve systemic change and will be impacted by actions taken. Many things—such as policy, finance, education, migration, and the current state of the economy—influence people's livelihoods and the labour market. These factors impact how people's skills are used, and how income and opportunities are distributed across and within societies. Aligning laws, flows of capital and opportunities for people with circular economy principles creates a powerful synergy, ultimately allowing us to shift away from our take-make-waste mode of operation in a way that works with and for people.

** Ultimately, the goal will be to redefine the regulatory and fiscal framework to ensure that circular investments become the first-best solutions for private investors, based on their risk-return credentials. This will involve reduced interest rates for sustainable activities to develop local markets and lower the risks for private finance to engage.*

CONNECTING THE DOTS TO UNLOCK SYSTEMIC CHANGE

Although public policy has the power to shift priorities and ultimately redefine the 'rules of the game', so that they facilitate—rather than restrict—the transition, the increasingly financialised economic system[37] has limited government's ability to enact change, allocate funds and direct spending to necessary capital-intensive green investment—from green infrastructure development to welfare schemes, particularly in Build and Grow countries.[38] In this system, countries' GDP and national wealth (and debt) can rise, while environmental stability and human wellbeing erode.

To maximise the environmental, social and economic potential of the circular economy, governments must actively support mission-driven innovation, redesign markets to maximise public value creation, align on purpose-driven strategies and reduce inequality to uphold social cohesion. While there has been a rise in circular economy-related policymaking,[39] more concerted efforts are needed from governments to redefine the goal of the economy and put powerful incentives in place that can truly foster systemic change. This fundamental role of capital in the circular transition especially highlights the importance of public **finance**. In many countries, significant targeted public investment remains the crucial first step to developing the capacity, infrastructure and know-how to implement circular economy solutions at scale. Entrepreneurial states and development banks[40] are best suited to take on this task, ensuring 'value' is redefined to go beyond finance and also consider returns in natural, social and human capital.

International financial institutions and governments also have an important role in mainstreaming circular models, and incentivising private finance to engage with projects and businesses that minimise resource demand and that actively keep materials in use for as long as possible. One of the main problems with the existing economic paradigm, however, is that the economics just don't work for making the global economy operate within planetary boundaries: environmental and social harms (so-called 'negative externalities') are not factored into prices, and this heavily favours investments in the linear businesses that extract and pollute as means to keep costs down and profits up. While this is a pricing issue, it stems from policy decisions. **Finance and policy** must work in tandem to level this playing field for circular solutions. Policy must set the right incentives in place to channel private capital towards desired activities, so that finance can practically enable and accelerate the transition.*

Last but certainly not least, the **labour market** is a pivotal lever for driving the circular economy transition by harnessing a country's national competencies, knowledge and skills. To maximise this, circular principles can be integrated into education, strategies for workforce development, and forecasting within the labour market: the circular economy will be labour intensive, especially in certain sectors, and it will require re- and up-skilling huge numbers of people. This comprehensive approach can ensure a synergistic relationship between the circular economy and the labour market, fostering sustainable and decent livelihoods.

To bring circular interventions to life around the world, it will be key to uncover the people, skills and roles pivotal for success, while crucially accounting for atypical forms of work—temporary, flexible or informal work, for example—and considering the interplay of social equity and gender dynamics that impact decent work outcomes. If the circular transition is managed equitably and effectively, it can positively impact the labour market by providing new job opportunities, raising job standards and reducing inequalities through a global redistribution of value and opportunities. To effectively transition to a circular economy, however, it's crucial to better understand the trade-offs and dynamics inherent in the labour market to help craft strategies that manage or mitigate challenges that might crop up during the transition. For example, by addressing inevitable job losses in transitioning industries or shifting trade relationships.

PUTTING POLICY, FINANCE AND PEOPLE TO WORK ACROSS COUNTRY PROFILES

Unlocking and realising circular economy solutions will require systemic enablers that can overcome challenges specific to different country profiles and systems. It's important to recognise that the three enablers of policy, finance and people are not isolated from each other—they are deeply intertwined. Each faces its own barriers in each country profile, and in each system. For example, while *Shift* countries enjoy available capital and space to develop cutting-edge policies, many *Build* and some *Grow* countries are bound by less access to financial resources, a huge debt burden[41] and a lack of autonomous policy space. For this reason, a different mix of enablers across policy, finance and society will be needed to kickstart action in each country profile and system.

4

CIRCULARITY IN *SHIFT* COUNTRIES

RADICALLY REDUCE MATERIAL CONSUMPTION AND UPHOLD WELLBEING

SETTING THE SCENE

Overconsumption in high-income countries is the main driver behind planetary overshoot and ecological breakdown.[42] Shift countries may enjoy high general HDI scores, but they operate far beyond the planet's means. It is estimated that if every person were to live and consume like the US, for example, we would need five Earths to sustain our population.[43] At the same time, despite the relatively comfortable lifestyles enjoyed, Shift countries have failed to eliminate social shortfalls in many ways. For example, the gap between rich and poor is only widening:[44] in Organisation for Economic Cooperation and Development (OECD) countries, (a group almost exclusively composed of Shift nations) income inequality is the highest it's been for the past half a century.[45] This trend has accelerated as the cost of living crisis continues.[46]

While these countries have stricter domestic environmental regulations and advanced waste management systems, they drive significant environmental degradation in the rest of the world.[47] Demand from *Shift* countries sparks extraction and pollution elsewhere—and these wealthy nations outsource industrial production to countries with weaker environmental and social regulations. *Build* and *Grow* countries are highly dependent on the export of the raw materials—while on the other hand, they also frequently import *Shift* countries' waste. All these dynamics impact the way in which resources (and capital) flow between countries,[48] and influence the type of economic activities and job opportunities common to each country profile. As new industrial policies are introduced to reshape these inequality dynamics, it's crucial that place-sensitive policy packages are rolled out to mitigate potential job losses in more 'linear' sectors and address regional disparities within and across *Shift* countries, as well as their partner *Build* and *Grow* countries.

Shift countries are characterised by a rapidly ageing workforce. This is taking its toll on key industries, such as construction and manufacturing, for which young new talent is lacking: these industries often fail to attract talent as new entrants to the labour market increasingly move into knowledge worker roles. Other trends—such as automation and outsourcing—are sparking economic concerns and job insecurities across industries, from manufacturing and transport to trade and finance.[49] Advanced service industries in *Shift* countries also bring challenges: these industries are often highly precarious due to part-time, flexible contracts and informal working relationships are prevalent. These roles often attract lower-educated, young people and those with migrant backgrounds, posing greater risks to these groups.

SYSTEM ONE: BUILD A CIRCULAR BUILT ENVIRONMENT

What could a circular built environment look like in *Shift* countries?

Shift countries have already built up much of their buildings and infrastructure: so here, circular solutions centre on making the most of what already exists. In a circular future, buildings are repurposed, renovated and retrofitted rather than demolished, meaning that far fewer materials are used to provide housing or commercial spaces. Through adaptive reuse principles, abandoned buildings are given new life, and heritage sites are carefully preserved through structural upgrades, for example.

All of these processes make use of the most circular materials possible: locally-sourced, renewable and secondary. Where building new is necessary, circular design strategies are the gold standard—from material lightweighting to biomimicry. Nature's inspirational solutions are used to influence building design and even act as a muse for material innovation: cutting-edge innovations like bendable concrete—inspired by the chemical structure of abalone shells—are used to cut material use while maintaining strength and durability, for example.[50] Buildings are designed for repairability and deconstruction, so that components and materials can be easily reused in the future, and with a focus on energy efficiency. These low-carbon buildings of the future are also seamlessly connected to renewable energy sources. Circular construction is the norm thanks to heavy public support, with policies, incentives and fiscal mechanisms making sustainability worth developers' while.

Built environment workers in *Shift* countries benefit from circularity, too: workers have been well-prepared for the change in job profiles, with harmonised training systems across the EU, for example, equipping workers with the necessary skills for success:[51] think Building Information Management (BIM) systems and 3D printing, for example. Decent working conditions are a reality for all, including migrant workers, who have previously been at higher risk for workplace injuries and are more likely to be employed under short-term contracts. With labour shortages already rife in construction industries in *Shift* countries, circular economy interventions need to include measures that increase the quality and attractiveness of these roles.

What could a circular built environment look like in *Shift* countries?

We envision a circular future for the built environment in *Shift* countries, in which design, construction, operation and end-of-use management work in synergy to deliver highly resource efficient buildings and infrastructure in a fully closed-loop system. Unlocking this vision, however, will require concerted action across policy, finance, and the labour market. Some of the key components of unlocking this vision include the following:

CREATING A LEVEL POLICY PLAYING FIELD

Reward market players for investing in circular solutions and business models

Many actors in the built environment aim to adopt circular business models but lack the regulatory signals and economic incentives to do so. A policy environment that carefully mixes regulations and rewards for market players is key to (dis)incentivising innovation in business practices across the entire built environment value chain.

- **Implement strict regulations that prioritise renovation, retrofitting and adaptive reuse** wherever possible, and require the high-value recycling and reuse of construction and demolition waste. This could include mandating adaptive reuse and renovation for existing structures, rolling out penalties for landfilled or incinerated waste and applying minimum requirements for secondary material reuse in renovation and lifetime extension projects. This would interrupt the cycle of demolishing and building new, which is a key barrier to maximising the value of what already exists for as long as possible.
- **Develop effective certifications and warranties for secondary materials** to validate their safety and quality, and make it much easier for contractors to comply with building regulations when using these materials. This effort could be combined with strengthened environmental requirements for imported materials to mitigate the use of high-impact virgin materials that have been produced in locations with less stringent standards. These efforts in tandem can help incentivise builders and developers to make more sustainable material choices.[52] The skills and knowledge needed to adhere to these certifications must be integrated into Vocational Education and Training (VET) and in-work training.
- **Roll out standards and criteria for circularity** throughout public procurement, zoning and spatial planning guidelines. Bold targets can be set to decrease buildings' and infrastructure's embodied carbon, next to mandating material passports and targets for secondary or bio-based material use. Normalising circular economy practices throughout building regulations creates demand in the market for companies to invest in and compete on circular economy approaches.
- **Roll out innovative land ownership models,** such as Community Land Trusts, to ensure affordable long-term housing for communities—homes should not be treated like a financial asset first, and a place to live second.[53] Regulatory, technical and financial instruments like the restriction of foreign investment in housing can be tailored so that buildings are used more appropriately. Improved access to financing for cooperative housing, or the right to first refusal can ensure that buildings are used efficiently.[54]

GETTING THE ECONOMICS RIGHT

Make circular building projects an attractive investment option

Working in synergy with the stricter policy environment that is described above, it is crucial to expand the flow of capital and investment toward companies who take the risks to transition toward more circular models. The barrier of risk aversion must be fully overcome in order to transition the sector to a more circular model.

