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Scaling circular finance: No time to waste

Four levers for unlocking investment at scale

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Foreword

The circular economy (CE) has gained significant attention over the past ten years and has been embraced as a framework for rethinking the way we make, use and reuse products, and manage post use material flows in the economy. More than 70 governments around the world are implementing regulation and policies to capture its potential. Leading companies and the finance sector are also mobilising capital, with over USD270billion of assets being deployed towards circular solutions and infrastructure investments on our calculations.

The opportunity for development of circular economy solutions is vast, spanning all major sectors and all geographies. These range from up-stream innovation for new materials, innovation for lower waste and more efficient product manufacturing, and circular solutions for extending product life, such as reuse, repair, remanufacturing and resale. It also spans the circularity of materials at the end of product life, through establishment of effective collection and recycling systems, particularly in developing markets.

Importantly, the solutions noted represent a huge economic opportunity, contributing to more sustainable growth, enhancing resilience and reducing risk. At the same time, they also deliver many other important benefits, perhaps most important of which is avoided greenhouse gas emissions, with many research publications pointing out that the circular economy is essential for delivery of decarbonisation and climate objectives. Circularity is also an important vehicle for delivery of nature and regenerative objectives, and societal benefits.

However, as this report points out, while the circular economy investment topic has been socialised in many circles, neither its full potential nor the scale of the opportunity has led to mainstream adoption yet. Conservatively, our analysis demonstrates that, for a subset of key sectors, the circular economy transition financing gap to 2035 is at least USD6.5 trillion, and despite the rapid growth of circular economy financing in recent years the scale up and transition has really only just begun.

At Standard Chartered we recognise the importance of scaling finance for the circular economy and have expanded our existing Sustainability Innovation Hubs to include a new Circular Economy Innovation hub, with Andrew Morlet, past CEO of the Ellen MacArthur Foundation, appointed as a senior advisor to lead its development.

Our aim is to leverage Standard Chartered's innovative financing expertise, network and global reach to support our clients in developing and scaling circular economy solutions. We also aim to collaborate with other leading financial institutions, commercial banks, MDBs and investors to develop the much needed standards, tools and insights to inform policy globally, in order to unlock and scale the investment opportunities and capital needed to support CE innovation and infrastructure development.

"Scaling circular finance; no time to waste" is the initial output of the new CE Innovation Hub, and points to four key levers we believe will be essential to enable this capital mobilisation. We look forward to supporting our clients and working with other leaders globally to capture this opportunity and to realise the many benefits a circular economy holds.

Marisa Drew
Chief Sustainability Officer

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Executive summary

In recent years there has been substantial growth of interest in the circular economy from leading businesses and governments, academics, the media and the public. Numerous studies and reports have demonstrated its potential, including to create 8 million jobs by 2030 (ILO, 2018), generate USD5 trillion in value by 2030 (Business and Sustainable Development Commission, 2017) and benefit all 17 of the UN Sustainable Development Goals (Schroeder, et al., 2018).

There are also many successful case examples of circular solutions around the world, with companies across sectors investing in R&D and partnerships for circular solutions. In recent years almost 80 governments have established circular economy roadmaps, including policies, regulations, and investment agendas (Chatham House, 2024).

However, the circular economy is often underestimated by being considered a concept only applicable to waste management and recycling. A more appropriate description is that it is a systems solution framework that decouples economic growth from the use of finite virgin raw materials, minimising the production of waste and pollution. It achieves these ends by extending the lifespan of products, keeping them in high-value use in the economy for longer, and designing products and services to have nature-positive and regenerative impact.

Adopting circular solutions improves the resilience and competitiveness of companies and economies by reducing their dependence on virgin raw materials – and therefore their exposure to related price volatility – and lowering their greenhouse gas (GHG) emissions and wider environmental footprints. Circularity reduces the impact of growth in population and per-capita consumption on the world's finite resources and is able to help address the 45% of global GHG emissions that energy transition solutions cannot tackle at scale (Ellen MacArthur Foundation, 2021).

The rationale for making the case for circularity as a climate solution is clear

- **Integrating circular solutions into decarbonisation strategies for hard-to-abate sectors such as steel, concrete, cement and plastics can reduce GHG emissions by more than 25% and lower abatement costs by 45% relative to only decarbonising the production of these materials (Agora Industrie, et al., 2024).**
- **Many circular solutions are ready for deployment at scale and deliver multiple benefits beyond carbon reduction, whereas this is not the case for proposed transition solutions such as hydrogen or carbon capture and storage.**
- **The introduction of circular solutions can reduce demand for energy, including renewable energy, by 20%. This lowers renewable energy-related investment requirements, raw material demand, and end of life challenges.**
- **Introducing circular solutions can increase the return on invested energy. Extending the life of products keeps the energy embodied in them in use for longer, reducing overall energy demand and carbon emissions. Reducing the need for mitigation releases capital that could be redeployed to further scale-up circular solutions.**
- **Successful circular strategies reduce the need for virgin natural resources, the extraction and processing of which accounts for 55% of global GHG emissions. Such strategies also benefit ecosystems, as 90% of land use related biodiversity loss is linked to resource extraction and processing (United Nations Environment Programme, 2024a).**

The circular economy is yet to become a fully mainstreamed agenda despite wide reporting of its economic rationale and the increasingly evident systemic risks posed by the linear economy. Using the crude measures currently available, the world remains mostly linear with material circularly hovering around 7% of total material throughput (Circle Economy, 2025). It's clear that while the concept of circularity is both economically compelling and brings numerous benefits, the transition faces several challenges, including factors such as:

- **Linear lock-in as some businesses see circularity presenting a revenue cannibalisation risk, and a risk of creating lower valued or stranded assets.**
- **Transition costs as developing a circular business model may require significant innovation and re-tooling which have associated investment costs.**
- **Policy and regulatory innovation is required to scale initiatives including Extended Producer Responsibility (EPR) funding models; stimulate appropriate cross border secondary material flows to improve aggregation and feedstock supply; and help develop economically viable markets for circularity to emerge.**

The fact that circularity is not being adopted at pace globally is perhaps not surprising, given that the concept has only gained global prominence over the past 10 years. Circularity may well follow a development path similar to the renewable energy sector, which in its early years struggled to compete commercially with the incumbent fossil-fuel based energy sector. However, renewable energy investments are now over USD2 trillion per annum, 80% higher than fossil-fuel based power investments (BloombergNEF, 2025).

The circular economy is especially relevant to developing countries, as without it over half of the targets associated with the UN's Sustainable Development Goals cannot be achieved (Schroeder, et al., 2018). By adopting circular policies, developing countries can improve the resilience of their economies. Key areas of focus include infrastructure investments associated with waste and recycling as many developing markets lack basic waste management systems. This is both essential for post-use materials recovery and for prevention of pollution, particularly in the case of plastics and plastic packaging. Other important development areas are water supply and adoption of circular principles in the food and agriculture sectors. Circularity strategies for developed markets, such as in Europe and in some countries in Asia such as Singapore, will be different as these countries already have well established waste management and recycling systems. The focus in these countries will be on expanding product life extension solutions and improving recycling and secondary material flow economics.

The risks resulting from failing to transition to a circular economy are substantial. In the business-as-usual scenario, extraction of raw materials will have to be 60% higher in 2060 compared to 2020 (UNEP, 2024), while total waste generated would likely increase by 80%, costing the global economy USD417 billion per year by 2050 (World Bank, 2024). The annual social cost in terms of health impact of plastics waste alone is estimated at over USD600 billion (Minderoo Foundation, 2022).

Four levers could help close the USD6.5 trillion circular funding gap

This report focuses on the challenge of mobilising finance to scale the circular economy. We outline four key actions critical for mobilising the capital required to scale upstream circular material solutions.

Circular investment requirements

For the assessed sectors we estimate a global circular investment requirement by 2035 to be in the range of USD7-14 trillion depending on the assumptions used by sector and the targets associated with the adopted circular strategies. Eliminating uncontrolled waste and increasing waste recycling rates to between 50-70% globally by 2050 alone requires USD2.6 trillion on our modelling. We have excluded some more complex sectors such as transport from our estimates suggesting that the overall circular investment requirement is higher than the top end of our current range. By comparison, net zero-implied energy transition investment requirements until 2035 may be more than USD88 trillion according to Bloomberg (BloombergNEF, 2025)

The funding gap

To determine the circular funding gap, we have estimated the current baseline of investment exposure to the circular economy and the annual circular investments made into the assessed sectors. Estimating financial exposure to the circular economy is challenging as there are currently no globally-accepted circular finance reporting standards. We have collated existing published estimates and applied conservative modelling assumptions to develop an initial perspective on major funding sources. This shows for corporate on-balance sheet lending a figure of around USD20 billion, and for corporate bonds and regional development banks an additional USD165 billion. If including additional non-bank investment by asset managers, and other private finance, this brings total existing financial investment in the circular economy to around USD270 billion. These figures compare to the USD334 billion estimate produced by the Ellen MacArthur Foundation in relation to named finance and investment mobilised and dedicated to circular economy solutions and infrastructure globally since 2019 (Ellen MacArthur Foundation, 2024). As for investments into circular solutions for the assessed sectors, we estimate that these could reach USD563 billion until 2035. Subtracting this from our previous estimate for total investment requirements suggests a circular funding gap of at least USD6.5 trillion for the period until 2035.

To help close this gap we propose a number of financing approaches, including the use of green and sustainability-linked bonds and loans, and a greater deployment of other innovative financial solutions. These include integrating public with private funding, blended finance, engagement from larger corporates into circular investment projects across their supply chains and embedding insurance or guarantee features into circular investment vehicles. All these solutions lower the perceived risk profile of circular projects, which in combination with policy support of off-take agreements and longer-term demand, is likely to help mobilise capital.

Governments and corporates are deploying significant effort and resources towards the introduction of policies, regulations and strategies to reduce their net emission profiles. However, other than in a few leading cases, most governments and corporates currently fail to recognise the potential of circular solutions as climate or nature solutions.

We argue that part of climate mitigation finance should be directed towards accelerating the development of a circular economy as this is likely to yield GHG emissions saving results quickly. In addition, we believe that developing countries should explore the possibility of creating carbon credits based on the level of GHG emissions avoided through the adoption of circular solutions. This report asserts that to successfully deploy all these options and increase investments in circular solutions requires the following four levers to be adopted by relevant stakeholders:

1. Recognise that the circular economy is fundamental to delivering climate and nature targets

Greater recognition of the circular economy as a climate and nature-related solution is important as it will raise the profile of circular solutions and facilitate mobilisation of capital towards them. This recognition, alongside showing how circular strategies directly reduce GHG emissions, would bring the circular economy into the mainstream climate agenda, facilitating access to climate finance flows (e.g. green bonds, sustainability-linked loans, climate funds).

This report makes the case for strengthening sustainable finance business cases by linking circular practices to measurable GHG emission reductions. This allows companies and investors to internalise avoided carbon costs (e.g. through carbon pricing, emissions trading, or corporate net-zero targets) which would make circular investments more financially attractive by showing more clearly their direct contribution to decarbonisation commitments. The approach could also enable a clearer path for policy support and blended finance support, which is particularly relevant to the funding requirements of waste and recycling infrastructure in developing markets.

Many governments and development banks are increasingly deploying blended finance solutions to accelerate climate—related investment. Establishing circular economy as a recognised climate mitigation and adaptation strategy may expand the scope for its eligibility for blended finance, concessional loans, and public–private partnerships, reduce risk for private investors, and encourage larger capital flows into circular ventures.

2. Agree on circular definitions, principles, measurement, and reporting

One of the key challenges to a wider adoption of circular solutions and the mobilisation of circular capital is that there is currently no universal agreement on the scope and definition of the circular economy; how to measure circularity; and what the reporting standards for it are. As a result, it is difficult to assess the rate of circularity of an economy or organisation or understand capital allocation towards circular solutions.

This report shows that progress around circular principles and reporting standards is being made, but more needs to happen. Mandatory, sector-based approaches and standards would help accelerate circular economy adoption.

3. Integrate the circular economy into finance risk models

Engagement by the financial sector with the circular economy has been low, and this needs to change if circular capital is to scale more quickly. Increasing engagement requires developing tools that estimate corporate exposure to the risks and opportunities of circular and non-circular activities and integrating these estimates into risk and lending models used by financial institutions.

This report highlights two recently published proposals that may accelerate engagement from the financial sector: the circular economy finance guidelines from the International Finance Corporation; and the circular risk scorecard methodology developed by the Kopgroep Circulair Financieren.

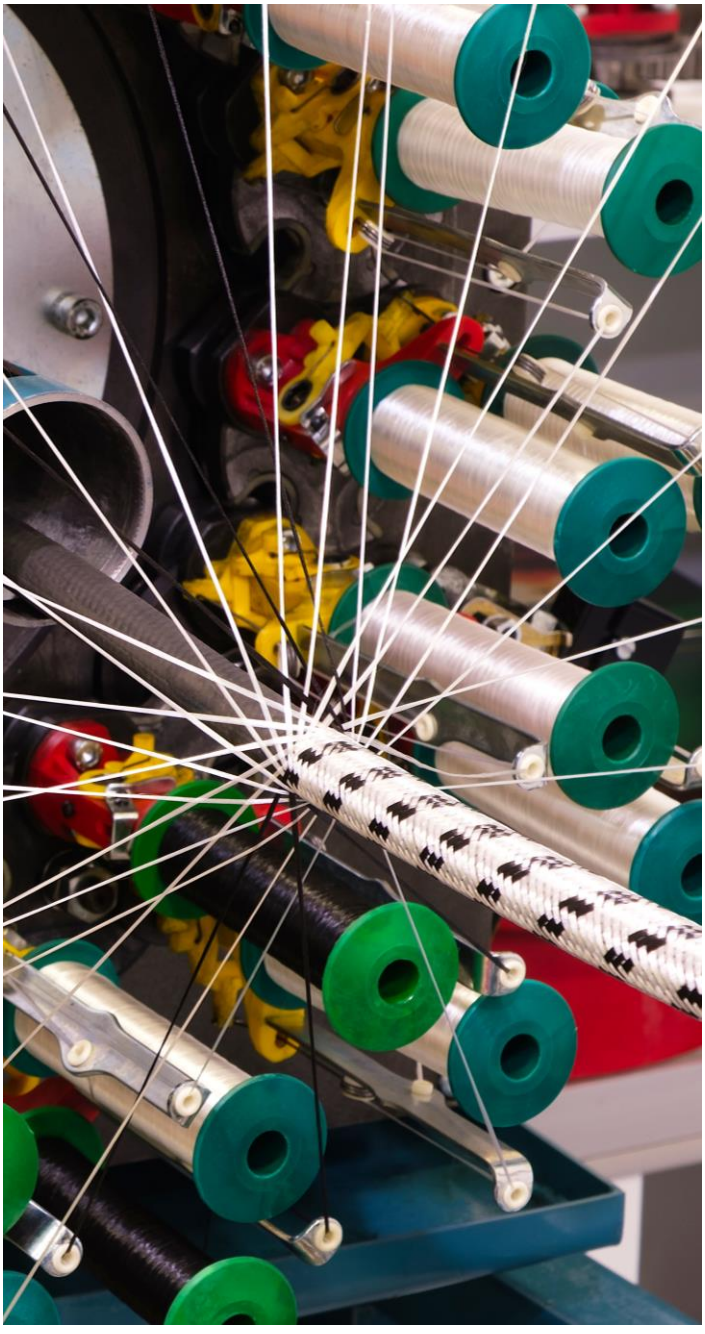
4. Drive for a harmonised international regulatory and policy landscape

Analysis across different countries suggest that regulation is necessary to drive circular adoption rates (Sanz-Torro, et al., 2025). However, circular economy legislation often fails to take a harmonised, sector-based, cross-border approach. Such an approach is important for accelerating adoption as it reduces complexity, costs and uncertainty for corporates and investors; and it improves economies of scale and helps develop cross border trade in secondary materials, which is often essential for their market viability. This approach could increase engagement with circularity from corporates across the value chain which helps to attract the capital necessary to develop low-cost circular solutions.

European Commission policy clearly demonstrates an intention to harmonise policy to enable the single market to achieve viable secondary material markets. This is apparent in the Ecodesign for Sustainable Products Regulation (ESPR) and the associated approach for the development of Product Passports. The Commission is also actively engaged in international trade and collaboration missions with numerous countries across Asia, Africa, Latin America and the Caribbean which in part aim to inform and influence circular economy policy harmonisation.

The need for policy harmonisation has been clearly highlighted in the negotiations to establish a Global Plastics Treaty. While at the time of writing, the United Nations Intergovernmental Negotiation Committee process has failed to deliver an agreed treaty, over 300 members of the Business Coalition For a Global Plastics Treaty have called for globally harmonised regulations that "businesses need and the majority of countries want" (Business coalition for a global plastics treaty, 2025).

Circular policies need to recognise any social implications that circular adoption may have. This is especially relevant for the Global South as work from the ILO shows that adopting circular solutions globally may cause up to five million job losses across APAC and up to one million across Africa (ILO, 2018). The adoption of circular economy solutions may also increase pressure on workers in sectors in the developing world that have a high share of informal labour.



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The circular economy: a multi trillion—dollar opportunity

There is a strong economic and environmental rationale to change the existing 'take-make-dispose' linear economic model. Transitioning to a circular economy represents a multi trillion-dollar opportunity that improves the resilience of companies and economies and reduces environmental pressures as the production of waste and pollution is eliminated, products and materials are kept in circulation longer and natural resources are regenerated.

The current economic model demands 80% more from nature than ecosystems can generate

The current economic system is linear in nature. It uses raw materials to manufacture goods that after an increasingly short period of use are disposed of as waste. Maintaining economic growth in such a system especially given continued population and per capita consumption growth across the developing world is becoming increasingly challenging. In the appendix we discuss these challenges in more detail, but we summarise these factors below:

Destruction of natural capital:

to sustainably meet humanity's current demand for ecological resources requires 1.75 Earths (Global Footprint Network.) (link)

Raw material demand:

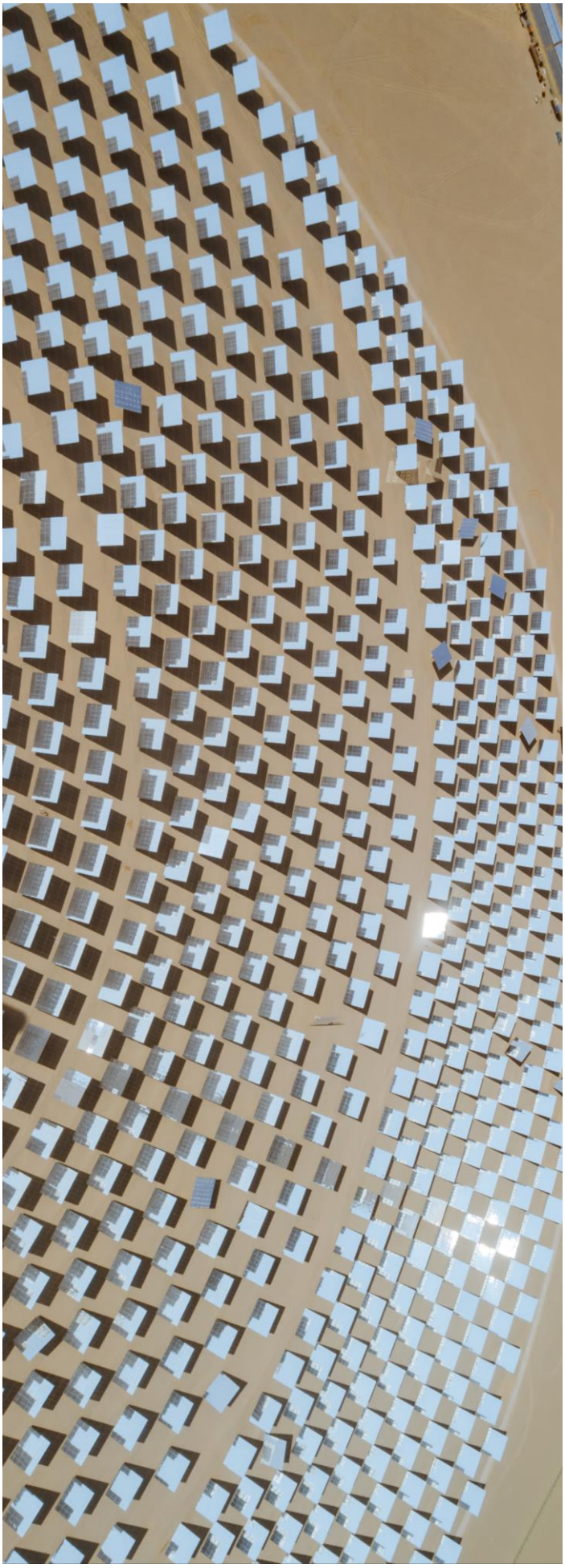
is set to increase by an additional 60% between 2020 and 2050. The developing world will face the greatest challenge as it could experience an increase in per-capita raw material demand of up to 90% (United Nations Environment Programme, 2024a).

Waste generation:

total waste generation is on track to increase by 80% between now and 2050, costing the global economy USD417 billion per year (World Bank, 2024)

Food and freshwater challenges:

Food-related emissions may increase by 90% by 2050 while demand for freshwater may increase by 65%. (Springmann, et al., 2018)



Circular solutions enhance economic resilience and competitiveness

A circular economy is an economic system that aims to decouple economic growth from the use of finite non-renewable raw materials and the extractive use of natural resources. The circular economy has three core principles:

Eliminate:

Design out waste and pollution

Circulate:

Increase the lifespan of products by keeping products and materials in use at their highest value for as long as possible and recycling materials at the end of life

Regenerate:

Adopt nature positive solutions and practices to regenerate the world's natural resources

By redesigning products, services, processes and business models, the circular economy reduces virgin raw material use, energy demand, waste and pollution.

The benefits of decoupling economic growth from the consumption of finite non-renewable resources through the adoption of circular solutions go beyond those related to an economy's long-term outlook. Short to medium-term economic and security implications are highly significant too and include the following:

- **Enhanced corporate resilience and competitiveness via reductions in risk from scarcity of raw material inputs or from exposure to resource or raw material input price volatility.**
- **On a national level, adopting circularity improves supply security of key materials such as critical minerals. It also builds resilience towards the supply of other finite raw materials, natural renewable materials, water and food.**

Circular strategies and solutions

As noted, to capture the value inherent in a circular economy, products, services and systems need to be redesigned, offering the public and consumers new product and service solutions and enabling less raw material intensive consumptive behaviours. To make this happen various strategies and solutions have been developed that help improve circularity across the entire lifecycle of a product. These strategies are summarised in the 10R framework (Figure 1).

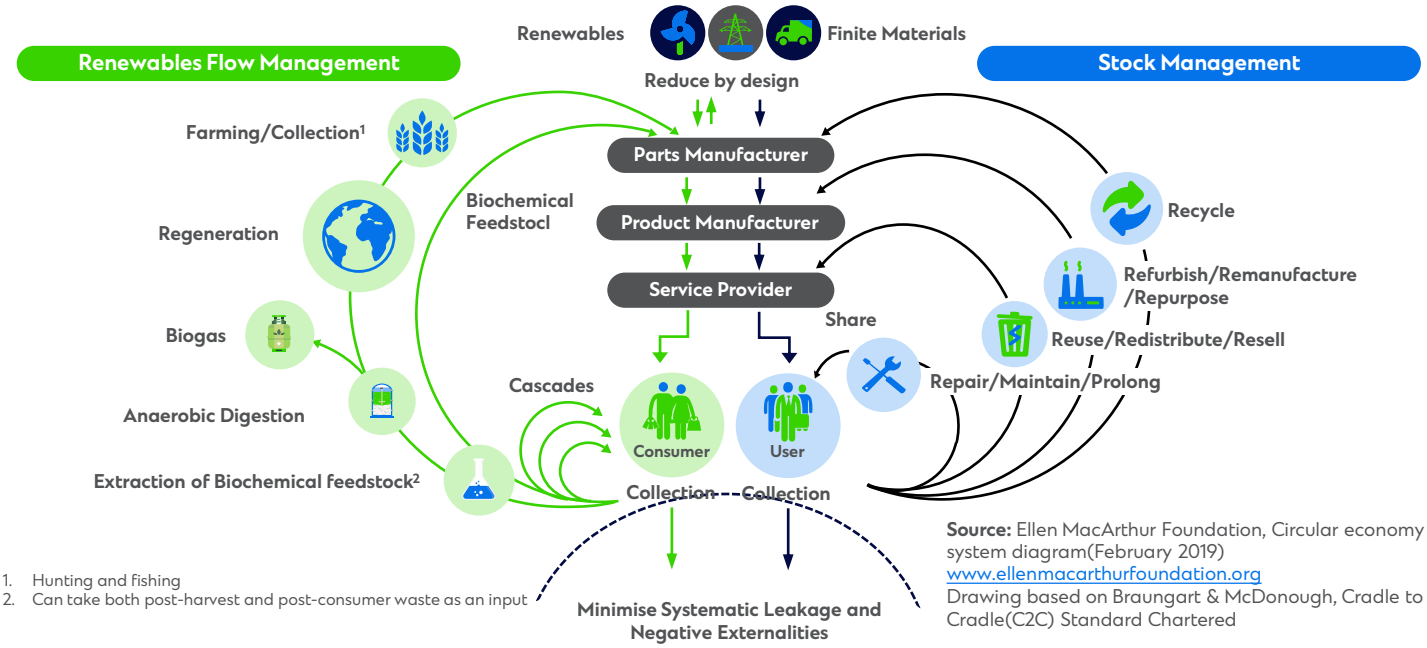
Figure 01: The circular 10R framework

Product cycle characteristics	Strategy	
Design phase of product Responsible use and manufacturing of product	R0 Refuse	Eliminate unnecessary materials. Make product redundant or offer same function with different product
	R1 Rethink	Intensify product use (e.g. sharing)
	R2 Reduce	Increase efficiency of manufacturing or product use by using fewer materials
Use phase of product, increasing utilisation and extending product life	R3 Reuse	Reuse of existing product by other consumers
	R4 Repair	Restore defective product to its original function
	R5 Refurbish	Bring old product up to date through renovation
	R6 Remanufacture	Use parts of existing product to build a product with the same function
	R7 Repurpose	Use parts of existing product to build a product with a different function
End-of-life return phase Capture and retain value Use waste as a resource	R8 Recycle	Process input materials of existing products for usage as inputs in new or other products
	R9 Recovery	Capturing energy from biomass via anaerobic digestion, and use of digestate for soil enhancement

Source: : (Productivity Commission, 2025), Standard Chartered

The circular economy 'butterfly' diagram as developed by the Ellen MacArthur Foundation visualises how these strategies and solutions apply to finite non-biobased material flows on the right-hand side of the diagram, and to biobased materials on the left (Figure 2).