- **Financially incentivise circular construction** by cutting property taxes for buildings that meet circular criteria, providing tax credits for circular material use or reducing insurance premiums for circular buildings or infrastructure. Additional financial support can be provided through subsidies and grants that encourage the application of circular business models, or experimental materials and building techniques. **Mission-driven financial mechanisms such as green bonds** or sustainability-linked low-interest loans can make circular initiatives more financially attractive for large developers.
- **Establish a common language amongst stakeholders in the financial and building sectors** to boost transparency and enable better collaboration. This is already taking place in the EU. For example, the EU Taxonomy, Corporate Sustainability Reporting Directive (CSRD), Sustainable Finance Disclosure Regulation (SFDR) and labelling of circular built environment projects through initiatives such as Level(s) are all important steps in this direction. This is because they consolidate the assessment and reporting of the sustainable performance of construction activities and buildings across their entire lifecycle.
- **Rethink accounting standards and practices** to better capture the value of built assets, frame waste as a resource so that no building depreciates along a linear pathway, and acknowledge the positive benefits of long-term social, environmental and economic impacts for investment. This could also include the revision of building regulations to accurately reflect the depreciation of various building components. Buildings don't depreciate as a whole—some parts wear out faster than others: furniture and facades, for example, have much shorter useful lives than building structures. Accurately capture this difference to boost the long-term value of building projects.[55]

BUILDING CIRCULAR EXPERTISE AND SKILLS

Close the labour and skills gap with a mix of education and policy

Despite having a highly skilled workforce, critical knowledge and skills gaps persist in the building sector. This must be tackled to deliver circular solutions at scale. This presents a number of opportunities, such as bringing more women into the workforce, training migrant workers, and increasing workers' safety—all of which remain challenges in this sector today.

- **Address labour shortages in the industry by aligning policy and increasing the attractiveness of jobs.** Construction industries across *Shift* countries face persistent labour and skills shortages that are increasing with ageing societies and

worsened by the impacts of the covid-19 pandemic. Although greening the construction industry may increase the attractiveness of these occupations, it will not be enough to overcome existing shortages. Efforts to increase the quality of jobs, through better wages, working conditions, social protection and skills development are needed to bolster the right types of jobs and with them circular practices in the industry.

- **Support the development of necessary circular skills in the labour market by including the circular economy in Technical and Vocational Education and Training (TVET) curricula,** lifelong learning systems and workplace training. **Public training services** can be offered to workers within the construction sector, along with income support during unemployment and effective re-employment services to support smooth and effective re-integration for jobseekers.
- **Review and (re)formulate skills development policies,** especially for the validation and recognition of skills and qualifications for migrant and more informal workers. Such an approach would address local shortages of workers and provide greater mobility to workers who can bring the necessary skills that deliver circular approaches within the construction sector through tools like skills passports.[56]

> Circular, socially sustainable public procurement holds strong potential for setting high standards and driving change. We can source greener, more sustainable products and services while supporting local employment, in fair and decent conditions.
>
> **Juliette Moizo**, French Ministry of Environment

HAFENCITY, A FORMER INDUSTRIAL BROWNFIELD SITE TURNED INCLUSIVE 'CITY-WITHIN-A-CITY' IS A MODEL FOR SUSTAINABLE DEVELOPMENT.

Like many European cities, Hamburg faces challenges tied to rapid urban growth, density and lack of affordable housing. Gentrification has led to increased rents, rising inequalities and the displacement of long-time residents. In an effort to combat the increasing demand for housing and offices while anticipating flood risks, the city decided to redevelop its former port into a new urban district: **HafenCity.**

In the early 2000s, the **City of Hamburg launched one of the biggest inner-city regeneration projects yet.** The objective was to extend Hamburg's downtown area by 40%, create inner-city access to the shores of the Elbe and provide additional housing for the city's growing population.[57] The process followed the concept of **urban regeneration**, which connects the stimulation of economic activities and environmental improvements with wider social and cultural aspects.[58]

While several urban regeneration projects have made ground in the EU over the last few years, **HafenCity's scale and ambition set it apart. HafenCity is built on a former industrial port area and effectively reuses existing infrastructure and land.** Its historic warehouses have been preserved and converted into mixed-use spaces, such as offices, restaurants and apartments, extending the life of these structures. What's more, the City of Hamburg negotiated complete site control from the start, which allowed it to counter conventional practices concerning building designs and technologies, land use synergies and environmental amenities and performance.

To achieve such high environmental and social objectives, HafenCity relied on a specific public-private governance model, **HafenCityHamburg GmbH**. A GmbH, or '*Gesellschaft mit beschränkter Haftung*' is a limited liability company. The partnership combines the efficiency of the private sector (market discipline and mechanisms) with the benefits of public direction and legitimacy.[59] This entailed a clear division of responsibilities between public owners and private managers to avoid short-term partisan politics. **The city developed ambitious tendering processes that favoured quality over price.** HafenCity Hamburg GmbH drives development concepts that support a socially balanced mix of apartments—one-third of which are reserved for low and medium-income households—good architecture, urban design and energy efficiency.

In terms of mobility, **the city prioritises smart solutions with walking, cycling and public transport, substantially reducing car ownership.** To further reduce reliance on fossil fuels, **the city relies on green heating power for high energy efficiency, reduced CO_2 emissions and lower energy bills.** All the buildings in HafenCity must be connected to two district heating networks, for example. Compared to a conventional fossil fuel heat supply, by 2028, a minimum of 75,000 tonnes of CO_2 will be saved. For each subsequent year, an additional 12,000 tonnes will be saved.

If that wasn't enough, **the city also developed Germany's first cradle-to-cradle design residential project, the Moringa project.**[60] It is the healthiest high-rise building to ever have been constructed in Germany, with half the materials used coming from secondary sources and boasting maximal green space. Hamburg embeds sustainable design throughout the city, **requiring all renovation and new building projects to have eco-labels certifying environmental sustainability in construction.** The DNG special aware label, launched in 2022, is focused on circular construction methods: the use of regenerative raw materials such as timber and clay, carbon-reduced steel, recycled building materials and modular or reduced-concrete construction methods. It also places an important focus on the documentation of the materials used and their separability during deconstruction to favour their recycling and reuse potential.[61]

The project is set to be completed by 2030, at which time HafenCity will house 15,000 residents, 5,000 students and create up to 45,000 jobs. HafenCity is a model for other cities implementing circular and socially sustainable development concepts. The setup of HafenCity Hamburg GmbH as an autonomous subsidiary helped to avoid cumbersome and lengthy planning processes and red tape. The ambitious tendering process has allowed both the city and its stakeholders to achieve their objectives, creating a diversified urban and social fabric while upholding strong standards for reusing what existed by applying eco-design principles.

SYSTEM TWO: ADVANCE CIRCULAR MANUFACTURING

What could circular manufacturing look like in *Shift* countries?

In a circular future, Shift countries have embraced a shift in values that has redefined their relationship with the material world. Here, consumption is guided by an appreciation for nature and its resources, with consumerism a thing of the past. Schools pass this ethos on to younger generations, who are taught to care for and repair their belongings from primary education, while advertising extols the charm of the well-used over the allure of the new. Consuming less but cherishing more, Shift societies enjoy lifestyles marked by quality and connection rather than quantity and consumption.

Consumer goods are made to last, too: fast fashion is replaced by durable, easy-to-mend and recyclable clothing, while electronics are designed for repairability and upgradability, with robust 'right to repair' laws ensuring access to parts and services. Businesses play a positive role in society by offering services like repair, rental and second-hand sales, with take-back schemes making it simple to give their products a second life. Instead of tossing their items at end-of-use, citizens also swap, share or upcycle their clothing, electronics, furniture and appliances. This is all backed by supportive government policies and community-based initiatives—such as clothing banks, tool 'libraries' and repair cafés—that make circular behaviour as convenient as possible.

In this circular future, workers in the manufacturing sector have been well prepared for changes in their job profiles, and are increasingly trained in upgrading, repairing, refurbishing and remanufacturing products, as well as how to market and sell services as well as products. Jobs in recycling, reverse logistics and secondary markets have also risen, as well as good quality jobs in service sectors.

How can we unlock this vision in *Shift* countries?

Shift countries need to scale down socially unnecessary production and consumption and focus on activities that uphold wellbeing. Curbing overconsumption will require a comprehensive mix of policy instruments to inspire action, reduce existing barriers and shift mindsets. The keys to unlocking this vision include, but are not limited to:

CREATING A LEVEL POLICY PLAYING FIELD

Encourage products to be designed for circularity: durable, and easy to reuse, repair and recycle

Constructing an ecosystem of complementary and supporting regulations is crucial to the wide scale adoption of circular business models and to encourage the uptake of new ownership models, such as Product-as-a-Service and Peer-to-Peer product-sharing platforms.[62]

- **Strengthen universal Right to Repair legislation and Extended Producer Responsibility,**[63] which require manufacturers to provide spare parts, tools and repair manuals to their customers and repair shops. Ensure legislation puts repair before replacement, provides data for the open-source production of spare parts and removes software barriers to repair.[64]
- **Set standards for material efficiency and product durability,** especially for electronics and appliances. Prohibit planned obsolescence and incentivise repair, recycling and reuse to extend product lifetimes. This could also be extended to include **setting targets for material use reduction** that progressively and rapidly decline until sustainable levels are reached at the needed speed, scope and scale, and **banning the destruction of unsold or returned goods**, banning waste exports and introducing liability for waste export violations to lessen waste generation. **Require regular maintenance for goods**—such as capital equipment—to ensure value is retained for as long as possible.

GETTING THE ECONOMICS RIGHT

Use pricing and convenience to nudge people toward sufficiency lifestyles

Pricing and convenience help people make better choices. Making circular products and services more affordable and cost-effective is crucial to encourage consumers to adopt less materialistic lifestyles and more sustainable consumption patterns, making the transition to a sufficiency-centred lifestyle both feasible and attractive.

- **Stimulate demand-oriented shifts** that encourage lifestyle changes and reduce barriers to repairing, refurbishing, remanufacturing and recycling products, both for consumers and industries. This could include developing an **environmental 'score' for all products to be included on labels,** and **banning the advertising of high-impact goods and services,** from fast fashion to air travel. This could be realised in a variety of ways such as restricting advertising in public places and to children or establishing commercial-free zones and times.
- **Apply more progressive taxation and heavier inheritance and wealth taxes** to curb excessive wealth and income inequality and reduce the overconsumption of luxury goods.[65]
- **Provide consumers with financial incentives** such as bonus cheques, or reduced or zero tax on repair services and refurbished goods, that allow them to easily repair their goods or shop second-hand.[66] These incentives could be quite targeted towards specific consumer goods like fast-fashion and electronics.
- **Governments may also consider taxing material extraction rather than labour.**[67] This would require broad stakeholder engagement between actors in academia, the private sector and financial institutions to support research and scale pilot projects that advance 'true cost' pricing.[68]

BUILDING CIRCULAR EXPERTISE AND SKILLS

Foster a cultural shift where sustainability is the norm and sufficiency mindsets prevail

Ultimately, the entrenchment of consumerism and linear production-consumption patterns in contemporary culture and social norms underscores the necessity of a paradigm shift, where values, attitudes and behaviours are realigned to embrace circularity and sufficiency.