Figure 02: Visualising the circular economy



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

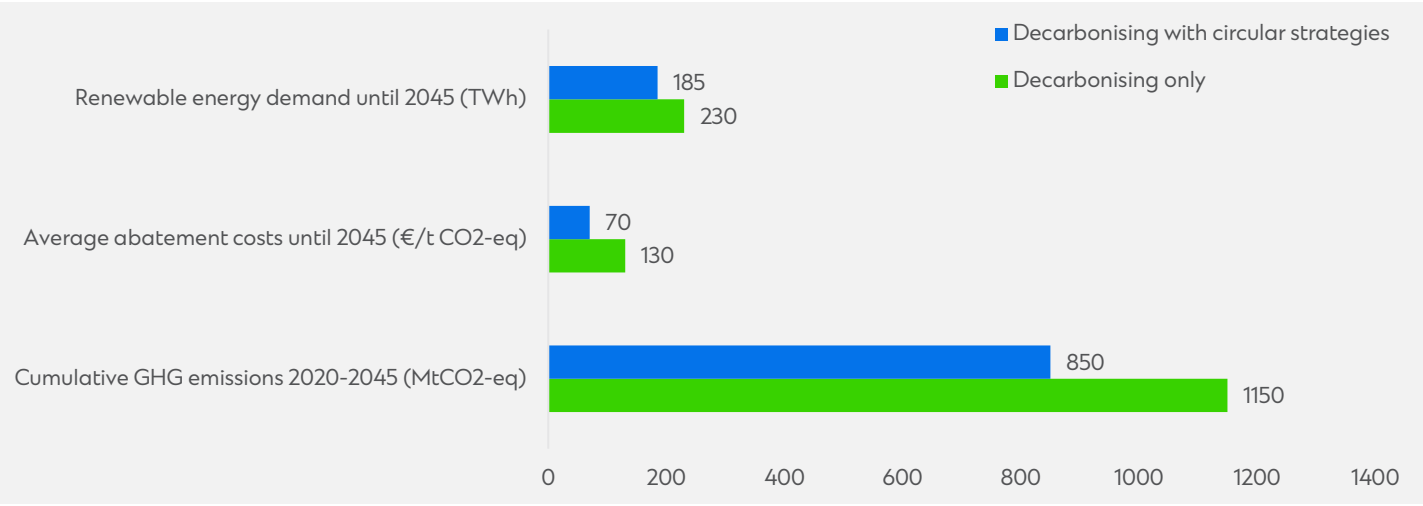
Source: Ellen MacArthur Foundation, Circular economy system diagram(February 2019)
www.ellenmacarthurfoundation.org
Drawing based on Braungart & McDonough, Cradle to Cradle(C2C) Standard Chartered

Source: Ellen MacArthur Foundation, Standard Chartered

Circular solutions deliver decarbonisation

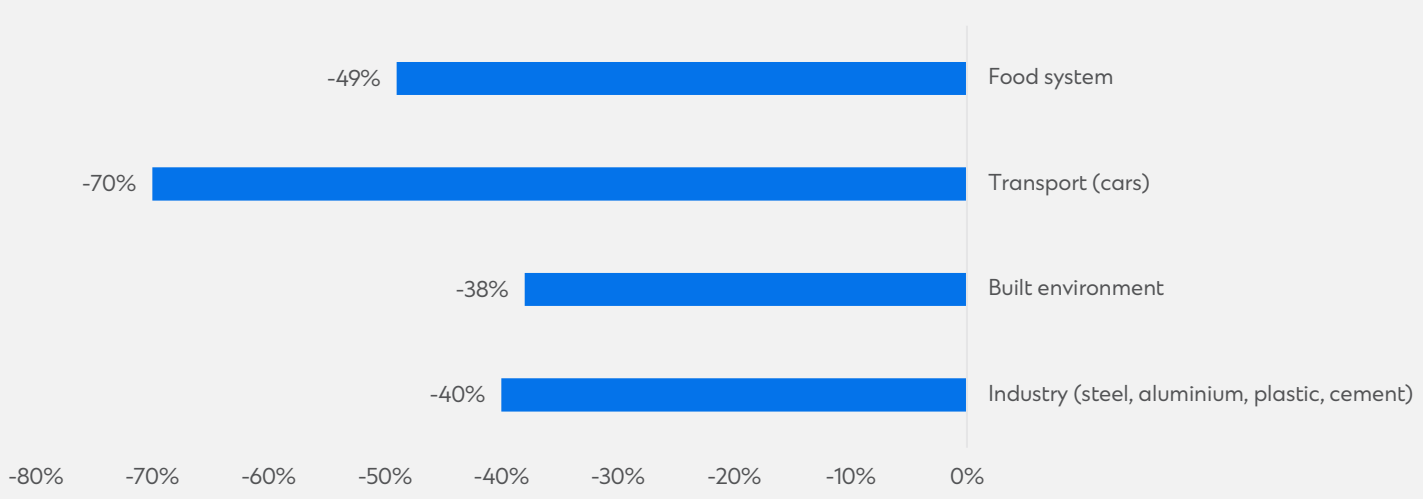
Research indicates that taking a circular approach can significantly lower the life-cycle energy and emission intensity of an economy. A recent study from the Agora Industry in conjunction with Systemiq (Agora Industry, et al., 2024) found that GHG emissions from hard-to-abate sectors such as steel, cement, concrete and plastics would fall by an additional 25% through integration of circular solutions into decarbonisation strategies. In addition, the study found a 45% reduction in abatement costs and a 20% reduced demand for energy (Figure 3). The study also stressed that many of the CE solutions and technologies are market ready and can be adopted at scale. Work from the Ellen MacArthur Foundation in 2021 also demonstrated that circular solutions can reduce GHG emissions by between 38% and 70% for key sectors relative to a baseline scenario (Ellen MacArthur Foundation, 2021) (Figure 4).

Figure 03: Potential impact of adding circular solutions to decarbonisation strategies in Germany



Source: Agora Industry, Systemiq, Standard Chartered

Figure 04: Impact from adopting circular economy solutions on GHG emissions for key sectors



Source: Ellen MacArthur Foundation, Standard Chartered

A Circular Economy can generate USD5 trillion in value

Various attempts have been made to estimate the value that is generated through the adoption of a circular economy. Work from Accenture back in 2015 estimated that developing a circular economy would help avoid losses in economic output of cUSD25 trillion by 2050.

A range of other organisations have produced estimates for the impact that circular economy strategies can have on key economic sectors such as food, textile, plastics, electronics, and capital equipment (Figure 5). Although these estimates show a wide dispersion in terms of impact, they do clearly suggest that developing circular strategies carries a strong economic rationale.

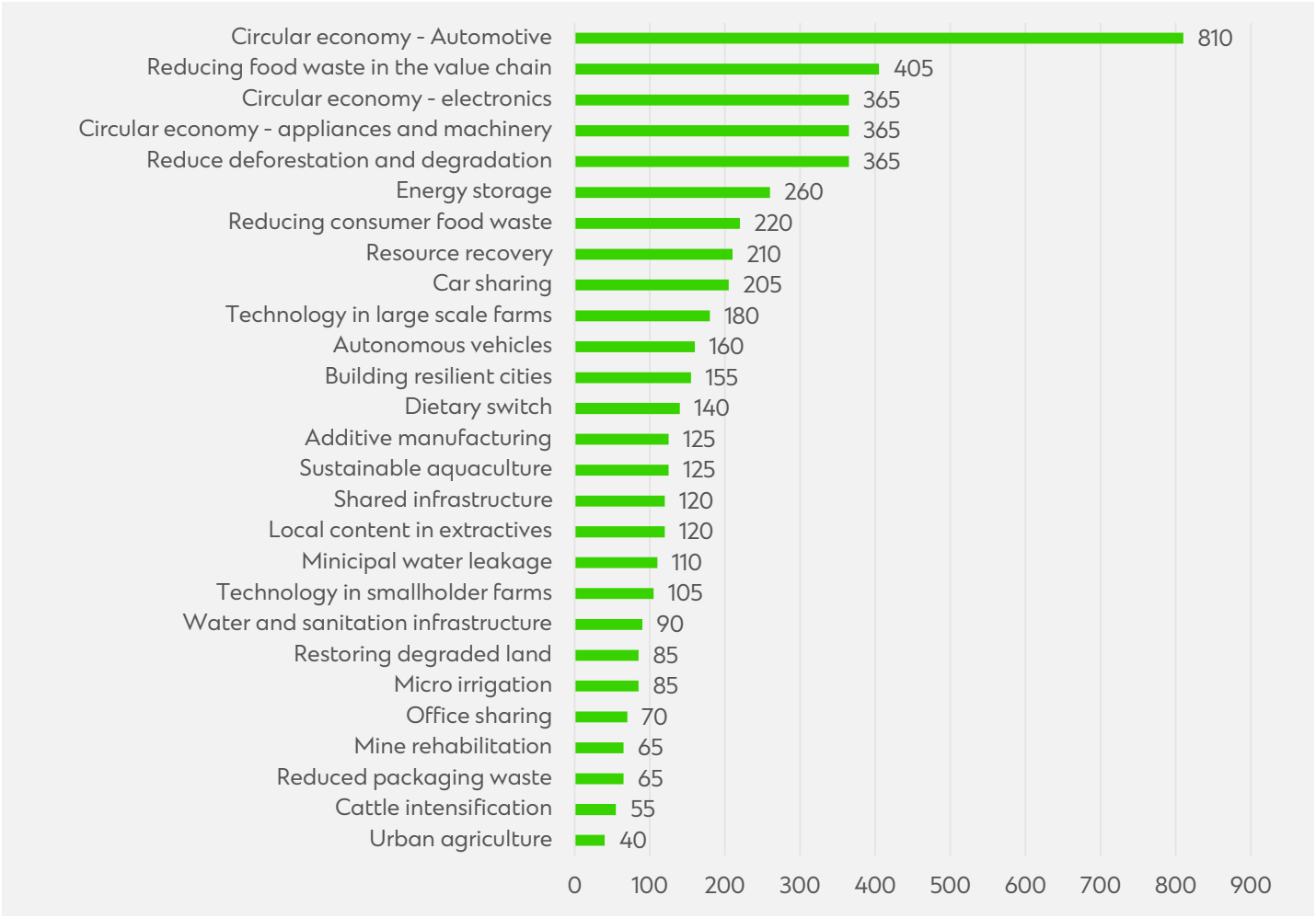
Figure 05: Circular economy considerations for key sectors
USDbn, number represents maximum scenario value

Sector	Focus	Impact	Source
Food	Total annual opportunities	USD4.5 trillion	FOLU
	Bioeconomic opportunities_	USD7.7 trillion	WBCSD
	Food waste reduction per year	USD127 billion	EMAF/Google
Textiles	Recycling textile waste	USD100 billion	EMAF
	Market for pre-owned clothes (2028)	USD350 billion	GlobalData
	Textile emission reduction potential	44%	WRI
Plastics	Plastic waste generated per year	400 million tonnes	UNEP
	Cost of plastic packaging waste per year	USD120 billion	UNEP
	Lifetime cost of plastic/kg (HIC/LIC)	USD19/200	WWF
Electronics	E-waste generated (2010/2030)	34/82 million tonnes	UN
	E-waste recovery value (2022)	USD62 billion	UN
Capital equipment	Raw material usage	7.2 billion tonnes	PACE
	GHG emission generated	3.2 billion tonnes	PACE

Source: Organisations listed, Standard Chartered Bank

One of the broader estimates for the potential value of a circular economy was provided through the 2017 'Valuing the SDG Prize' report (Business and Sustainable Development Commission, 2017). In it, some 60 SDG-focused strategies were valued, 27 of which support circular economy principles. Their estimates suggest that adopting these 27 strategies could represent USD5.1 trillion in value by 2030 (Figure 6).

Figure 06: Potential value of adopting circular economy-related strategies
USD billion, number represents maximum scenario value



Source: Business and Sustainable Development Commission, AlphaBeta, Standard Chartered Bank

03

Interest in the circular economy is growing but mainstream adoption has yet to happen

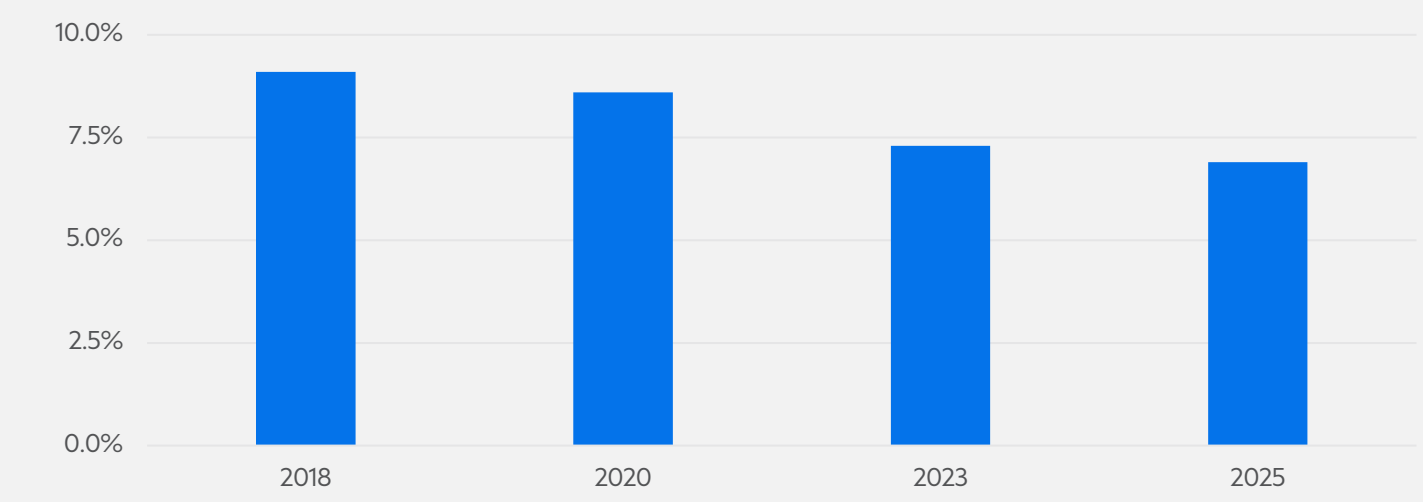
Circularity (as measured by Circle Economy in their Circularity Gap Reports) has failed to show consistent growth since 2018. However, the aggregate estimate contained in these reports fails to capture variations by country and region, the extent of momentum behind corporate engagement with circularity, and substantial growth in regulation and policies. The combination of these factors suggest that the rate of circularity globally is likely to increase going forward.