- **Invest in and use just transition funds to invest in skills development, education and training.**[69] In particular, support regions with historically extraction-focused economies in (re)training their workers and youth to prepare them for a circular future. Public education should also be shaped so that necessary skills, knowledge, and problem-solving abilities are embedded in all forms of education. This will serve to influence both career choices and consumer behaviour.
- **Roll out Job Guarantees** and explore reducing the standard work week to gradually break the 'work and spend' cycle and foster a less materialistic, more relational and participatory society. Promote Job Guarantee programmes as a way of increasing green jobs while reducing unemployment, poverty and income inequality.[70, 71] Support social dialogue as a way of improving workers' rights and acquiring better and safe working conditions within green sectors.[72]
- **Roll out awareness-raising campaigns to overcome cultural barriers** to a more circular lifestyle. Encourage the practical realisation of such lifestyles by funding awareness campaigns, responsible advertising and other interventions that promote more sustainable choices and reduce stigma related to prolonging the life of or sharing consumer goods.

> The cost of production is deformed, we are not seeing prices reflect the true costs of new goods. True fiscal integrity means breaking taboos; let's shape a system where the cost of new goods is transparent, and repair is more appealing than replacing, including through fiscal incentives.
>
> **Cristina Ganapini**, The Restart Project

POLICY—SUCH AS THE EU'S RIGHT TO REPAIR LEGISLATION—CAN BE LEVERAGED TO MAKE REPAIR THE NEW NORMAL.

The current status quo: products that are made to break and are not easily repairable. Now, it's difficult for consumers to do anything other than trading their broken goods for brand new ones: repair processes are costly and complex, and the artificially low prices of new products make them the more financially attractive option. This produces mountains of waste: electronic waste (e-waste), for example, is the EU's fastest-growing waste stream—and less than 40% of it is currently recycled.[73] On a global scale, emissions from e-waste grew by more than 50% between 2014 and 2020—a figure expected to swell to new heights without targeted intervention.[74]

The EU, however, is tackling this, with considerable progress over the last decade. Due to active lobbying efforts from advocacy groups and EU Member States themselves, Right to Repair legislation is emerging: the current Proposal for a directive on common rules promoting the repair of goods, for example, as well as amendments to other regulations and directives[75, 76, 77] that **prioritise repair as a remedy for non-conforming products,** so long as it's more affordable than product replacement. The Proposal aims to facilitate this by **ensuring consumers are up-to-date on producers' repair obligations, setting up online repair platforms for nations to matchmake consumers with retailers and repair services,** and **determining a European-wide quality standard for repairs.**

It's expected that repair will become increasingly easy and attractive for consumers, resulting in cost savings of around €176.5 billion over 15 years—or around €25 per person per year.[78] Social gains are also expected for EU repair businesses: sales for the sector will largely apply to small- and medium-sized enterprises and social enterprises, generating quality jobs across the region.[79] Environmental impacts are also expected to be significant, with the Proposal **expected to save 18.4 million tonnes of CO_2 over 15 years**—equivalent to the emissions generated by a year's worth of energy use for 2.1 million homes. While the Proposal has yet to be approved, its impact could be favourable—despite concerns relating to software barriers, the scope of the legal guarantee and the affordability of spare parts, considerations currently not addressed in the directive's text.

Individual Member States are already taking this a step further, rolling out a range of policy tools to make repair the new normal: Sweden, for example, has cut VAT rates for repair, while Austria, Germany and France now offer repair bonuses—partial reimbursement for consumers that take this route. In Graz, Austria, both commercial and community repair initiatives are supported, with Repair Cafés eligible for yearly funding, while repair bonus funding in Upper Austria saved around 260 tonnes of e-waste between September and December 2019 alone.[80] France has also rolled out a repairability index for five categories of electronic devices,[81] informing consumers on their options prior to purchase. A mix of both hard regulatory tools—such as those targeting manufacturers—and softer instruments that tackle cultural barriers and shift consumer attitudes is proving remarkably effective: a range of policies are needed to promote repair as the way forward.

5

CIRCULARITY IN *GROW* COUNTRIES

STABILISE MATERIAL CONSUMPTION AND SAFEGUARD WELLBEING

SETTING THE SCENE

Many Grow countries are manufacturing hubs with increasingly well-trained and educated workforces and extractive industries organised around their natural resource endowments. Their economies are characterised by rapid growth and expansion to more diversified economic structures with growing service and industrial sectors. They are also characterised by increasing trade and global market integration, improved infrastructure and a growing middle class. These countries have benefited from globalisation by becoming important links in global supply chains, especially in labour-intensive sectors like textiles, electronics, automobile manufacturing and other resource-intensive industries like steel. They represent an increasing share of global economic output and are developing fast. That being said, their economic structure is mired by 'second-generation' development challenges such as increasing competitiveness pressures, unsustainable urban development dynamics, ageing populations, rising social inequality and related disparities, stoking social discontent and lifestyle diseases.

Today, many of these nations are rapidly transforming from low-cost production centres to hubs of innovation and high-value-added manufacturing. They offer a combination of cost-competitive labour, improved technical capabilities and strategic geographic locations, making them attractive for domestic manufacturing and foreign direct investment. Their growth is supported by investments in education, research and development, and technology adoption. In particular, digital transformation—also known as Industry 4.0—is gaining momentum in *Grow* countries. Technologies like the Internet of Things (IoT), AI, robotics, 3D printing and data analytics are being increasingly adopted to improve efficiency, flexibility and product quality. Ultimately, inclusive and sustainable growth and development in these countries provides positive spillovers across the global economy regarding poverty reduction, sustainable livelihoods, financial stability and cross-border global issues such as climate change, energy, food and water security, and international trade.

SYSTEM ONE: NURTURE A CIRCULAR FOOD SYSTEM

What could a circular food system look like in *Grow* countries?

In the heartlands of *Grow* countries, we can imagine a new era of agriculture that merges traditional wisdom with innovation and food production with stewardship over ecosystems. Where fast food, unhealthy diets and food waste were once rising, these countries could champion regenerative agriculture centred on people and the planet.

In this new system, fields are no longer vast monocultures but rather host diverse polycultures that nurture soil, maintain local biodiversity, and yield abundant local and seasonal foods. Industrial farms have adopted regenerative practices, and ecosystems are regenerated at scale. Protein production has been reimagined at scale, providing a greater range of plant-based options and greatly reducing the level of industrially reared livestock. This has had a tremendously positive impact on the environment, climate and public health. Meanwhile, the workforce has been well-equipped with the relevant skills to support this transition. Beyond the fields, a network of local processing units and markets thrives. These hubs prioritise minimal processing, ensuring the nutritional value of food is retained while providing employment to many. These hubs also act as centres of innovation, pioneering techniques to reduce food loss and transform waste.

What's more, the narrative around consumption would shift dramatically. Urban and rural communities savour predominantly local, seasonal and organic diets. Meals have become a celebration of regional flavours, supported by educational campaigns underscoring their health benefits. The public health landscape has been transformed. With diets rich in diverse, organic and fresh ingredients, illnesses such as diabetes and obesity have drastically declined. Moreover, the emphasis on local and seasonal foods means that food loss, emissions and environmental impacts are all far lower. In this vision of the future, the circle of life is truly complete: the circular food system in *Grow* countries nurtures nature, and nature, in turn, provides nourishment that holistically sustains communities.

How can we unlock this vision in Grow countries?

We imagine a resilient, climate-smart and nature-positive food system that nurtures Grow countries' communities and ecosystems based on legislation that is integrated, tailored and aligned with other policies.[82] The keys to unlocking this vision include, but are not limited to:

CREATING A LEVEL POLICY PLAYING FIELD

Roll out an integrated policy mix to encourage nutritious choices and cut food waste

Implement an integrated policy mix to encourage sustainable food consumption based on nutritional content and environmental impact[83] and to prevent and valorise food loss and waste across all stages of production and consumption.[84, 85] Household income growth is often followed by rising consumption of high-impact foods and increased volumes of food loss and waste. Policy, finance and public communication tools can create structural incentives for consumers to choose nutritious and low-impact options over the long term, and minimise and valorise food loss and waste.

- **Roll out effective market-based incentives** tailored to consumers that make healthy and sustainable foods the preferred option. This could mean taxes on high-impact food products, within a broader redesign of taxation so that poverty and inequality are not exacerbated. **Set mandatory public procurement standards**—for example, for local, organic, or more plant-based food and beverages—to facilitate market access and create a stable market for these products, and trigger wider societal behavioural changes.
- **Create an effective regulatory environment,** including **advertising sales bans** on certain high-impact food products that threaten human and planetary health—especially ones directed at children or placed in public spaces such as hospitals. **Make food waste reporting compulsory** and strengthen stakeholder cooperation to improve the tracking of food losses across the value chain. This can include **introducing mandatory legal requirements for strong food waste reduction targets** and supporting processes as high as possible in the food waste hierarchy, such as prevention and reuse.
- **Use information-based incentives,** such as food labels with information about food products' environmental and social impact. **Strengthen education and raise awareness** with effective public information campaigns to demonstrate the benefits of sustainable agriculture, to subtly but effectively shift conceptions around meat or 'Western' diets as inspirational and high status among the population. **Identify and communicate the added value of prevention measures** to various value chain actors.

Use policy to ensure that financial institutions invest in regenerative farming and circular food

The right investment tools and practices must be developed to allow for broad investment in regenerative farming and circular food companies implementing circular solutions across the agricultural value chain. Financial institutions are instrumental in driving the economic viability of different business models and can thus directly influence producers to develop responsible and transparent supply chains and prioritise investments in sustainable agricultural companies.

- **Policymakers can ensure that the financial regulatory environment supports** long-term transformation by introducing transparency requirements. This will help ensure that **companies' lobbying activities** comply with their public statements, and contribute to **fully traceable supply chains** where companies are responsible for upholding strict sustainability standards and human and labour rights across. These frameworks can ensure that investors can't capture short-term gains while escaping long-term costs by redirecting capital from intensive, industrial practices (such as animal farming) to more sustainable ones (such as alternative protein production).
- **Financial institutions can shift capital** toward regenerative agriculture, alternative protein and food waste upcycling companies, while actively encouraging investee companies to adopt such methods. They can also **set clear processes** for portfolio assessment, monitoring and reporting to maintain transparency and accountability, and implement robust monitoring systems to detect harmful practices such as deforestation and high methane emissions. They can also **divest** from companies with evidence of negative environmental or social impacts, while **ensuring rigorous due diligence** to differentiate genuine sustainable practices from greenwashing.[86]

GETTING THE ECONOMICS RIGHT

Restructure economic incentives and regulations to prioritise regenerative farming models and holistic land management practices

Regenerative farming remains a difficult model to bring to the mainstream due to, partly, a lack of alignment around the definitions and distorted economic signals expressed by prices that don't reflect the true environmental and social costs of mainstream agricultural practices. Designing agricultural policies in support of regenerative approaches and progressively shifting funds, pricing models and subsidies could structurally change the playing field and drive transformation.[87, 88]

- **Ensure a true price for sustainable food** that fully reflects the social and environmental impacts so that products of regenerative and sustainable farming are competitive and attractive. **Aligning price signals and shifting fiscal incentives** away from heavily polluting practices could encourage farmers to place longer-term investments in sustainable practices that are demonstrated to enhance soil health, reduce synthetic fertiliser and pesticide use, cut water use and enhance biodiversity, for example. **Direct subsidies away from industrial agriculture** and towards supporting farmers' incomes and sustainable solutions, such as solar-powered irrigation, organic nutrients for soil and integrated pest-management solutions.
- **Establish fact-based regulatory frameworks** tailored to particular farming systems and regions to support the roll out of carefully implemented agroecological approaches and regenerative practices, such as increasing biomass cycling and the nutrient balance while promoting the biodiversity of systems.[89] Governments can enable these practices and ensure **efficient approval processes, certifications, labels and accessible intellectual property** to secure farmers' access and control over natural and other productive resources. This will also help them scale up technologies and reduce costs, making sustainable products such as alternative protein production more accessible.

BUILDING CIRCULAR EXPERTISE AND SKILLS

Empower and protect farmers engaged in regenerative agricultural practices

Many communities rely heavily on agriculture for their economic well-being and require assistance and protection as they transition. Farmers who feel secure in their transition process are more likely to embrace innovative and sustainable farming methods. In addition to access to finance, it is important to ensure farmers have access to avenues to reskill and upskill and transition towards more sustainable farming practices.

- **Create just transition funds** to de-risk and enable changes in farming practices, supplying farmers with the tools and knowledge they need to convert their farms. This could specifically include transition payments to reduce risk aversion, and access to lower interest rates and insurance products that protect farmers from extreme weather events, crop failure, or other unexpected damages. This will provide farmers with the safety net needed to transition to more regenerative practices or compensate them appropriately if they decide to retire or change career path. Capacity-building, training and reskilling programmes will also be crucial to upskill and leverage existing regenerative practices.

> Today, more than ever, social dialogue should be integral to our policy efforts to a just transition towards environmental sustainability and the circular economy.
>
> **Elisenda Estruch Puertas**, International Labour Organization

COCOAACTION BRASIL USES REGENERATIVE FARMING TO EMPOWER SMALL-SCALE COCOA FARMERS AND POSITIVELY IMPACT COCOA PRODUCTION SYSTEMS.

While multinational corporations control much of the sale and profits of the world's chocolate, the majority of the world's cocoa beans are grown on small farms in the Global South. When it comes to producing cocoa sustainably and ethically, farmers often lack the technical knowledge and resources to implement such practices.[90] This is the case in Brazil—the sixth largest producer of cocoa on the planet—where upwards of 95,000 growers produce cocoa.[91] To promote sustainability with a focus on the grower, **CocoaAction Brasil, a comprehensive public-private pre-competitive initiative,** launched in 2018.

CocoaAction Brasil works with value chain partners to align and develop the cocoa chain and promote knowledge exchange and synergies with existing work, giving special attention to sustainability. The initiative enables value chain partners to do so in four key ways: 1) **working with producers** to increase yield and quality and improve farm management; 2) **working with communities** to strengthen working conditions, youth and gendered work, and labour unions; 3) **working with the government** on reforestation, agroforestry and land conservation; and 4) **working across the value chain** to increase access to funding and land regulation, information management and governance.

In working with policymakers, CocoaAction Brasil has supported the publication of the *Normative Instructions of Pará and Rondônia* (two northern Brazilian states), which enable the recovery of legal reserves through cocoa cultivation in agroforestry systems. It has further revised Ordinances in the Bahia and Espírito Santo states that regulate the management of the *cabruca* cocoa cultivation system and reinforce its relevance to the preservation of the Atlantic Forest. It also contributed to improving the *Plano Safra (Crop Plan) 2021–2022*, based on submissions from stakeholders and advocacy with the Ministry of Economy. These measures generate **socio-environmental benefits, generate income for families and stimulate biodiversity conservation.**

CocoaAction Brasil also worked to **increase small growers' access to credit** between 2017 and 2021 by 240% through multiple initiatives. For one, it coordinated *GT Crédito*, a working group that specifically addresses credit in the cocoa chain, linked with the Cocoa and Agroforestry Systems Sectoral Chamber of the Ministry of Agriculture, Livestock and Food Supply. It obtained the inclusion of rural residents in the *Pronaf Floresta* credit line and cocoa grown in agroforestry systems in the *Pronaf Bioeconomia* credit line. Finally, in partnership with the International Labour Organisation, CocoaAction Brasil **involved more than 50 entities of the public and private sectors and civil society** to produce the *Cacau 2030 Strategic Guidelines*, a set of guiding actions for the sustainable development of cocoa production focused on decent labour and better living conditions.

One company that has directly benefited from CocoaAction Brasil's initiatives is Dengo Chocolates—a sustainable and ethical chocolate company based in the Brazilian state of Bahia. Dengo encourages organic cocoa, regenerative agriculture and agroforestry with 100% of the brand's cocoa coming from **traditional agroforestry systems** known as *cabruca*. For its chocolate production, **the company only purchases cocoa from local producers,** and farmers receive more for the product they deliver—with Dengo paying a premium of up to 160% of the market value for high-quality cocoa beans.[92]

Dengo has found success and made a major impact on local communities by **connecting small- and medium-scale farmers who are interested in creating a high-quality product,** thus establishing a network of local farmers for the mass production of chocolate. The network follows the cultivation process set out by Dengo to achieve the best possible cocoa. The company provides **free technical consultancy and access to knowledge** about harvesting, fermenting and drying cocoa beans. Today, the network consists of around 200 families of farmers and **a part of the company's profits are shared** with these farmers.

To date, Dengo boasts 100% student attendance, while 38% of its in-network farmers earn above the minimum living wage and 45% have access to credit. To further embed sustainability into its products, 34% of Dengo's products are sold in bulk, packaging is just 7% plastic and entirely recyclable. Some packaging is even made from cocoa-based paper using production by-products. By designing its products sustainably and tapping into traditional cabruca agroforestry methods, **the company has preserved 20 hectares of Brazilian forest.**[93]

SYSTEM TWO: ADVANCE CIRCULAR MANUFACTURING

What could a circular manufacturing system look like in *Grow* countries?

Circular manufacturing systems in *Grow* countries have the potential to intertwine economic, environmental and social elements in a way that fundamentally reshapes the fabric of society. Central to this vision is the design phase of products, which prioritises their entire lifecycle and focuses on qualities like durability and modularity. This shift can open the door for many skilled job opportunities, from design engineers specialising in sustainable materials to technicians trained in product repair and remanufacture, heralding a resurgence of craftsmanship and localised industries.

Meanwhile, domestic and international trade evolves to prioritise exchanging sustainable and circular products, components and services. This reimagined trade ecosystem values transparency, ensuring products crossing borders meet stringent sustainability and ethical labour standards. Ultimately, justice and equity lie at the heart of this transition. Recognising that the shift to circularity might present challenges—especially for those in extractive industries and waste management—policies and support systems have been put in place.

In this adjusted system, industrial clusters, hubs and parks are strategically localised to capitalise on synergies between sectors. Raw materials are chosen for their quality and social and environmental footprints, emphasising sustainable and recycled inputs. This focus can spur a renaissance in local industries that recover, process and recycle materials, strengthening regional supply chains and promoting fair trade practices. Instead of becoming victims of obsolescence, local manufacturers become invaluable nodes in a resilient, interdependent network. Along with production, consumption in this new paradigm is about conscious choices. People embrace making their products last, leading to a greater demand for maintenance and repair services. This will lengthen product lifetimes and increase demand for Vocational Education and Training (VET), equipping individuals with the skills needed for a circular economy. Through these comprehensive measures, *Grow* countries can craft fair, prosperous, and sustainable futures.

How can we unlock this vision in *Grow* countries?

Our circular vision for manufacturing in *Grow* countries will require a comprehensive policy mix to decarbonise and make industrial processes more circular.[94] Policies should manage both supply and demand, embracing 'push' and 'pull' measures, complemented by emphasis on knowledge flows and technology transfers. The keys to unlocking this vision include, but are not limited to:

CREATING A LEVEL POLICY PLAYING FIELD

Remove barriers to scaling circular manufacturing with clear and mandatory targets and aligned incentives

Mandatory environmental impact reduction targets and policy incentives that promote innovative circular production processes can ensure that systems are optimised to reduce total material demand and save energy. Creating clear targets and aligning incentives for producers can overcome one of the core barriers to sustainable manufacturing, which is the ease and cost-effectiveness for companies to pollute and not incur cost or liability.

- **Introduce policy measures**—including **technology or performance requirements**—that impose and enforce public bans and limits on pollution. Or, develop legislation that mandates ambitious Extended Producer Responsibility schemes[95] or requires a **minimum amount of recovered materials for all new production** to cut resource depletion, waste generation and air pollution, while minimising rebound effects.
- **Create economic incentives via pull mechanisms,** by properly taxing material- and carbon-intensive production and trade, and rolling out subsidies to encourage energy-efficient production and appropriate pricing of common resources.[96] This will serve to promote material cycling, extend product lifetimes and improve material and value retention, substitution and efficiency.
- **Integrate clusters and eco-industrial parks, and hubs into national policy frameworks** such as development plans and national industrial strategies to foster industrial symbiosis and decarbonisation, especially in resource-intensive sectors like metals, cement, chemicals and paper.[97]

Ensure policy alignment to support industrial transitions

This means, for example, ensuring environmental impact reduction targets (alongside others) are supported by labour and education policies that can create demand for the occupations and skills needed to deliver on these goals.

- **Take an ambitious, mission-oriented approach to industrial policy** that directs investments towards maximising public-value creation and people's wellbeing within ecological limits.[98] To this end, **governments can directly invest in developing and adopting advanced technology** via subsidies and direct investment support schemes, such as **investment funds** and **public or private grants**, to boost research and development into alternative materials to reduce upfront costs and risks.
- **Scale eco-industrial parks** via public-private partnerships with centralised management to effectively plan and coordinate services, including the maintenance of a data system that can optimise resource-use and pollution control systems. **Invest in common infrastructure,** such as district steam, water management, heat neatworks, and energy, transport and digital facilities to enable high-value industrial symbiosis that minimises waste generation and pollution. **Promote collaboration between local academia and research institutions and companies** to deliver the necessary technologies and innovation to meet the desired outcomes of an inclusive circular economy transition in the manufacturing sector.