Strong circular momentum across key markets likely to lift circularity globally

Circle Economy have published a Circularity Metric since 2018 where they estimate the share of secondary or re-used materials out of an economy's total material consumption. While there are limitations to this measure of circularity, it is one of the most widely used indicators for circular adoption. The most recent update (Circle Economy, 2025) shows that the amount of re-used materials in the global economy has increased from 7.1 billion tonnes in 2018 to 7.3 billion tonnes in 2025, but that this growth was outpaced by growth in total material usage in the global economy. As a result, the Circularity Metric declined to 6.9% in 2025 from 9.1% in 2018 (Figure 7).

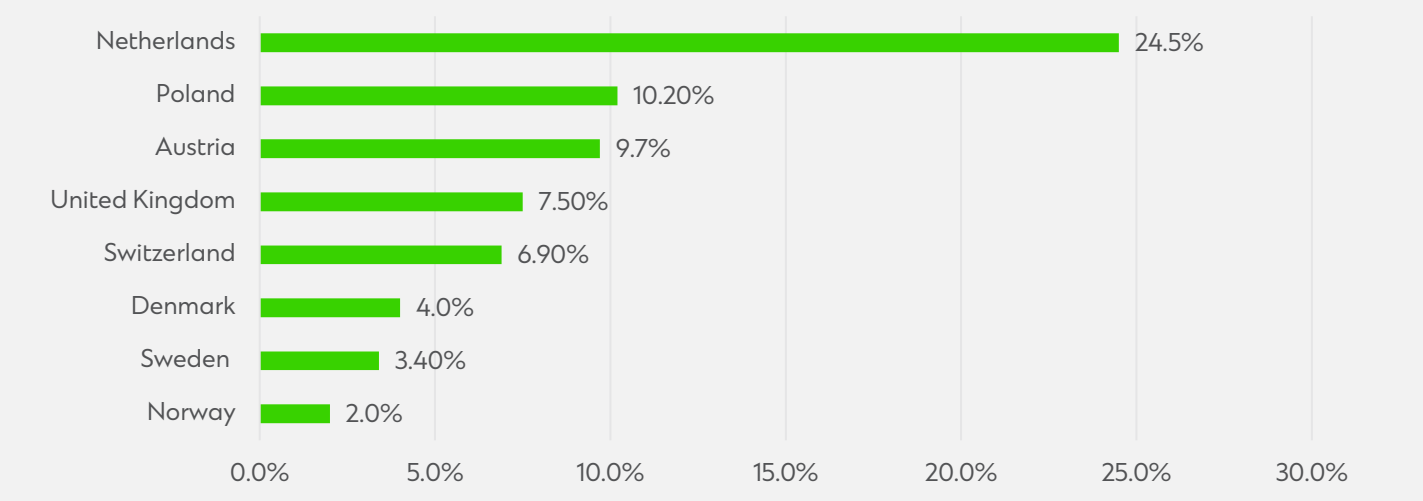
Circle Economy have also published several country-level circularity metrics. These indicate that, except for the Netherlands, circularity rates tend to be around or below 10%, indicating that the potential offered by moving to a circular economy is broad-based rather than driven by just a few countries (Figure 8).

Figure 07: Circularity rate: Growth in re-used material consumption offset by growth in virgin material use
Share of re-used materials in total material consumption



Source: Circle Economy, Standard Chartered Bank

Figure 08: Rate of circularity for individual countries
Share of re-used materials in total material consumption

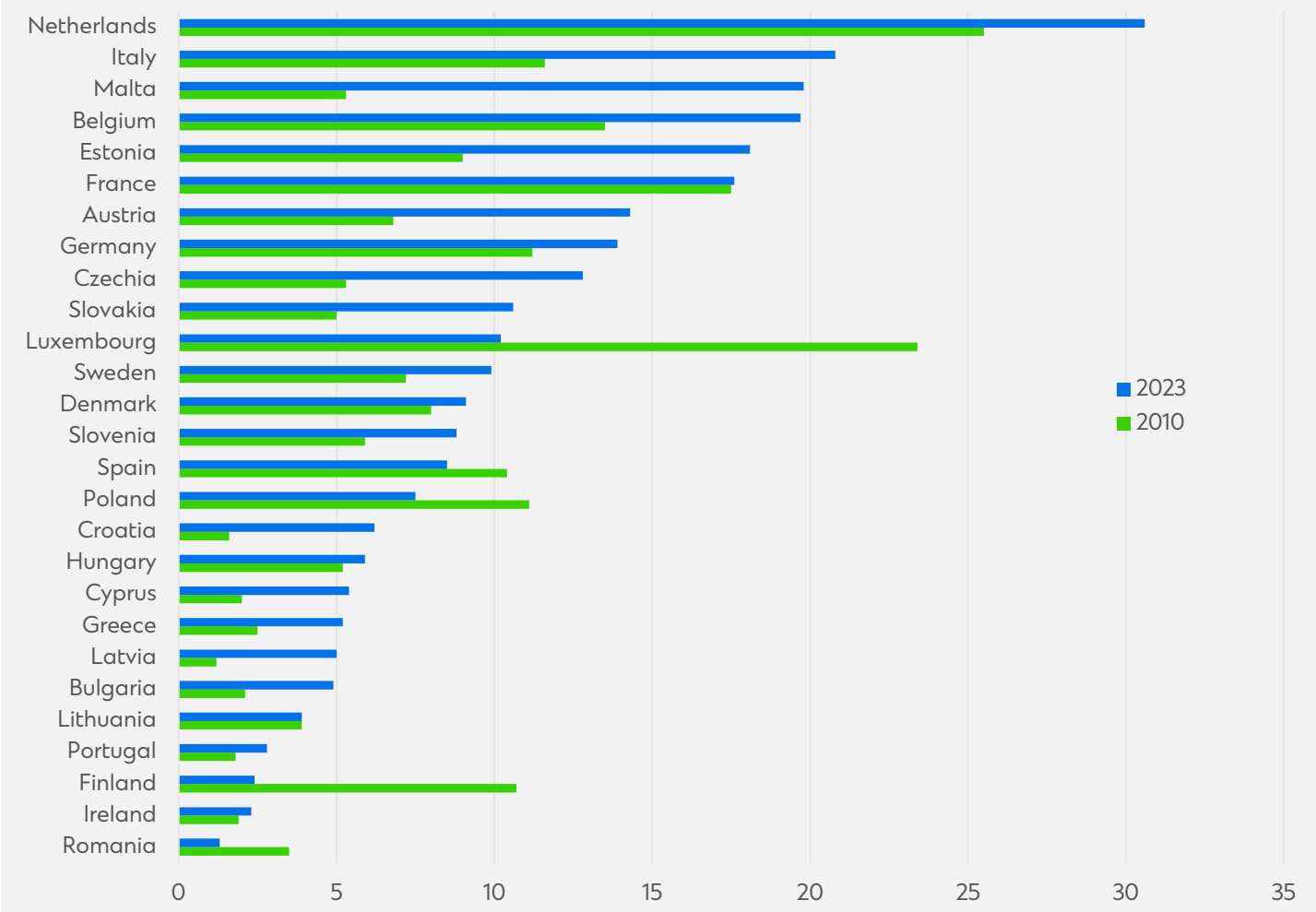


Source: Circle Economy, Standard Chartered Bank

Europe: rising circularity as policy focus intensifies

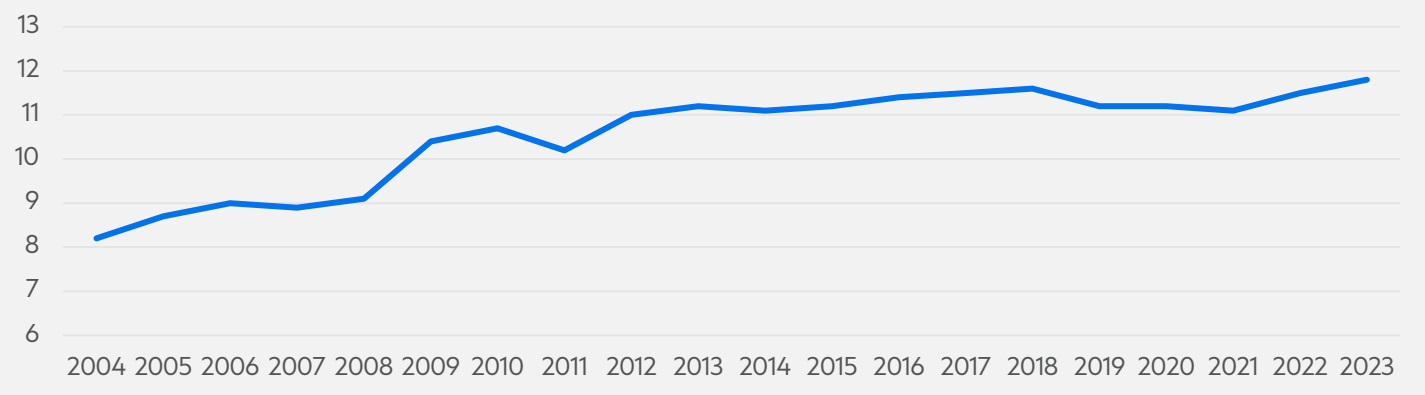
Data from Circle Economy showed that the rate of circularity in the global economy appears to be falling. However, a closer look at circularity among different regions and countries suggests that the picture is much more nuanced. For example, EUROSTAT analysis shows that circularity is increasing across all but a few EU countries (Figure 09). This approach is different from the one adopted by Circle Economy, however the rise in circularity shown by the EUROSTAT analysis may well be explained by the range of circular policies that have been adopted by the EU.
This would also suggest that the global rate of circularity is likely to increase if other countries adopt tighter targets associated with circularity and develop incentive schemes to reach them.
As shown in the appendix, many European countries have established circular economy targets, regulations and policies, and the EU commission and some European countries are working in close collaboration with Asian countries to progress efforts globally. EUROSTAT data for the degree of circularity achieved by individual member states shows that these policies appear to be having an impact. The most recent data suggest that the total circular material use rate for the EU as a whole reached 11.8% in 2023 which is up 44% from the 8.2% achieved in 2004 (Figure 10).

Figure 09: Circular material use rate across EU countries %, 2023



Source: EUROSTAT, Standard Chartered Bank

Figure 10: Circular material use rate in the EU%



Source: EUROSTAT, Standard Chartered Bank

Circularity across Asia appears strongest in Singapore and China

Outside of Europe we find that the topic of circularity has been taken up by many countries and is notably prominent across Asia. China has focused on circular economy solutions for more than 20 years, with a particular focus on industrial symbiosis and the establishment of industrial eco-parks in the 1990's. However, the most recent estimate of its degree of circularity is the 5.8% estimate from 2015 (Wang, et al., 2020).

Estimates for the ASEAN economies have been made, although they only relate to 2018 (Emami, et al., 2024). This work suggests that circularity rates in 2018 were highest in Singapore at 18% but that the rate was below 2% for the majority of the ten countries being analysed (Figure 11).

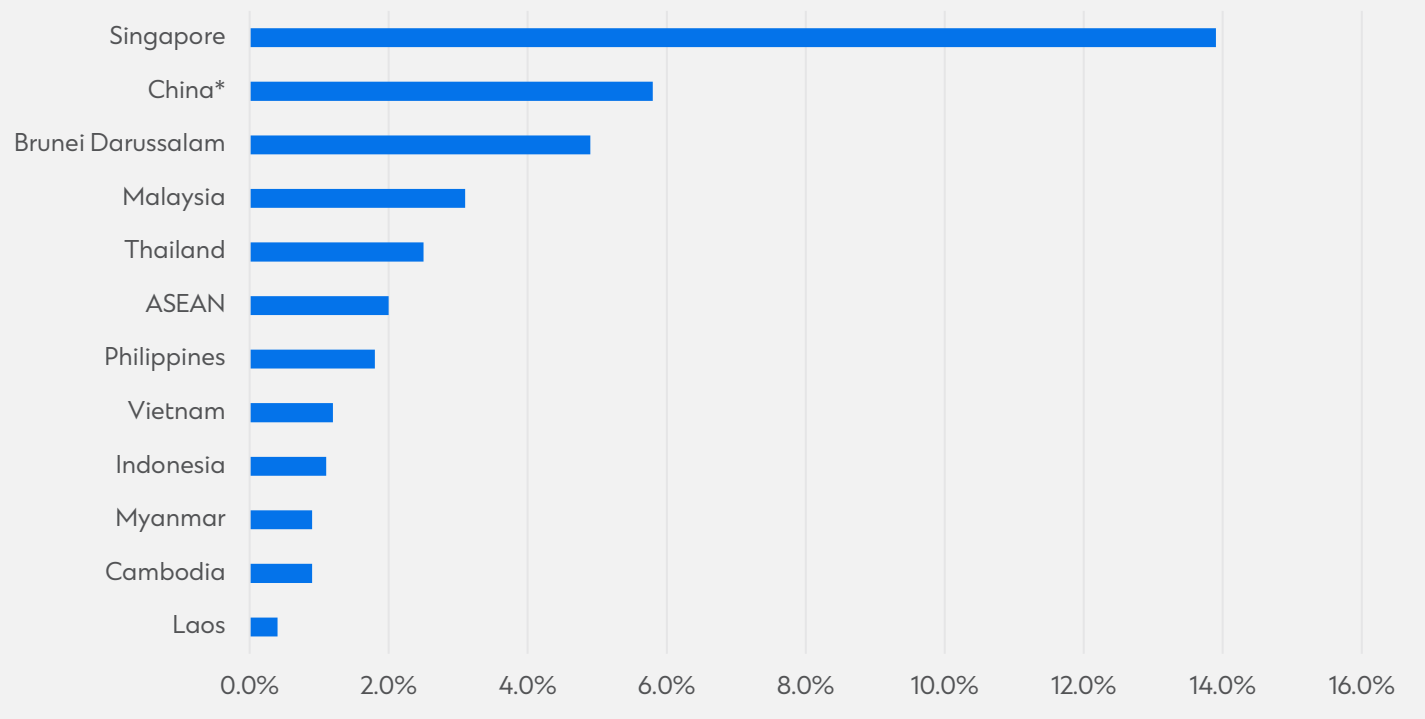
Work focused on more recent circular policies and targets suggests that Vietnam and Singapore currently have some of the most elaborate circularity programmes (Herrador, et al., 2023).Vietnam receives credit from the authors for its ambitious national circular economy plan, while Singapore is applauded for its implementation of all 10 R-based circular strategies and its zero-waste approach. Countries across ASEAN with less advanced circular economy policies, according to Herrador et al, are Brunei, Laos and Myanmar.

Data for India does not exist although NITI Aayog (India's national policy think tank) is actively promoting a circular economy for the country.

Overall, the data for Asia suggests that most of the benefits from incorporating circularity in government policies have yet to be captured. The potential for this to happen is growing considering that circular economy objectives are becoming more prominent across the region.

In the appendix we provide a summary of key circular policies adopted across regions and countries globally.

Figure 11: Circular adoption rate across Asia %, 2018 * China estimate is for 2015



Source: Emami et al (2024), Standard Chartered Bank

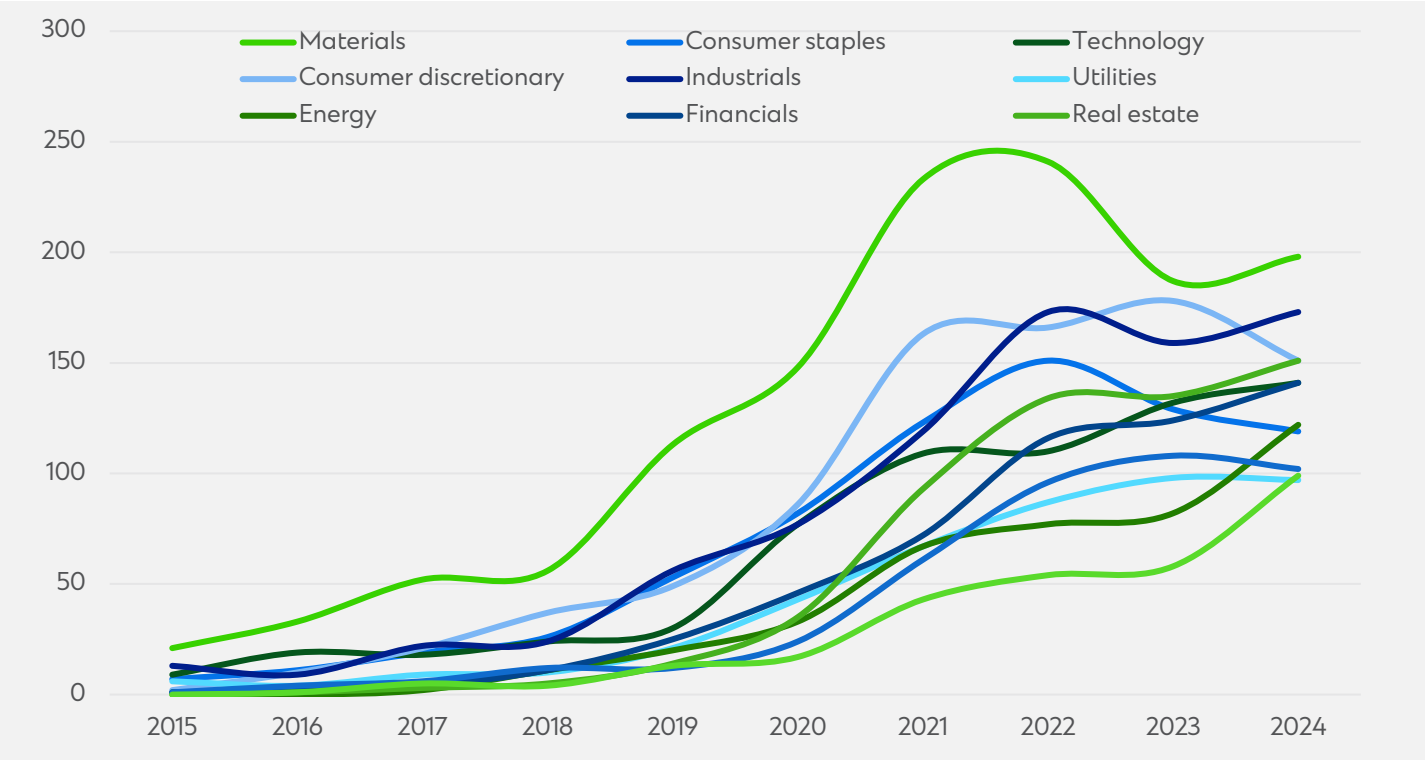
Corporate engagement with circularity is growing

Bloomberg data suggests that corporate engagement with circularity has been growing across all industries since 2018 (Figure 12). It shows that the frequency with which corporates discuss circularity in their filings or reports has started to accelerate for all major sectors.

Growing recognition that adopting circular solutions may reduce a company's supply chain and reputational risks, and that circular solutions can offer value opportunities and lower GHG emissions, might explain the level of corporate interest.

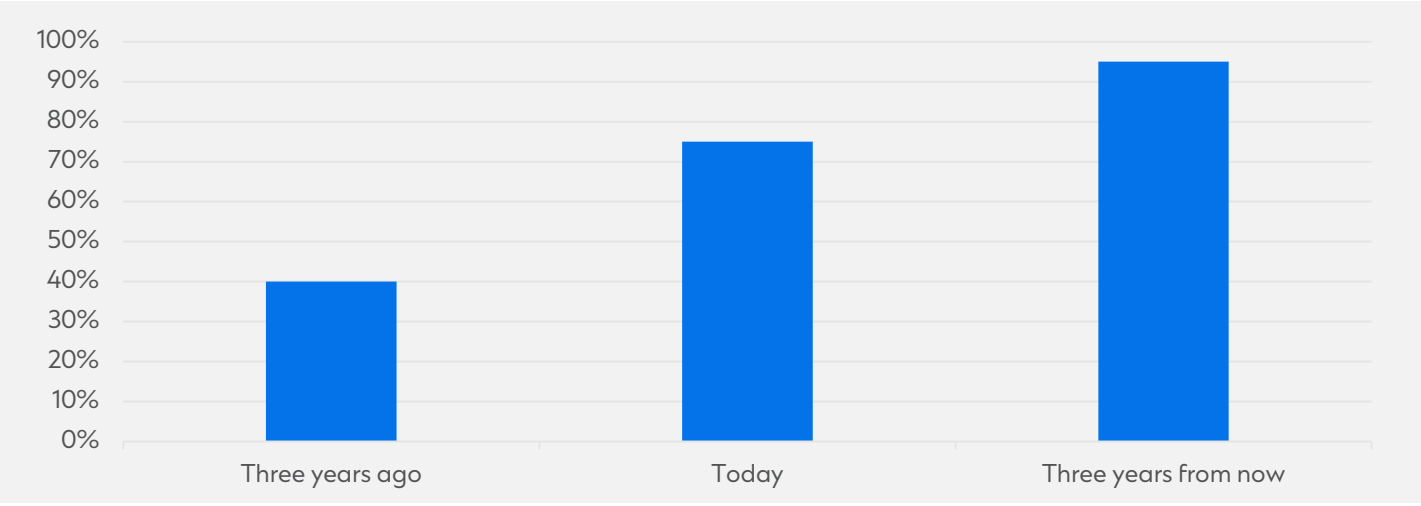
Evidence for this can be found in the results of a survey held by the Circular Transformation of Industries group among 420 top executives last year. It showed that almost all corporates engaged with circularity believe that it will be an important or very important topic for their company by 2027 (Figure 13). The survey also showed that 65% of surveyed executives view circularity as positively impacting their GHG emission profile, while 73% believe that adopting circularity will have a positive revenue impact on a three-year view (World Economic Forum, 2025).

Figure 12: Mentions of 'circular economy', 'resource efficiency' and 'recycling' in company filings and reports count



Source: BloombergNEF, Standard Chartered Bank

Figure 13: Share of businesses engaging in circularity that consider it as important or extremely important %, 2024



Source: Circular Transformation of Industries, Standard Chartered Bank

Widespread circular innovation is taking place across key sectors

Strong momentum in relation to circular innovations is another factor suggesting that the rate of circularity globally is likely to increase. Growing recognition of the value and benefits provided by circularity has triggered a wave of innovation in circular solutions and created a large number of startups across all key sectors. Our review found that there are already thousands of circular economy case studies across a wide range of sectors.

Figure 14 summarises organisations which profile case studies for the key sectors covered in this report. The Circulate Initiative's investment tracker shows that more than 5,500 companies globally focus on plastic-related circular solutions, while Circle Economy's database covers more than 5,200 circular economy focused businesses across seven sectors.

This report does not focus on exploring circular solutions that exist for individual sectors but rather takes stock of the waste and recycling challenge in developing countries and explores the circular funding gap and levers to address this. For readers interested in key solutions by sector please refer to the appendix.

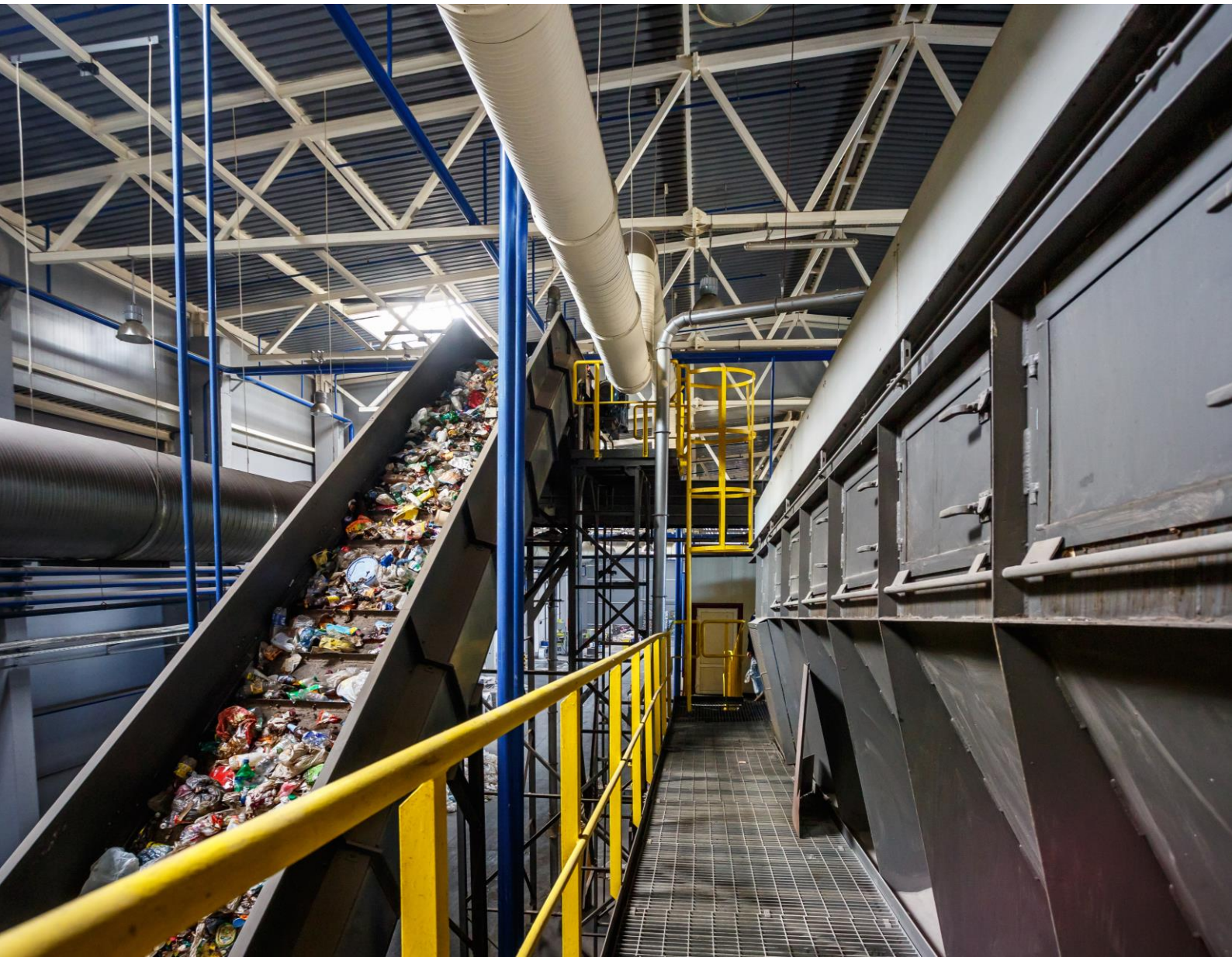
Figure 14: Sources highlighting organisations that offer circular economy solutions

Organisation	Link	Examples	Focus
Circle Economy	Knowledge Hub | Circle Economy Foundation	5,273	Agrifood, materials and fuel, capital equipment, transportation, building and construction, goods and services
Circular innovation lab	The Global Circular Economy Innovation Database	In progress	Textiles, electronics, food, plastics, construction
Ellen MacArthur foundation	Circular Startup Index	811	Building and construction, textiles, finance, agrifood, chemicals and plastics, product design
Fashion For Good	Innovations - Fashion for Good	200+	Textile and fashion supply chain
Reuse landscape	Database | Reuse Landscape	1,350	Plastics
The Circulate Initiative	Plastics Circularity Investment Tracker	5,544	Plastics
World Green Building Council	Circular-Built-Environment-Playbook	75+	Building and construction
WRAP	WRAP - The Waste and Resources Action Programme	140	Agrifood, plastics, textiles

Source: Organisations highlighted, Standard Chartered

04

Waste management and recycling in the Global South – a critical development challenge



This section focusses on the waste sector and in particular the need for waste management and recycling infrastructure in the developing world. This is a prerequisite for achieving the vision of a circular economy globally. We estimate the cost and potential environmental benefits that can be achieved from switching to circular waste solutions, and also highlight the potential of avoided emissions and how these can be valued and traded in order to contribute to financing the investment for infrastructure development. Finally, the chapter discusses the value of reduced negative externalities triggered by a circular waste management approach.