GETTING THE ECONOMICS RIGHT

Direct significant capital investments and promote technology transfers to increase access to and help scale up innovative green and clean tech that delivers cost savings, drives down material demand and reduces pollution

A range of barriers severely constrain the ability of Grow countries to access and disseminate affordable technologies that are essential for environmental and climate objectives, such as: high costs related to licensing fees and technology prices, limited access due to overly protective patent restrictions and monopolistic business dynamics, and innovation barriers preventing knowledge sharing.

- **Develop policies to overcome barriers to access** and facilitate the transfer of cleaner technology. For instance, **waivers to Intellectual Property Rights** can be introduced to improve access to technology that helps facilitate deep electrification and leapfrogging to circular industrial activities, such as green hydrogen. This is particularly relevant for hard-to-abate industries such as steel and cement production. Shift countries can, via multilateral agreements, **legislate, regulate, incentivise and compel multilateral corporations** to enter into agreements with companies or governments to revise intellectual property laws to introduce more flexibility and thus enable the rapid deployment of technologies that *Grow* countries need, but currently can't access.
- **Ensure investments integrate social requirements** made on the basis of sound socioeconomic indicators, to ensure socioeconomic benefits are promoted and externalities are mitigated or prevented where possible. This should include a strong focus on decent work and occupational health and safety, where existing circular economy activities in these countries involve precious and unsafe work. Where investments and support policies work to leverage or scale these existing practices, it heightens the need to address working conditions and the social protection system needed to support working particularly in growing and emerging industries.

BUILDING CIRCULAR EXPERTISE AND SKILLS

Develop a forward-looking plan on sustainable skills development for the jobs of tomorrow

Grow countries must navigate a rapidly changing landscape of technological development throughout the manufacturing sector. A significant factor for success will be to properly educate and train people to master the skills for the economy of tomorrow. This must be done in a holistic way to ensure that vulnerable groups are included in this transition and society as a whole can benefit from decent work opportunities.

- **Invest in skills development programmes with particular focus on workers vulnerable to the transition.** Reskilling and upskilling can help workers be reallocated to jobs within the

same occupations in growing industries, while professional training can support workers in declining industries move into new sectors. Retraining and empowering workers to understand principles of sustainable industry, such as Industry 4.0, automation and additive manufacturing will be key to supporting workers in *Grow* countries. This must be underpinned by effective social dialogue between governments, employers' and workers' organisations, which can ensure that the provision of skills development meets demand and those most at risk.

- **Set up systems for identifying and anticipating skills needs and mapping skills needs across the entire value chain.** Conduct a detailed empirical analysis of emerging green skill demands on country and regional levels with an analysis of the available skill supply to identify skills gaps within and across partner countries. Formulate strategies for closing these gaps through skills development policies and other interventions.
- **Encourage exchanges between VET institutions and industry** so that VET educators can update their knowledge and ensure their offerings meet new industry demands. Support trainers in firms to update and formalise their teaching skills across disciplines. This can further strengthen bridges between education and the world of work, and leverage the knowledge and skills held by entrepreneurs working both in the formal and informal sectors.
- **Promote social dialogue and partnership in planning, designing and implementing national and sectoral policies** for the just transition. The inclusion of all relevant stakeholders—including workers—will be key to ensure that decent work and social conditions are embedded within just transition policies and within curricula to upskill workers and their employers on safe ways of working in the circular economy.

> Even with a will to reuse, many companies find themselves handcuffed by the absence of the right infrastructure, knowledge or technological prowess.
>
> **Paula Peláez**, IDB Invest

CHINA'S MANUFACTURING SECTOR IS BEING UPGRADED THROUGH AN ECO-INDUSTRIAL PARK PROGRAMME, INDUSTRIAL SYMBIOSIS AND REMANUFACTURING.

China's high-speed economic development has secured its status as a global industrial powerhouse. While there are many socioeconomic benefits to rapid growth, the increased concentration of industrial activity has come at a very high cost to the environment: pollution, waste generation and ecosystem degradation, to name a few.[99] China's industrial parks account for **over two-thirds of the nation's energy consumption and GHG emissions.** To alleviate the negative environmental impacts of its manufacturing sector, China has adopted the concept of an 'ecological civilisation'—a system of development and governance based on the principles of environmental management, ecological restoration and green development.[100]

China's '**ecological civilisation**' consists of a set of initiatives based on enhanced sustainable production and consumption, superior environmental and ecological planning for both urban and rural regions, and an industrial ecology that champions a comprehensive circular economy with a zero-waste approach.[101] Within this context, China initiated its eco-industrial parks (EIPs) programme in 2001. EIPs are strategically designed as a blueprint for industrial clustering and transformation based on clean production mandates, and circular economy and industrial ecology principles. By 2021, the number of established EIPs had reached 55, up from just one in 2008, while another 52 are now underway.[102]

China has been successful in transforming its industrial sector due in large part to three major factors: **governmental frameworks and technical guidance, manufacturing prowess and strategic blueprints,** and **local governance and academic synergy.** In terms of governmental frameworks and technical guidance, sustainability was heralded as a priority at the national level, resulting in an array of policies, incentives and regulations that bolstered industrial clustering and transformation via eco-industrial parks and activities such as industrial symbiosis and remanufacturing.[103] The environmental governance system was modernised to ensure that standardisations, monitoring and innovation incentives rendered operational harmony across industries.

The manufacturing prowess and strategic blueprints of China's EIPs further lent themselves to the creation of a more circular industrial sector. The sheer scale of its manufacturing provided a unique platform where industries could naturally form symbiotic relationships. The parks' designs were inherently strategic, ensuring industrial clustering and transformation so that neighbouring industries could share resources, thereby reducing costs and logistics-related constraints, for example. Finally, local governments played a crucial role, adapting national guidelines to fit local contexts and providing requisite incentives. Meanwhile, local academic institutions and industries joined forces, honing technological and process innovations and fostering a relationship of ongoing research and development.[104, 105]

Looking at China's journey, it is important to note that while the nation blazed substantial trails in championing industrial sustainability, the path will never be obstacle-free. For example, concerns remain around total resource use and lacking social impact research.[106] The number of EIPs in China is also limited compared to traditional industrial parks and zones and their type and size varies considerably. Nevertheless, EIPs reduce virgin resource use, emissions and waste generation compared to traditional industrial parks and zones.[107, 108] EIPs have also been proven to drive innovation, attract human and financial capital, produce technology spillovers and positively impact surrounding areas.[109] Other *Grow* countries can extract valuable lessons from China's successful strategies and apply best practices within their own economies to chart their sustainable industrial trajectories.

6

CIRCULARITY IN *BUILD* COUNTRIES

INCREASE MATERIAL CONSUMPTION TO SECURE WELLBEING

SETTING THE SCENE

Build nations boast rapidly expanding economies, vast populations and abundant natural resources—and consequently hold substantial potential to drive the transition towards a circular economy. However, Build countries also grapple with a set of multifaceted constraints emanating from international trade dynamics and the overarching international financial architecture.[110] As a result, these economies are often relegated to exporting raw materials or low-value-added products to Shift countries, not only restricting their ability to climb the economic value chain but also having profound negative environmental and social impacts.[111]

Thus, many low-income countries must balance the urgent need to improve living standards and reduce poverty while addressing pressing environmental issues. These nations need more resources and face competing demands for investment in critical sectors like healthcare, education and infrastructure. With large—and growing—populations, *Build* countries also face high levels of youth unemployment and underemployment. Many workers are employed in the informal economy: on one hand, this is often characterised by necessity-driven value-retaining practices for materials and goods, but it is also associated with precarious employment, and limited or absent social protection and collective bargaining schemes. Women tend to be over-represented in informal and vulnerable employment as they continue to face various barriers to accessing formal jobs. Gender wage gaps persist within *Build* countries' labour markets, and specific segments of marginalised groups within society tend to face inequities such as discrimination and limited access to social protection.

Looking ahead, *Build* countries should leverage circular practices that have long been present in their communities, as well as knowledge rooted in Indigenous groups. But they will also need to invest in new technologies and practices that allow for sustainable human development, particularly in material-intensive industries like food, energy and construction. This will require access to technology and know-how, significant financial resources and human capital to ensure proper implementation and scaling. This poses an acute risk to *Build* nations: a debt burden far beyond their ability to shoulder alone. With this in mind, the Paris Agreement emphasises the need for global cooperation, with wealthier countries providing support to lower-income *Build* countries in the form of financial resources, technology transfer and capacity-building. This is essential to aid their efforts in mitigating and (crucially) adapting to climate change.

SYSTEM ONE: NURTURE A CIRCULAR FOOD SYSTEM

What could a circular food system look like in *Build* countries?

Agricultural workers in *Build* countries face challenges like never before, from climate-change-induced droughts and floods to financial crises, conflicts and pandemics. They also tend to be in the bottom 40% based on income, putting them in a vulnerable position. A circular food system—built on the cornerstones of wellbeing and resilience—can usher in a new normal.

In a circular food system, **regenerative** practices are the norm: techniques like cover cropping, agroforestry and holistic grazing are applied at scale to nourish soil, sequester carbon and enhance biodiversity. Farmers have access to both cutting-edge technologies and high-quality inputs as well as the knowledge and support necessary to use them, allowing them to farm their land to the benefit of people and planet. Substantial investment in education—especially in rural areas—results in a well-trained agricultural workforce with abundant regenerative and circular knowledge. Thanks to **circular** practices, such as a diverse rotation of local crops and livestock, as well as techniques that boost production with minimal artificial fertilisers, food is organic, seasonal and highly nutritious. All packaging is reusable and compostable, helping cut waste throughout the value chain. Unavoidable biomass waste—surplus food and crop residues, for example—is minimised by valorising and cascading to its maximum value. This includes composting so crucial nutrients return to the soil, developing high-value products or converting it into bioenergy to sustainably power local communities.

A circular food system feeds into wellbeing, too: local markets, cooperatives and farm-to-table initiatives connect farmers with the people they feed, ensuring their access to fresh, sustainably-grown food while securing fair wages for farmers and access to land, and bringing more equitable opportunities for women. Education and cultural events are used to cultivate a deeper appreciation for farmers and the land they work, and promote food literacy and traditional culinary practices. A circular food system ensures more than sustainability—it nurtures nutrition and a deeply-rooted sense of community, preserving cultural heritage and encouraging stewardship for the Earth.

How can we unlock this vision in *Build* countries?