Managing waste may cost the global economy USD6.7 trillion by 2050 unless action is taken

Waste generation in a business-as-usual scenario

To be able to estimate the cost and impact of developing waste recycling capacity, we developed two scenarios. In the business-as-usual scenario we model total waste generation for more than 80 countries globally until 2050, and assume that the share of total waste that is recycled remains constant. Our circular-economy scenario includes estimates for recycling and for adoption of circular economy solutions. This allows us to estimate by how much waste generation may change for each of our scenarios.

The countries chosen for our calculations (Figure 15) may be seen as representative for global waste generation as their population represents more than 93% of the global population, while total waste generated by these countries accounts for more than 90% of global municipal waste as per World Bank data (Kaza, et al., 2018).

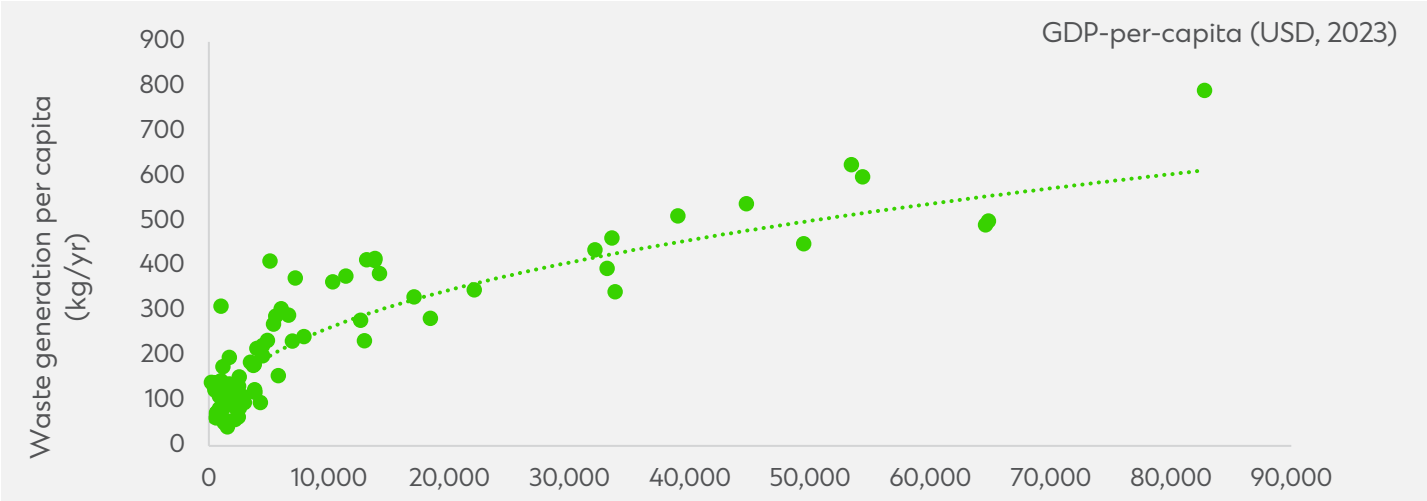
To estimate potential future waste generation by country population estimates from the World Bank were used, in addition to the fact that there is a strong fit between waste generation-per-capita and GDP-per-capita (Figure 16). Each of these countries was categorised into one of four income groups ranging from low-income to high-income using World Bank income thresholds. For each of these groups, assumptions were made on annual growth rates in GDP-per-capita ranging from 6% for low-income countries to 2% for high income countries. Combining the relationship between GDP-per-capita and waste-per-capita with population size estimates from the World Bank and GDP-per-capita estimates from this research allowed us to estimate total waste generation for each of the countries in this sample until 2050.

Figure 15: Countries used for modelling
Grouped by region

Region	Countries	Population (mln)	
	#	2023	2050
Central Asia	4	210	2021
East Asia & Pacific	12	2295	2258
Europe	10	524	509
Latin America & Caribbean	10	558	625
Middle East & North Africa	9	426	572
North America	2	375	415
South Asia	6	1937	2376
Sub-Saharan Africa	28	1175	2086

Source: World Bank, Standard Chartered

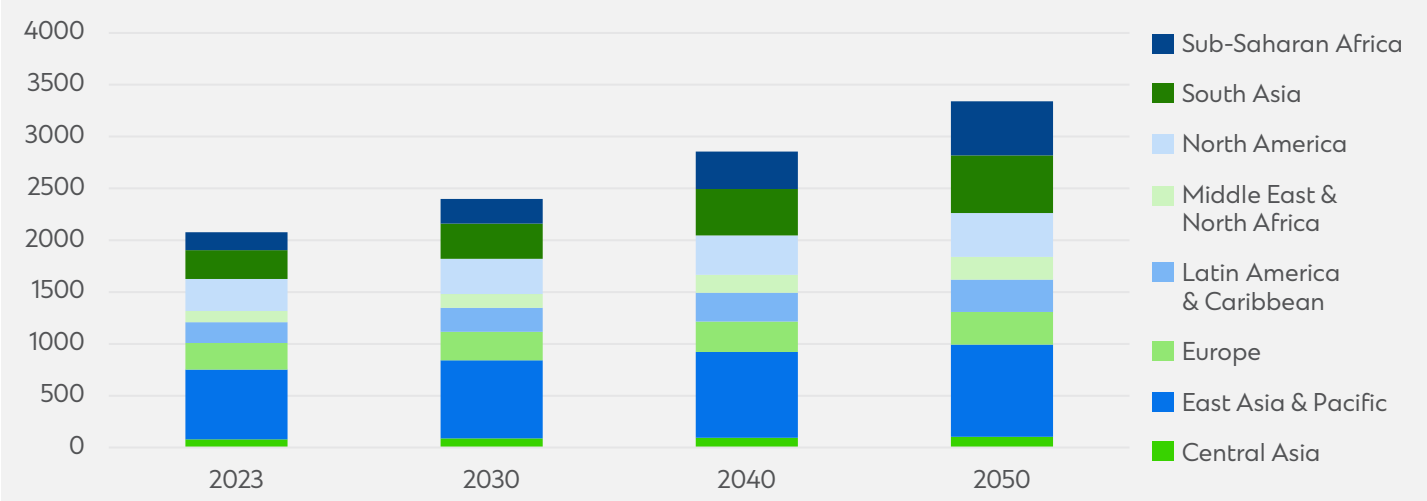
Figure 16: Waste generation per capita is correlated to GDP-per-capita Dots represent countries chosen



Source: World Bank, Standard Chartered

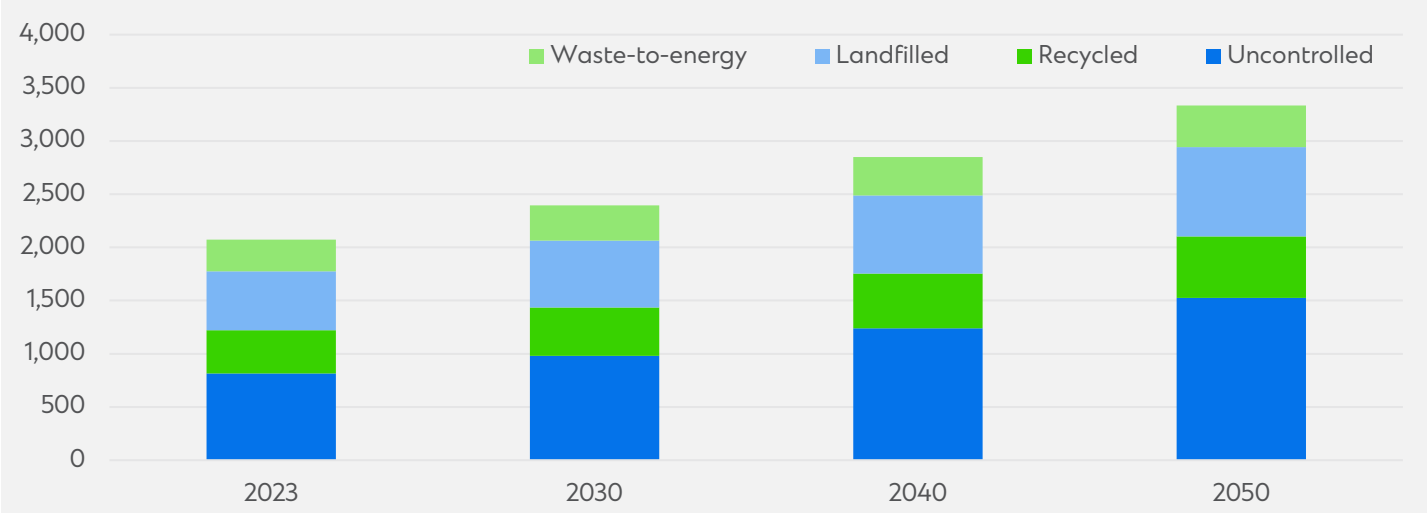
Based on our assumptions, we estimate that in a business-as-usual scenario total waste production across the chosen countries would reach 2.4 trillion tonnes by 2030 and rise to 3.3 trillion tonnes by 2050 (Figure 17). Our calculations are relatively close to those produced by others. The World Bank predicts global municipal waste to reach 2.6 trillion tonnes in 2030 and 3.4 trillion tonnes by 2050 (Kaza, et al., 2018). The United Nations in their 'Beyond an age of waste' publication predicts global waste to reach 2.7 trillion tonnes in 2030 and 3.8 trillion tonnes by 2050 (World Bank, 2024).

Figure 17: Business as usual scenario waste generation estimates Billion tonnes per year



Source: World Bank, Standard Chartered

Figure 18: Business as usual scenario waste treatment estimates Billion tonnes per year



Source: World Bank, UN, Standard Chartered

Waste treatment in a business-as-usual scenario

How waste is dealt with is as relevant as how much is generated. Data from the UN shows that municipal waste collection rates range from nearly 100% across North America and Europe to as low as 36% in Sub-Saharan Africa. The share of uncontrolled waste or waste that is dumped or burned (even if collected) is 79% for Central and South Asian countries and 87% for countries in Sub-Saharan Africa. Recycling rates of municipal waste are low across most regions. In Europe, 56% of municipal waste is recycled but this is 10% or less across Asia and Latin America while in Sub-Saharan Africa it stands at just 3% according to data from the UN (United Nations Environment Programme, 2024).

Uncontrolled waste: in need of a clean up

Our business-as-usual scenario assumes no changes to the treatment of waste across the regions. In that case, calculations suggest that total uncontrolled waste is likely to more than double and reach c1.5 trillion tonnes by 2050, or 45% of total global waste (Figure 18).

The potential growth in the balance of uncontrolled waste poses significant health issues that increase the need for action. Recent work from the University of Leeds shows that in 2020 almost 30 million tonnes of plastics were burned without any controls in place, with India, Nigeria and Indonesia accounting for 54% of this (Cottom, et al., 2024). In addition, data from the latest World Risk Poll report shows that more than 40% of households globally dispose of their waste in an uncontrolled manner (Lloyd's Register Foundation, 2024). The health issues associated with the uncontrolled disposal of waste, including open burning, are significant and are estimated to cost up to 1 million lives a year (Williams, et al., 2019)

Waste generation when levels of recycling and circularity increase

To assess the extent to which recycling of waste, and circularity solutions more broadly, can help lower total waste generation and reduce demand for new virgin materials, we have also developed a circular scenario. This scenario differs from the business-as-usual calculations in two areas:

Waste per capita generation

Recycling is but one of the circular solutions that help to reduce waste generation. Our assumptions around total waste generation per capita reflect that circularity will increasingly be adopted globally. This should first result in a decoupling of waste growth from GDP growth before an absolute reduction of waste generation is achieved.