We envision a future where food is not just a commodity but a vital source of life and community. Unlocking this vision, however, will require action throughout the value chain; this includes the fair pricing of regenerative practices and products, strategic investments, supportive policies and community-led initiatives. The keys to unlocking this vision include, but are not limited to:

CREATING A LEVEL POLICY PLAYING FIELD

Enact policies that help unlock investment in much-needed climate mitigation and adaptation

Build countries need help to make essential investments in sustainability due to their excessive debt burden. High-income, Western creditor countries have the financial capacity, technological expertise, and global influence in global institutions to help lower-income countries unlock funds. This will be essential to advance smart material management and environmental stewardship aligned with climate change mitigation and adaptation measures, including ecosystem preservation and regeneration.

- **Implement debt relief and fair access to capital markets to national governments in *Build* countries,** such as reliable **nature-for-debt swaps**[112] and via **Green Bonds and Climate Funds.**[113] Through the reduction of sovereign debt burdens and fair and preferential access to financial markets, national governments have an increased capacity to mobilise capital towards regenerative farming, nature-based solutions and infrastructure.[114]
- **Implement efficient, stable and transparent regulatory and business frameworks** that improve how many resources and investment flow into the agricultural sector to explicitly improve environmental and social outcomes. Coupled with debt relief and cheap access to affordable capital—via low interest rates, for example—a regulatory framework that sets a clear vision for environmental and social outcomes is key to minimise investment risks and encourage efficient capital allocation.
- **Secure land rights and tenure policies** to protect smallholder farmers from land grabs, provide legal recognition for customary land rights and/or offer long-term leases. This is critical for farmers' confidence in investing in and transitioning towards long-term regenerative practices.
- **Set concrete policy targets for soil, water and biodiversity** to establish long-term strategic goals and send clear signals to market players about where to invest in the future. Clear targets would unlock significant and sustained investments from large-scale farmers and multinational corporations, encouraging the wide-scale adoption of regenerative practices. These targets should be combined with financial incentives and monitoring frameworks that can provide feedback on how to steer targets over time.

Strengthen resilience in small- and medium-scale agriculture with improved market access

This would address barriers such as a lack of access to market information, limited market access, price volatility and inadequate infrastructure. Ultimately, it could enable farmers to make more informed decisions, reach a wider market and receive fair compensation for their produce. This is crucial to enhance food security, boost farmers' income, and foster sustainable agricultural practices.

- **Promote farming cooperatives by supporting and financing aggregator models** where a central entity, such as a cooperative or social enterprise, consolidates smallholder farmers' produce and provides services such as access to finance and technical assistance. Additionally, fund 'backbone organisations'[115] that can deliver capacity-building programmes, and test and scale digital solutions. These organisations can also invest in transportation and storage infrastructure to help smallholder farmers overcome financial barriers and achieve economies of scale.
- **Update standards to help the creation of new markets** that allow for circular practices such as the use of byproducts or treatment of organic waste, for example. Ensure that this is done efficiently and safely and support businesses and individuals in adopting these practices.

GETTING THE ECONOMICS RIGHT

Enable farmers to invest in innovations to increase agricultural output and quality[116]

One of the key barriers in Build countries is farmers' lack of access to resources and formal education. By increasing access to funding, skills development, knowledge and technology, farmers can steadily scale up regenerative and sustainable models of food production.

- **Credit farmers and landowners** engaging in regenerative agriculture for the restoration and stewardship of ecosystems. For example, **reliable, high-quality carbon and biodiversity credits** can be used to incentivise practices that sequester carbon and improve soil health and biodiversity. This would give farmers who are transitioning to—or maintaining—regenerative agriculture additional income, making regenerative practices more attractive and viable over the long-term.
- **Make the transition less risky for small-scale farmers** who fundamentally lack resources by increasing their access to financial and insurance services such as grants, microfinance and smallholder loan guarantees. This makes investments in inputs like seeds and new equipment or practices that improve soil health more appealing and convenient.

BUILDING CIRCULAR EXPERTISE AND SKILLS

Ensure 'future-proof' skill-sets with training and skills pathways and recognise Indigenous, regenerative practices

Gaining the necessary knowledge and skills is a key barrier due to the vast number of people working in agriculture in *Build* countries. A proactive approach will be necessary to endow current and future generations of workers in this sector with the knowledge and practical skills needed to achieve an ambitious transformation of the food system.

- **Facilitate the transition from the informal to the formal economy for both workers and economic units.** Agriculture in *Build* countries is characterised

by high levels of informality which, in turn, is often related to low productivity and poor working conditions. Informality often acts as a barrier to accessing skills development programmes and other government support. To tackle this, create an enabling environment for the formalisation of enterprise and expand the application of labour law and social protection to employers and workers engaged in circular activities.

- **Promote knowledge transfer, training and comprehensive skills development programmes** to valorise workers' skills, and especially to help bring women into the labour market. Equipping smallholder farmers with the tools and knowledge to engage in methods such as regenerative agriculture, intercropping, mixed cropping, and more can support the shift towards a more climate-smart model of production. Workers should also be supported in developing technical and transversal skills, and cultivating new practices within their communities.[117]
- **Support a holistic curriculum for skills development and training through** a participatory method that involves all relevant stakeholders. This can ensure that existing local culture, production methods and knowledge are preserved while also promoting continuous and lifelong learning to enable workers to keep up with new innovations and technologies.
- **Establish employment-related services** that are adapted to the needs of the rural populations. These, such as labour orientation and intermediation services, can provide locally-relevant information that can help facilitate rural people and particularly rural youth's access to job opportunities, as well as agricultural support services and entrepreneurship opportunities.
- **Recognise informally learnt and practised regenerative approaches** in formal education, namely Vocational Education and Training (VET). Strive to leverage Indigenous ways of knowing and recognise them in curriculum and qualifications.
- **Establish funding for skills development initiatives** that call for the coordination of both private and public financing to promote innovation and training. Under skills development programmes, specific vulnerable groups should be targeted, such as workers in rural communities, women, migrants and informal workers.

NATIONAL STANDARDS CAN SUPPORT THE PRODUCTION OF INSECT-BASED PROTEIN TO CUT COSTS, EMISSIONS, WASTE AND MORE.

The Black Soldier Fly (BSF) offers a promising avenue to valorise food waste, cut emissions and lift **Build** residents out of poverty. Food waste poses a problem around the world: in Sub-Saharan Africa, around 125 million tonnes of organic waste is generated each year—most of which degrades in open landfills, harming human health and releasing emissions. What's more, as incomes begin to rise in *Build* countries, so do appetites for meat—but current practices associated with animal agriculture, such as land-use change to make space to grow feed crops, pose many threats to the environment.

Insect-based protein may offer an all-in-one solution. To combat the issues of food waste, land use change and the swelling cost of animal feed, the Kenya Bureau of Standards has approved three National Standards to support the production of edible insects, as well as their processed by-products. These guidelines will instruct insect farmers on how to ensure the safety of their product and meet environmental regulations, while gaining accreditations for their businesses and certificates for their products. This will allow insect-based products to be widely sold in Kenya and beyond.[118]

While these National Standards are relatively new, research shows the promising potential for impact: farmed insects, such as the BSF, make excellent livestock feed—with BSF-fed pigs reaching market weight a month earlier than their traditionally-fed counterparts. This can **cut feed costs by as much as 15%**, both benefiting farmers and reducing the land needed to grow crops for livestock consumption. One study found that—at its current rate of production—African insect farming could generate 14% of the crude protein needed to feed all the pigs, goats, fish and chickens across the continent. By converting the organic waste generated each year in Sub-Saharan Africa, insect farming has the potential to **save 86 million tonnes of CO_2e**—equivalent to removing 18 million vehicles from the road. Efficient converters, insects can transform food waste into a more useful form: with the potential to **recycle as much as 18 million tonnes of waste into fertiliser,** the BSF is a crucial pathway to greener, less polluted cities. Insect-based fertilisers have proved incredibly effective, too: maize plots treated with BSF fertiliser resulted in yields 14% higher than those treated with existing commercial organic fertilisers.

If scaled, impacts could be even larger: one 2020 study, for example, found that replacing half of the fish meal traditionally used in animal feed with insect meal could make enough fish and maize available to **feed an additional 4.8 million people** each year in Kenya alone—while **providing 33,000 additional jobs per year,** reducing poverty for an estimated 3.2 million people.[119] These results could be replicable across Africa, and may even serve to kickstart women- or youth-led agricultural ventures—as both groups are often deterred from starting their own businesses due to lacking the necessary capital.

SYSTEM TWO: BUILD A CIRCULAR BUILT ENVIRONMENT

What could a circular built environment look like in *Build* countries?

Build countries face a serious challenge: building up homes, workplaces and infrastructure for their growing populations in a way that benefits people with minimal harm to the environment. In a circular built environment, wellbeing is addressed at every corner: urban planning makes residents' lives easier through compact, walkable neighbourhoods with reliable and well-connected public transport. Owning or driving a car is far less desirable—why go to that effort when public transport is quick, cheap, safe and easy? In these neighbourhoods, air and noise pollution are drastically lower, improving residents' health, and public spaces are designed to foster connection and belonging.

Buildings are circular, too: local, sustainable materials—think wood instead of concrete, for example—are used as efficiently as possible to cut waste at every stage, from design and construction to use and eventually deconstruction. Structures are built to last, with a careful balance struck between durability and material choice at the design stage. Every building feature is designed for positive impact: walls and roofs are used to grow plants, for example, boosting biodiversity and providing natural cooling. Passive House principles are applied to all new builds to cut energy demand as much as possible and make the most of sunlight and fresh air—while excellent insulation protects from heat, cold and moisture. At the end of their lifetimes, buildings are deconstructed rather than demolished, so that every material and component—from doors and windows to wooden beams—can be used again.

Workers in the built environment value chain have seized existing and new roles and opportunities. They are fairly paid and protected from harm at work. They're equipped with the skills needed to make this a success, from knowledge of material handling and design for sustainability to technical installation and testing and machine operation. Financial resources are geared towards the necessary capital investments needed to build a circular built environment.

How can we unlock this vision in *Build* countries?

Our circular vision for *Build* countries' built environment sees cities and towns that are sustainable, resilient and livable for all social strata, offering a high quality of life while minimising environmental impact. The keys to unlocking this vision include, but are not limited to:

CREATING A LEVEL POLICY PLAYING FIELD

Cultivate a conducive policy environment for a circular built environment value chain

Build countries face challenges in enforcing building codes and standards due to lack of follow-up mechanisms and because of the prevalence of informal construction and demand for cheap housing. This can lead to subpar construction quality and inefficient material use as well as potential safety hazards.[120] A lack of policy incentives to promote circular economy practices coupled with inadequate waste management and recycling infrastructure, as well as limited technology and innovation to repurpose and reuse materials hinder the creation of a circular built environment value chain.[121]

- **Develop and implement localised, tailored and simplified building codes and set enhanced standards** that prioritise and incentivise low-tech climate-smart buildings, circular maintenance and renovation, and the use of local, renewable and secondary materials.
- **Leverage circular public procurement** to support traditional, circular building techniques and materials as well as demand for circular skills in construction by setting strict requirements on the profiles and technical expertise needed. This can stimulate local circular businesses by encouraging workforce development and local manufacturing, and can create simpler and more local supply chains.
- **Identify dominant regional waste streams** and offer guidelines on safely and effectively integrating waste into construction by converting it into building materials.
- **Ensure regulations prioritise circular practices** such as repair, renovation, retrofitting and maintenance, particularly given the high share of low-cost, low-quality and energy-inefficient buildings.