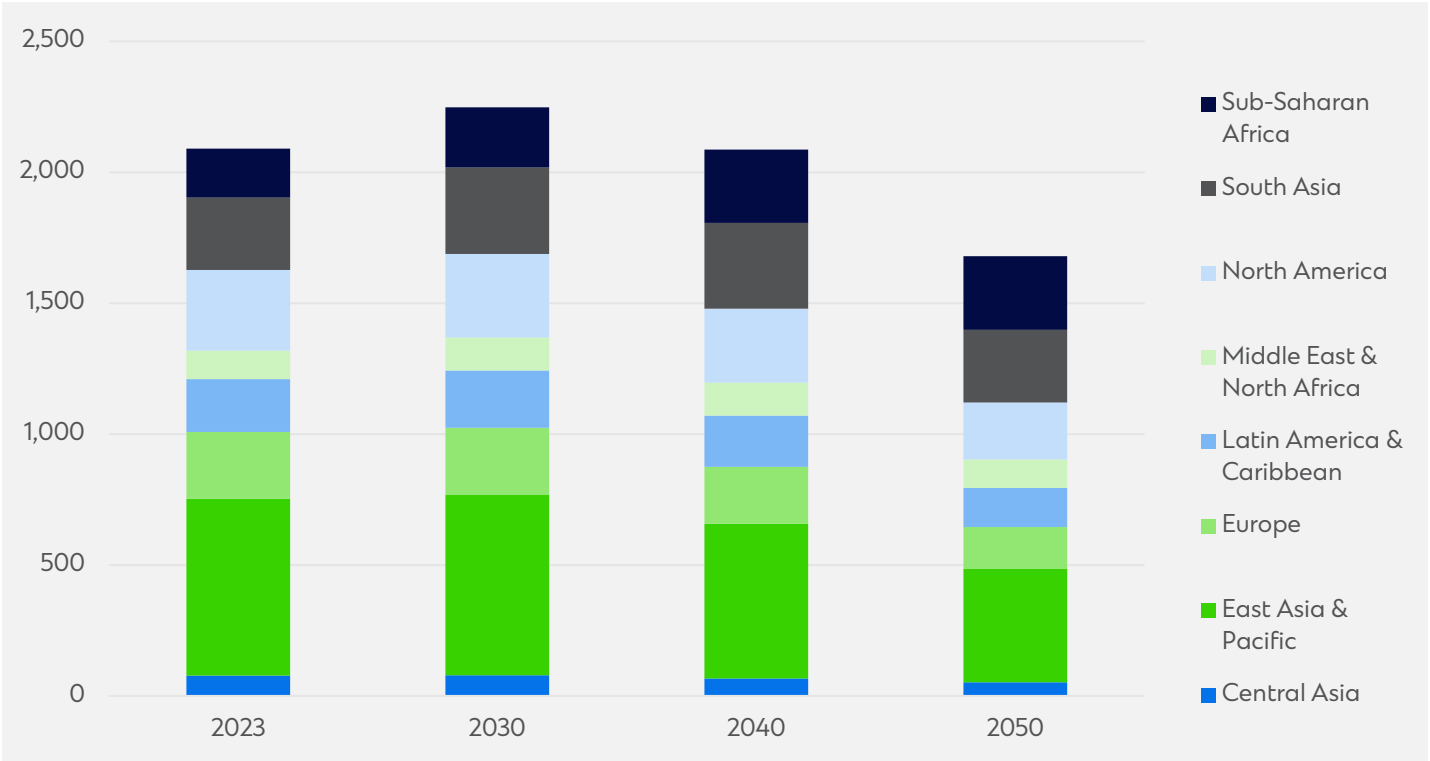
As part of our circular scenario we assume that high income countries manage to decouple waste growth from GDP growth by 2030 but we do not expect this to happen for low-income countries until 2040. By 2050 we believe that high income countries will have achieved a 25% reduction in waste-per-capita relative to 2040 levels whereas we assume a 5% reduction in low-income countries.

Recycling adoption

In addition to waste generation, we also model how treatment of generated waste might change in our circular scenario. We expect every region to achieve a 100% waste collection rate by 2050 and expect the share of uncontrolled waste to reach 0% by 2050. The circular scenario assumes that the share of recycled waste will increase to 70% in the case of Europe and to 50% for countries across the Global South.

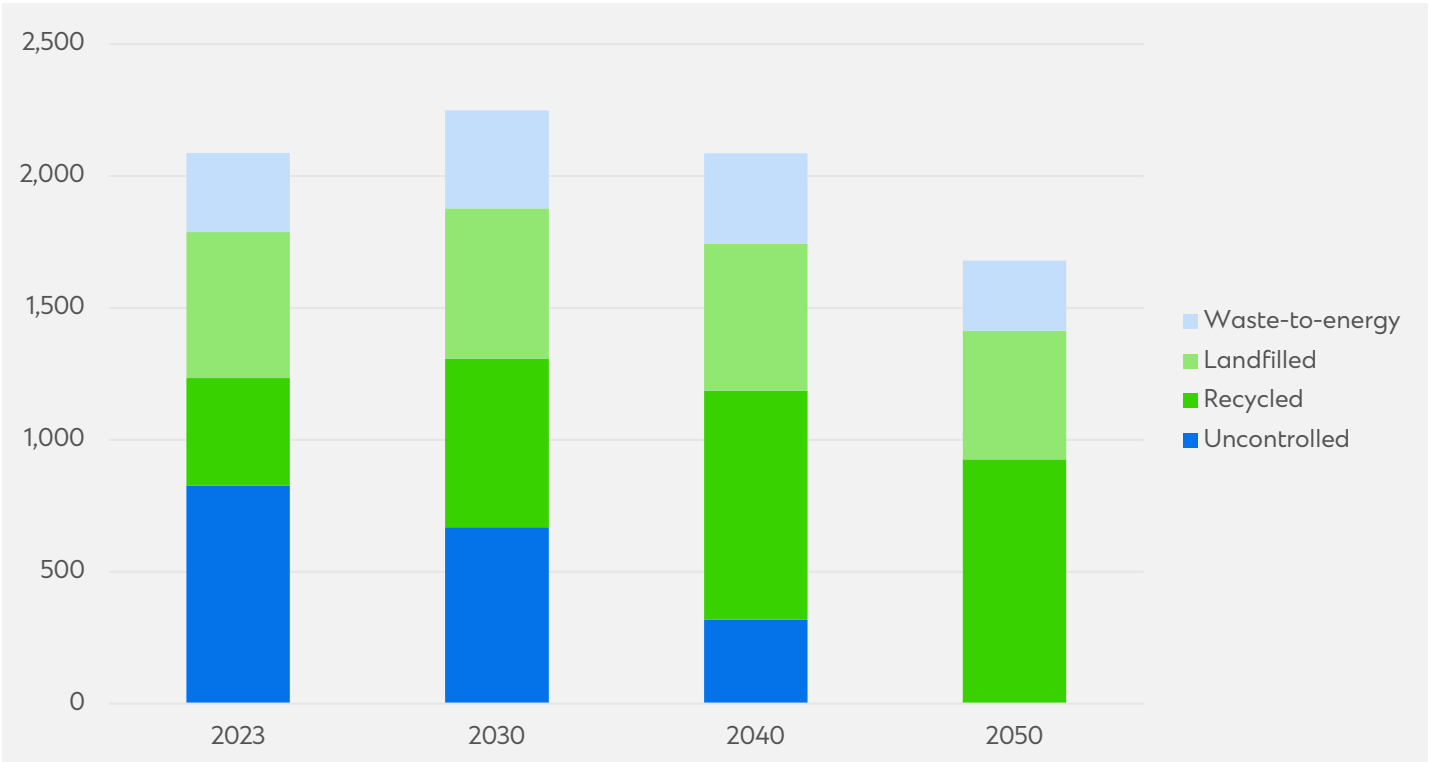
Based on these assumptions, we calculate that total waste generation in our circular scenario will increase by 2030 to 2.2 trillion tonnes or 6% lower than in our business-as-usual scenario. By 2050, waste generation in our circular scenario may have fallen to 1.7 trillion tonnes (Figure 19).
This level of waste would not only be 20% lower than current waste levels but it would also be c50% lower than what we believe could be generated in the business-as-usual scenario.

Figure 19: Circular scenario waste generation estimates
Billion tonnes per year



Source: World Bank, UN, Standard Chartered

Figure 20: Circular scenario waste treatment estimates
Billion tonnes per year



Source: World Bank, UN, Standard Chartered

The benefits of a global circular waste sector could reach USD912 billion

Applying capital investment estimates from the Nordic Council associated with waste management activities to our waste projections suggests that a circular waste approach may require an additional USD450 billion of investments relative to the investments that are likely needed in our business-as-usual scenario. In the remainder of this chapter, we show that the potential benefits of a circular waste approach can be more than twice the level of associated costs.

Circularity can reduce waste management costs by almost USD500 billion

Managing waste costs money. The potential for a long-term decline in waste generation as predicted in our circular scenario therefore provides a financial incentive for governments to focus on circularity. We have modelled the costs of operating and managing waste systems in our business-as-usual and circular scenarios. To do this we used 2018 waste cost data (Kaza, et al., 2018) and adjusted this for inflation since 2018. It shows that collecting waste cost USD176 per tonne in a high-income country and USD42 per tonne in a low-income country. Recycling costs range from USD15 per tonne in a low-income country to USD67 per tonne in a high-income country. The cost of converting waste-to-energy ranges from USD91-146 per tonne whereas landfilling costs range from USD18-85 per tonne.

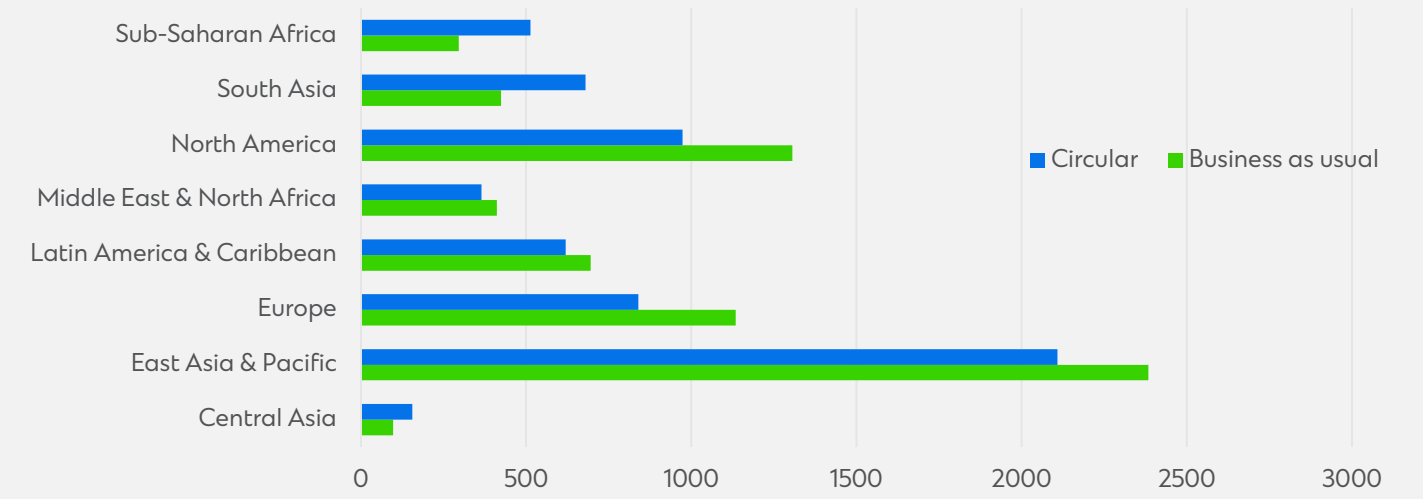
Applying these cost estimates to our waste projections implies that annual waste costs may reach USD243 billion by 2030 in a business-as-usual scenario before increasing to USD281 billion in 2040 and USD318 billion by 2050. Our annual projections suggest that the global cumulative cost of managing waste in a business-as-usual scenario is USD6.75 trillion for the 2025-2050 period. Switching to a circular approach to waste management, as reflected in our circular scenario, would lower these costs by almost USD500 billion over the 2025-2050 period (Figure 21).

These waste projections show that low-income countries across South Asia and Sub-Saharan Africa are likely to face a strong increase in waste generation as their populations increase, urbanisation continues, and income levels rise. This, by implication, also means that these regions will see an increase in waste management costs. The increase in waste management costs for these regions is set to be even stronger in our circular scenario given that it assumes that all waste will be treated rather than being disposed of in an uncontrolled way.

Our estimates suggest that adopting a circular waste strategy as opposed to our business-as-usual approach will increase waste management costs for countries in South Asia and Sub-Saharan Africa by cUSD473 billion over the 2025-2050 period (Figure 22).

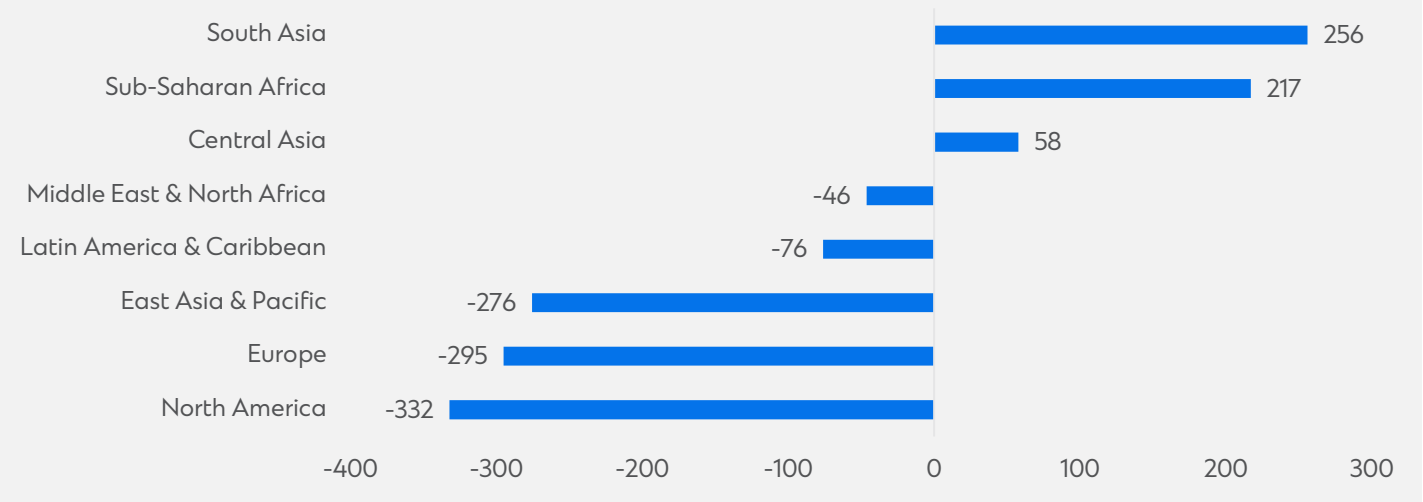
Funding such cost increases may be challenging for these low-income countries, however our regional forecasts point to a possible solution. Switching to a circular waste management approach may reduce waste management costs for countries in Europe and North America by a cumulative USD627 billion for the 2025-2050 period. They could use some of these savings to help fund the increased waste management cost that lower income regions face.