GETTING THE ECONOMICS RIGHT

Allow local governments to plan and adapt for circularity with financial and technical resources

Many cities in *Build* countries are grappling with the complexities of rapid and uncontrolled urban growth, often in informal settlements. To address these challenges, collaborative efforts that include governmental bodies, international organisations and local communities are essential to develop and implement strategies that ensure urban development is both resource-efficient, sustainable and inclusive.

- **Use development funds to directly support urban planning departments** with financial, technical and human resources to rapidly implement carefully-considered urban planning initiatives. These can include financing for capacity-building programmes and circular urban development plans for the development of resource-efficient and climate-smart public spaces, infrastructure and services, that can also make commercial developments more people-centric and resilient.
- **Provide affordable access to capital and technologies**—such as prefabrication and 3D printing—to help scale practical solutions such as plastic sand bricks. Equip facilities to transform waste into usable construction materials. Furthermore, roll out development funds to subsidise the innovation required to utilise local materials at scale for commercial buildings, as currently, international materials are trusted more and are less expensive.

BUILDING CIRCULAR EXPERTISE AND SKILLS

Facilitate labour-intensive circular building solutions with skills development and informal economy processes

The construction sector in *Build* countries is usually predominantly informal, characterised by a lack of regulation, inadequate working conditions and limited access to finance and technical expertise. Moreover, the skills and knowledge gap among professionals and workers in sustainable construction methods and material handling often hampers the integration of circular principles into design, construction and building management.

- **Establish and fund training programmes and Technical and Vocational Education and Training (TVET) courses** that equip local stakeholders with the necessary skills and knowledge to implement circular construction techniques, and improve knowledge of health and safety standards. Such programmes should make efforts to target migrant workers, who often make up a majority of construction jobs. This special focus would address the lack of expertise and develop a workforce capable of delivering circular projects.[122]
- **Design, revise and update curricula to include relevant skills** related to planning, designing, building and managing circular built environments. Embed circular economy thinking early in education to help train the next generation, and improve women's access to the labour market by identifying opportunities across the entire value chain, from design to maintenance to end-of-life. The private sector, national government and skills agencies of each country need to work together to set this direction and ensure that the provision of training matches demand.
- **Ensure community participation** by involving local workers and businesses in decision-making for construction projects, ensuring their needs and cultural values are considered, thus overcoming resistance and promoting community buy-in. **Social protection policies** can mitigate adverse impacts while supporting the transition's progression.

> Empowering ALL workers through training and upskilling is the lifeblood propelling the transition to a circular economy.
>
> **Ellen Hoeijenbos**, Netherlands Trade Union Confederation (FNV)

RWANDA'S CIRCULAR ECONOMY ACTION PLAN EMBEDS CIRCULAR PRINCIPLES INTO THE CONSTRUCTION SECTOR.

Rwanda is experiencing the second highest economic growth rate in Sub-Saharan Africa due to its booming population, an emerging middle class and increasing urbanisation. That being said, this economic upswing has brought unsustainable building practices along with it—currently, standards related to buildings' design phase do not require criteria for extended life cycles or a safe cycling of materials. Materials used for construction are largely imported, with only a minority produced locally. While it would serve the industry well to reduce its dependence on foreign imports of steel and cement—both lessening environmental impacts and building resilience—a lack of awareness and acceptance of circularity in the private sector and a lack of legal and financial incentives are preventing this.

To combat this, Rwanda's Ministry of Environment published a *Circular Economy Action Plan and Roadmap*[123] in 2023. This *Action Plan* provides a clear vision for Rwanda's construction sector: to design, construct and use buildings in alignment with circular principles and valorise construction and demolition waste (C&DW) in ways that enable high-quality reuse, recycling and recovery. The *Action Plan* outlines three priorities for the built environment in Rwanda alongside the practical solutions to make them possible.

First, a **revised national Building Code and the use of the Green Building Compliance System** should be enforced. This means including circular principles in the Rwanda Green Building Compliance System, and ensuring this system is applied to all buildings. Trainings and workshops should be held that provide clear guidance on the right application of the Building Code and the Compliance System, which could be offered to construction companies by the Green Building Organisation and the Rwanda Housing Authority. Ideally, each construction firm would have one or two in-house experts familiar with the Building Code and Compliance System, to help make circular buildings the new normal.

Second, the *Action Plan* advises that **renewable and local materials and construction types should be prioritised before exhausting non-renewable materials.** This will entail using alternative construction materials as well as more local construction types like rammed earth construction. To carry this out, vocational training and guidelines for the informal sector must be developed on how to shift from conventional to local alternative construction materials and how to better integrate into the formal sector.

Finally, the *Action Plan* calls for the **development of national guidelines on how to characterise and valorise Construction and Demolition Waste (C&DW).** National guidelines should include a transitory plan and clear guidance for construction companies and recyclers to identify different types of waste, which is essential for choosing the most appropriate recycling or recovering technique. Techniques and enablers for dismantling, repairing and reusing building elements should also be established to prevent demolition and keep materials in use at their highest value. Lastly, the guidelines should contain guidance on how to recycle different types of C&DW in the most circular way: avoiding low-grade applications such as backfilling, for example

It may be too soon to measure the impacts of the *Circular Economy Action Plan and Roadmap* in Rwanda, but the *Plan* serves as a huge step in the right direction to transforming a wasteful and material-intensive industry. What's more, the Plan's potential impacts transcend borders, offering a replicable framework for countries with similar economies to work towards a more circular built environment.

7

WHO NEEDS TO DO WHAT

HOW TO DRIVE ACTION

Working towards a global circular economy is undeniably ambitious, and won't be without its fair share of hurdles—but we can get there. In aligning material use with societal needs, we envision a world where the needs of all people are met within the safe boundaries of the planet. As illustrated in this Report, a systems-oriented approach will be imperative to move from theory to action and achieve this collective vision of a safe and just space. This chapter highlights the key stakeholders that can create an enabling environment for circular economy solutions to thrive, effectively transforming key systems: among these are countries' Ministries of Finance, Environment and Labour, labour unions, Multinational Development Banks (MDBs), financial institutions, educational institutions, and the private sector. No one actor can spur change alone: the transition calls for radical collaboration and concerted efforts to avoid burden shifting among industries, regions and resources—striving for a harmonious transformation of production and consumption. Let us set the stage for a global economy that operates by new rules—ones that promote a level playing field and propel us toward a more sustainable and equitable future.

SHIFT THE GOALPOSTS:

Place materials at the centre of the story of achieving wellbeing within boundaries.

WHO?

- Ministries of Economy, Finance and the Environment,
- Business leaders,
- Multilateral organisations (such as the Organisation for Economic Co-operation and Development (OECD),
- International Financial Institutions (such as the IMF and Development Banks).

HOW?

- **Develop and apply holistic indicators.** We must move beyond GDP and other traditional economic metrics to incorporate indicators that measure the things that matter to people: from environmental health to social equity, decent work and human wellbeing. This is necessary to sketch a clearer picture of how—and to what end—economies are progressing and developing. Better data and indicators are needed to show how environmental and economic activities can promote human wellbeing, including through decent job opportunities.[124]
- **Set mission-oriented targets.** New targets are needed to shift the goal from maximising economic output to maximising human wellbeing within planetary boundaries. Add to existing targets for greenhouse gas (GHG) emissions reduction by setting caps on total material use and waste generation that progressively and rapidly decline until sustainable levels are reached—and do so at the needed speed, scope and scale to achieve intended outcomes.[125] At the same time, ensure that the development of these environmental targets is adaptive and dynamic: it must centre on building resilience while being responsive to emerging challenges, technological advancements and changing societal needs in our increasingly uncertain and rapidly evolving world.

WORK TOGETHER:

Reform international financial and trade architecture to ensure all nations have the means to invest in sustainable development.

WHO?

- Ministries of Economics, Finance and Trade,
- International Financial Institutions,
- Multilateral organisations (such as the World Trade Organization).

HOW?

- **Reform international financial and trade patterns to promote circular solutions.** This will be critical to unlock the potential of the circular economy to improve and sustain social outcomes for nations while respecting environmental limits.[126, 127] The private sector must be part of the transformation, but reducing risks that attract private finance for development is crucial. These endeavours should be carried out at the local level, with robust public oversight. This approach is vital to prevent low-income countries from becoming overly reliant on the current structure of value chains and global financial capital.[128]
- **Increase fair access to affordable circular and green technological innovations.** Introducing intellectual property rights (IPRs) waivers can support technological transfer to improve access to necessary existing technologies, while rethinking trade policy will also foster necessary innovation in Build countries.[129] This can apply to clean energy technologies, technological innovation for resource-efficient industrial processes, alternative protein technologies, and more. This can enable Build countries to leapfrog and 'bend the curve'.[130]
- **Roll out measures for debt cancellation and relief.** Currently, despite contributing the least to climate change, many Build and Grow nations have accrued substantial debts, making it extremely difficult for them to prioritise sustainable and low-carbon investments. Debt cancellation and relief for Build and Grow countries is essential because it frees up financial resources—enabling these nations to invest in the circular economy transition, climate change mitigation and adaptation, ecosystem restoration, and resilience-building measures rather than funnelling their limited resources into debt repayment.[131, 132] Shift countries can directly support these efforts, particularly by ensuring multilateral financial institutions provide direct funding and prioritise access to affordable capital.[133]

GET THE ECONOMICS RIGHT SO FINANCING CAN FOLLOW: Roll out ambitious environmental fiscal reforms that realign economic incentives with the objectives of the circular economy to ensure that the private sector and financiers drive and accelerate the transition.

WHO?

- Ministries of Economy and Finance,
- Academic and educational institutions,
- Multilateral organisations (such as the World Trade Organization and the OECD),
- International Financial Institutions (such as the International Monetary Fund and the World Bank).

HOW?

- **Redesign taxation to ensure that prices reflect and include all costs.** This should include those linked to environmental and health impacts, and can be done through carbon pricing and resource taxes, for example.[134] Similarly, subsidies must be redirected away from high-impact activities and products—from meat[135] and SUVs to fast fashion and air travel—and towards activities with positive impact: those that minimise raw material extraction, regenerate ecosystems and provide social value.[136] Public support can be funnelled into these activities through tax deductions, preferential investment conditions and subsidies.
- **Dismantle incentives for excessive material consumption.** Modern societies are marked by stark inequalities, with some living on very little while others consume excessively, driving the lion's share of environmental damage. A key way to address this systemic issue is through the taxation of luxury goods.[137] By doing so, we can not only curb excessive consumption but also channel the generated revenue into public goods. These public goods, such as improved public transport, parks and healthcare, have the potential to benefit everyone, fostering a shift from a scenario of public neglect and private opulence to one of private sufficiency and public prosperity.[138]
- **Complement pricing signals with fee-and-dividend schemes.**[139] While true pricing is necessary, it can't steer change alone. Other mechanisms can also complement and reinforce better pricing, with the ultimate aim of limiting inflation and fostering social support for profound changes. For example, fee-and-dividend approaches that collect revenue from societies most polluting activities and directed towards essential services that mitigate impacts that disproportionately affect the most vulnerable in society. Raised proceeds on different assets—from carbon emissions and raw material extraction to land value to personal data—can be recirculated, mitigating potential disproportionate impacts on the poor.[140]

FORGE GLOBAL COLLABORATION FOR A JUST TRANSITION: Align environmental goals with social and economic ones across the world.

WHO?

- Ministries of Economy and Labour,
- Multilateral organisations (such as the UN, the World Trade Organization and the World Bank),
- Labour agencies and unions,
- Business leaders and,
- Educational institutions.

HOW?

- **Ensure the circular economy transition is people-centric.** As important as what needs to be done to tackle climate breakdown, it's also how these things are done that matters. As people—citizens, workers and employers—lie at the core of all economies, shifting how our economies function requires people-centred approaches. Working towards a just transition means leaving no one behind.
- **Build substantial support and leadership among governments around the world for this social transition to take place.** The time is ripe for a modern version of Franklin D. Roosevelt's New Deal[141] to address economic inequality, infrastructure investment, social welfare and environmental sustainability. Transitioning towards a circular economy requires state planning, strong social policy and the implementation of specialised public labour agencies that manage the transition of workers. Social protection policies should ensure that all workers can be supported and benefit from the transition.
- **Harness policymakers' creativity to achieve results within a tight timeframe.** This entails the development of subsidised green contracts and job guarantees. In *Shift* countries, job guarantees and Just Transition Funds can be used to support workers in resource-intensive industries that will undergo changes, both in their own countries and in partner *Grow* and *Build* countries. These have already been rolled out in the EU and the US, for example; while the International Just Energy Transition Partnership between South Africa, France, Germany, the UK and the US could be used as an example to learn from.
- **Ensure education addresses the inevitable shift in jobs and skills.** It is vital that the right basic education, vocational education and training (VET) and lifelong learning opportunities are made available now. Investment in and support for VET reforms should be a high priority, and aligned with industrial and environmental strategies. In parallel to foundational courses, micro-certifications should be developed in order to meet immediate demand in some sectors. Companies should also be encouraged to invest in new green skills so their workers are equipped for the future.
- **Ensure that circular, green employment means better employment.** This includes better representation, decent pay and improved working conditions. No matter what corner of the world or the value chain we find ourselves in, it is crucial that people everywhere have the opportunity to lead dignified lives. Work is a central part of delivering on that goal, and social dialogue, social protection and skills development for a sustainable economy is universally needed. Workers across industries must be given the security and insurance that their working conditions and lives will improve as a result of the transition, not deteriorate. Unemployment and violent geographical relocations must be avoided to the greatest extent possible, while workers' interests must be protected in the transition.

ENDNOTES

1. The trend assessment was conducted using Quid Discover, an AI-based research platform that reads, analyses, and contextualises large volumes of text-based data. This platform was utilised to examine datasets from news articles and blog publications. The analysis focused on publications released within a specific five-year period (01/11/2018-01/11/2023) and written in English. The key terms used for this included 'circularity', circular economy' and other related terms.

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GLOSSARY

Consumption refers to the use or consumption of products and services meeting (domestic[335]) demand. Absolute consumption refers to the total volume of either physical or monetary consumption of an economy as a whole. In this report, consumption refers to absolute consumption.

Cycling refers to the process of converting a material into a material or product of a higher (upcycling), same (recycling) or lower (downcycling) embodied value and/or complexity than it originally was.

Domestic Extraction (DE) is an environmental indicator that measures, in physical weight, the amount of raw materials extracted from the natural environment for use in any economy. It excludes water and air. [Source]

Domestic Material Consumption (DMC) is an environmental indicator that covers the flows of both products and raw materials by accounting for their mass. It can take an 'apparent consumption' perspective—the mathematical sum of domestic production and imports, minus exports—without considering changes in stocks. It can also take a 'direct consumption' perspective, in that products for import and export do not account for the inputs—be they raw materials or other products—used in their production. [Own elaboration based on Source]

Economy-wide material flow accounts (EW-MFA) are a 'statistical accounting framework describing the physical interaction of the economy with the natural environment and with the rest of the world economy in terms of flows of materials.' [Source]

Environmental stressor, in Input-Output Analysis, is defined as the environmental impact occurring within the region subject to analysis. There is, therefore, an overlap between the stressor and the footprint, as they both include the share of impact occurring within a region as a result of domestic consumption. This is how they differ: while the rest of the stressor is made up of impacts occurring within a region as a result of consumption abroad (embodied in exports), the footprint includes impacts occurring abroad as a result of domestic consumption (embodied in imports).

Greenhouse gases (GHG) refers to a group of gases contributing to global warming and climate breakdown. The term covers seven greenhouse gases divided into two categories. Converting them to **carbon dioxide equivalents** (CO_2e) through the application of characterisation factors makes it possible to compare them and to determine their individual and total contributions to Global Warming Potential (see below). [Source]

High-value recycling refers to the extent to which, through the recycling chain, the distinct characteristics of a material (the polymer, the glass or the paper fibre, for example) are preserved or recovered so as to maximise their potential to be re-used in a circular economy. [Source]

Materials, substances or compounds are used as inputs to production or manufacturing because of their properties. A material can be defined at different stages of its life cycle: unprocessed (or raw) materials, intermediate materials and finished materials. For example, iron ore is mined and processed into crude iron, which in turn is refined and processed into steel. Each of these can be referred to as materials. [Source]

Material footprint, also referred to as Raw Material Consumption (RMC), is the attribution of global material extraction to the domestic final demand of a city. In this sense, the material footprint represents the total volume of materials (in Raw Material Equivalents) embodied within the whole supply chain to meet final demand. The total material footprint, as referred to in this report, is the sum of the material footprints for biomass, fossil fuels, metal ores and non-metallic minerals. It is composed of the sum of domestic extraction and imports in raw material equivalents, minus exports in raw material equivalents. This allows us to allocate the footprint to the consumption. [Source]

Material flows represent the amounts of materials in physical weight that are available to an economy. These material flows comprise the extraction of materials within the economy as well as the physical imports and exports (such as the mass of goods imported or exported). Air and water are generally excluded. [Source]

Net Extraction Abroad (NEA) represents the difference between the trade balance of products and that of the raw materials needed to produce them. The difference between the two represents the 'actual' or net quantity of raw materials that have been extracted abroad to satisfy domestic consumption.

Planetary boundaries define the 'safe operating space' for humanity, based on the planet's key biophysical processes. Originally developed by Rockström et al. (2009), the framework quantifies nine 'limits': 1. Climate change, 2. Novel entities,[336] 3. Stratospheric ozone depletion, 4. Atmospheric aerosol loading, 5. Ocean acidification, 6. Biogeochemical flows (nitrogen and phosphorus), 7. Freshwater use, 8. Land-system change, and 9. Biosphere integrity.[337] Six of nine boundaries have now been transgressed. [Source]

Raw Material Equivalent (RME) is a virtual unit that measures how much of a material was extracted from the environment, domestically or abroad, to produce the product for final use. Imports and exports in RME are usually much higher than their corresponding physical weight, especially for finished and semi-finished products. For example, traded goods are converted into their RME to obtain a more comprehensive picture of the 'material footprints'; the amounts of raw materials required to provide the respective traded goods. [Source]

Raw Material Consumption (RMC) represents the final domestic use of products in terms of RME. RMC, referred to in this report as the 'material footprint', captures the total amount of raw materials required to produce the goods used by the economy. In other words, the material extraction necessary to enable the final use of products. [Source]

Resources include, for example, arable land, freshwater, and materials. They are seen as parts of the natural world that can be used for economic activities that produce goods and services. Material resources are biomass (like crops for food, energy and bio-based materials, as well as wood for energy and industrial uses), fossil fuels (in particular coal, gas and oil for energy), metals (such as iron, aluminium and copper used in construction and electronics manufacturing) and non-metallic minerals (used for construction, notably sand, gravel and limestone). [Source]

Secondary materials are materials that have been used once and are recovered and reprocessed for subsequent use. This refers to the amount of the outflow which can be recovered to be re-used or refined to re-enter the production stream. One aim of dematerialisation is to increase the amount of secondary materials used in production and consumption to create a more circular economy. [Source]

Sector describes any collective of economic actors involved in creating, delivering and capturing value for consumers, tied to their respective economic activity. We apply different levels of aggregation here—aligned with classifications as used in Exiobase V3. These relate closely to the European sector classification framework NACE Rev. 2.

Socioeconomic cycling is the technical term for the Socioeconomic Cycling metric. It comprises all types of recycled and downcycled end-of-life waste, which is fed back into production as secondary materials. Recycled waste from material processing and manufacturing (such as recycled steel scrap from autobody manufacturing, for example) is considered an internal industry flow and is not counted as a secondary material. In the underlying model of the physical economy used in this report, secondary materials originate from discarded material stocks only. The outflows from the dissipative use of materials and combusted materials (energy use) can, by definition, not be recycled. Biological materials that are returned back to the environment (for example, through spreading on land) as opposed to recirculated in technical cycles (for example, recycled wood) are not included as part of socioeconomic cycling. Energy recovery (electricity, district heat) from the incineration of fossil or biomass waste is also not considered to be socioeconomic cycling, as it does not generate secondary materials.

Socioeconomic metabolism describes how societies metabolise energy and materials to remain operational. Just as our bodies undergo complex chemical reactions to keep our cells healthy and functioning, a city undergoes a similar process—energy and material flows are metabolised to express functions that serve humans and the reproduction of structures. Socioeconomic metabolism focuses on the biophysical processes that allow for the production and consumption of goods and services that serve humanity: namely, what and how goods are produced (and for which reason), and by whom they are consumed. [Source]

Territorial-based carbon footprint is based on the traditional accounting method for GHG emissions, with a focus on domestic emissions, mainly coming from final energy consumption. A **consumption-based carbon footprint** uses input–output modelling to not only account for domestic emissions but also consider those that occur along the supply chain of consumption (for example, accounting for the embodied carbon of imported products).

Total material consumption is calculated by adding Raw Material Consumption (material footprint) and secondary material consumption (cycled materials).

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