Figure 21: Cost comparison between waste scenarios USD billion, 2025-2050



Source: World Bank, UN, Standard Chartered

Figure 22: Regional changes in waste costs between scenarios USD billion, 2025-2050



Source: World Bank, UN, Standard Chartered

Avoided emissions may be worth USD82 billion

The benefits of adopting waste recycling and circular solutions go beyond the direct cost savings associated with the management of waste. One of the indirect benefits is the GHG emissions avoided by adopting waste reduction strategies. To gauge the potential size of these benefits, we have estimated the emissions that can be avoided if countries switch from the business-as-usual to the circular scenario. We have also valued these avoided emissions by applying a carbon credit price for each tonne of CO2-equivalent.

Methodology for estimating avoided emissions

A range of publications have provided estimates of the level of emissions generated by different types or categories of waste. Examples include Greenhouse gases from landfills and Greenhouse gas emission factors for recycling of source segregated waste materials. To calculate a country's waste-related emissions, we used emission estimates for different waste categories (Department for Envrionment Food & Rural Affairs, 2022) and (Turner, et al., 2015) and multiplied these by our estimates for the level of waste generated per category for each of the countries in our sample.

To be able to estimate the amount of waste generated by category, we used data from the World Bank, which provides in its 'What a Waste 2.0' publication a breakdown of waste by category for countries based on their average GDP-per-capita (Figure 23).

We assumed that every country in a particular GDP-per-capita group has the same waste breakdown as given by the World Bank.

Figure 23: Waste composition for countries based on average income levels

Income group	Food and green	Glass	Metal	Other	Paper and cardboard	Plastic	Rubber and leather	Wood
Low income	56%	1%	2%	27%	7%	6%	1%	0%
Lower-middle income	53%	3%	2%	17%	13%	11%	1%	1%
Upper-middle income	54%	4%	2%	15%	12%	11%	1%	1%
High income	32%	5%	6%	11%	25%	13%	4%	4%

Source: World Bank, Standard Chartered

Emission estimates related to waste categories vary depending on how the waste is treated. For our calculations we use four different treatments consisting of recycling, landfilling, waste-to-energy or incineration, and uncontrolled waste. Emission data related to these treatments are listed in Figure 24. A negative number represents the emission savings that are achieved through the adoption of a certain waste treatment for a given type of waste. This is especially relevant in the case of recycling.

Figure 24: Emission waste factor associated with different waste treatments (kg CO2eq/tonne of waste)

Waste treatment	Food and green	Glass	Metal*	Other*	Paper and cardboard	Plastic*	Rubber and leather*	Wood
Recycling	0	-326	-4851	-512	-113	-576	-654	-477
Landfilling	592	9	9	419	1042	9	445	828
Waste-to-energy	-70	8	21	229	-216	1802	438	-268
Uncontrolled	592	9	9	419	1042	9	445	828

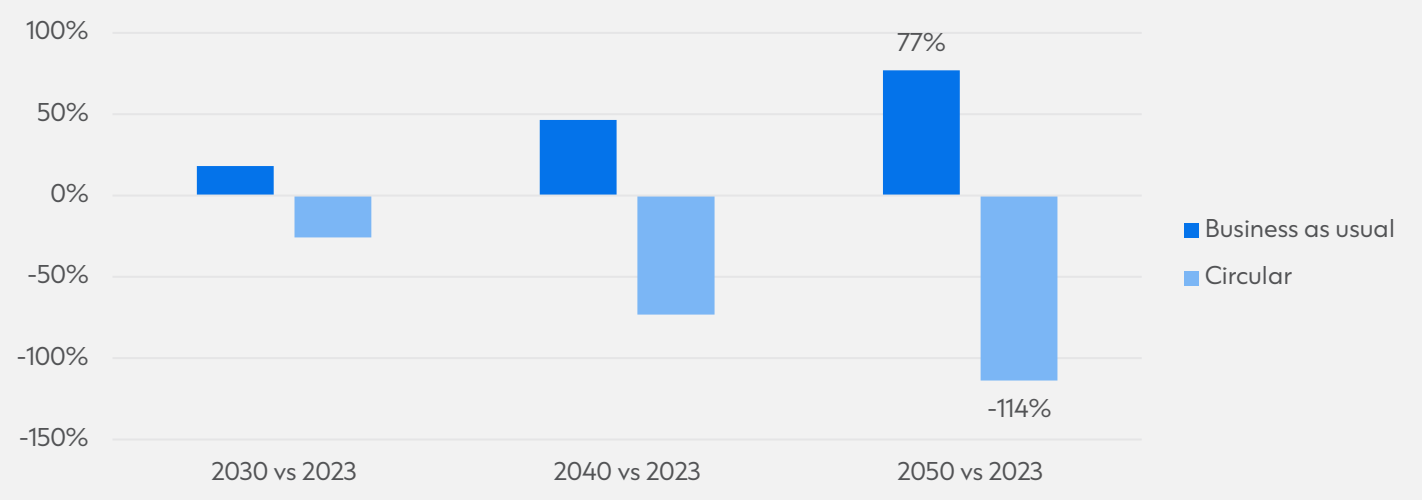
* Source: DEFRA, Turner et al, Standard Chartered * Metal: average for steel, aluminium and copper, Other: Uses other waste and recycling category of Defra, Plastic: average of PET, HDPE and dense plastics, Rubber and leather: Uses car and van tyre data from Turner et al

We note here that our calculations of waste-related emissions by country carry significant uncertainties as they are highly dependent on methodological choices, assumptions regarding waste generation, and the quality of the raw waste and emissions data. This suggests that assessing our calculations between the business-as-usual and circular scenario is as relevant as focusing on the absolute estimates for each scenario individually.

The assumptions we have made here around waste generation and the emission intensity of waste treatment provide us with the following conclusions:

- Our business-as-usual scenario implies that waste-related GHG emissions will increase by 77% between 2023 and 2050. Adopting a circular waste strategy would allow waste-related emissions to fall by 114% (Figure 25).
- Every region gains from switching to a circular waste strategy. By 2050, our estimates suggest that circular-related waste emissions can be between 90% and 200% lower for most regions than they would be if they had continued a business-as-usual strategy. Emissions in Europe fall too on our estimates although by less than for the other regions. The key reasons for this are that Europe is already recycling more than other regions and is expected to hit its peak recycling rate of 70% by 2040, which is earlier than other regions. This means that a further reduction in total waste after 2040 generates less recycled material and therefore reduced benefits from avoided carbon emissions.

Figure 25: Waste related GHG emissions by scenario % change relative to base year of 2023



Source: World Bank, UN, DEFRA, Turner et al, Standard Chartered

Valuing avoided emissions

Countries adopting circular waste strategies to reduce waste generation, increase recycling and therefore avoid emissions might be able to sell these avoided emissions via the creation of voluntary carbon credits. Each such credit would represent one tonne of avoided GHG emissions. The total value of the avoided emissions through the adoption of a circular waste strategy would be equal to the avoided emissions multiplied by the value of each carbon credit.

We note that significant uncertainties exist around the creation and potential value of voluntary carbon credits. One of the key issues relates to the concept of additionality of the avoided carbon. In essence this relates to the question of whether the creation of the voluntary carbon credit was the key driver for the action taken to avoid the emissions, or in fact whether a country would have taken the action anyway.

Through engagement with Standard Chartered's carbon team we have assessed a prudent approach to valuing the avoided waste-related emissions associated with our circular scenario. We incorporate the carbon team's view that less developed countries are more likely to be able to make the argument that avoided emissions-related carbon credits are essential to fund the development of a circular and recycling focused waste strategy. This in their view should translate into greater demand for such credits and, by implication, higher prices for these credits too. We value the avoided emissions by applying a regional carbon credit price. We use a range of USD25 for a credit created by countries in Sub-Saharan Africa to USD5 for a credit generated by countries in Europe and North America.

By multiplying the avoided emissions by region by our region-specific carbon credit price we calculate that the annual value of avoided emissions globally reaches USD3.4 billion in 2030 and increases to almost USD18 billion by 2050. Our approach implies that the value of all emissions avoided during the 2025-2050 period by switching to our circular waste strategy can reach USD82 billion. Credits related to waste strategies adopted in Sub-Saharan Africa could be worth more than USD28 billion, followed by South Asia (cUSD20 billion) and East Asia & Pacific (USD14.6 billion).

Circularity can reduce the cost of externalities by USD336 billion

Moving to a more circular approach of waste management not only reduces direct costs but also lowers externality costs associated with the impact of waste on climate change, biodiversity loss and pollution. Environmental prices can be used to calculate the social cost of particulate matter or products. One of the main publications that highlights environmental prices for different products is the Environmental Prices Handbook (Bruyn de, et al., 2018).

We have used the Environmental Prices Handbook to estimate the reduction in waste-related externalities from the adoption of more circular waste management practices. Multiplying the difference in emission levels between the two scenarios with the stated externality cost of EUR56.6 per tonne of CO2 equivalent provides an estimate of the cost differential of externalities that a move to circular waste treatment can generate.

Based on our cumulative avoided emission estimates for the various regions in the 2025-2050 period, we calculate that switching to a circular economy can reduce the total level of externality costs by cUSD336 billion. Countries across East Asia & Pacific and Sub-Saharan Africa would see the greatest benefit from a switch to circularity as this would lower their externality costs from waste by USD94 billion and USD73 billion respectively.

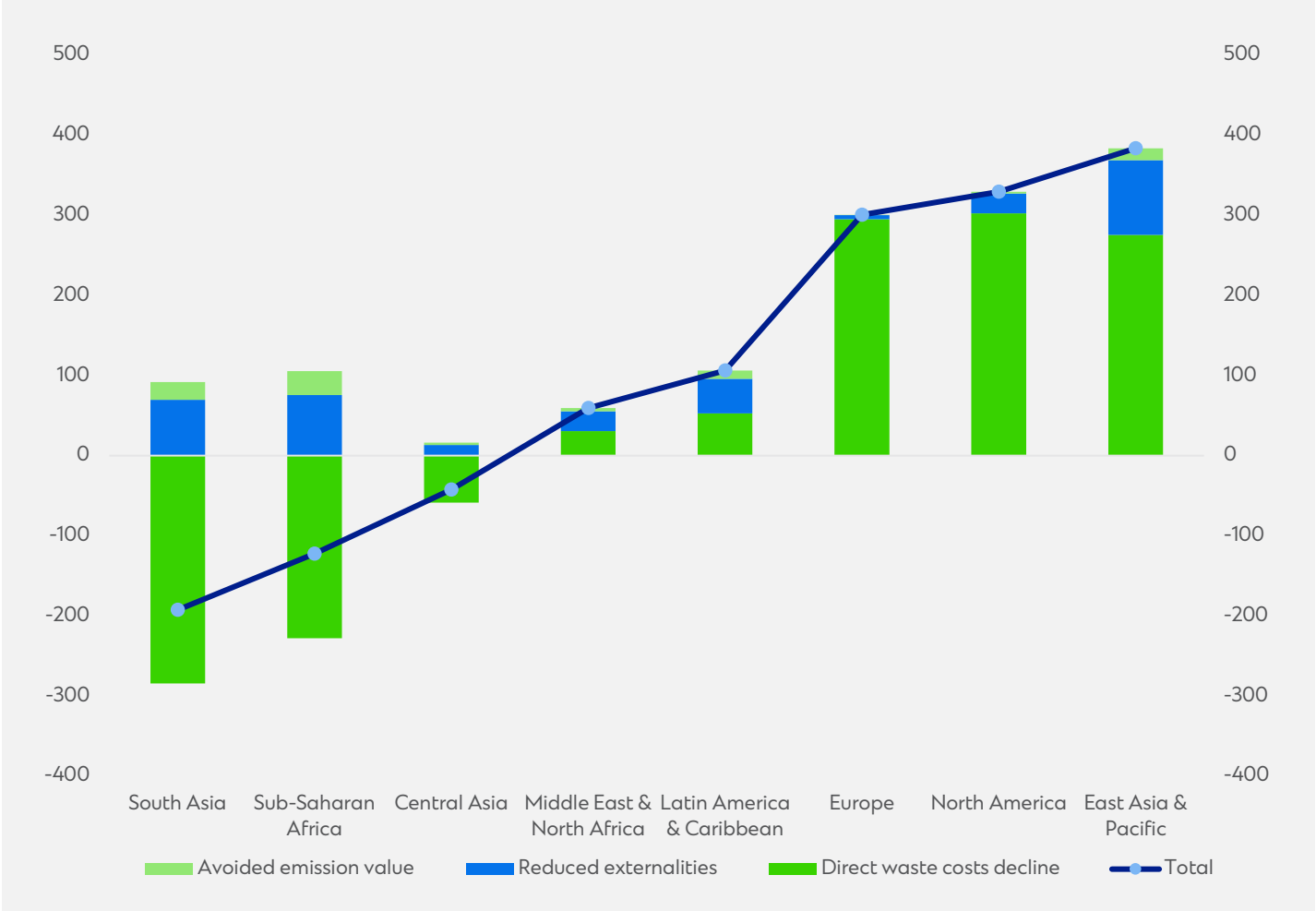
A circular waste model may provide a USD918 billion benefit

Combining our calculations for the reduction in waste costs (USD500 billion), avoided emissions (USD82 billion) and reduced externalities (USD336 billion) by region suggests that adopting a circular waste program globally may yield total benefits of cUSD918 billion over the 2025-2050 period. Countries that are likely to see the biggest benefits include those in East Asia & Pacific, North America, and Europe (Figure 26).

Countries across South Asia, Sub-Saharan Africa and Central Asia, on the other hand, are likely to face higher waste-related costs in a circular scenario. Reasons for this are the need to reduce current high shares of uncontrolled waste, and simultaneously increase waste management capacity as expanding populations, urbanisation and income levels will push waste generation higher. Developing countries often face challenges when trying to attract investment. However, in this case we believe that a pathway exists if developed countries accept that waste knows no boundaries. It often gets exported by developed countries to the developing world and emissions and pollution affect the world at large.

Countries across Europe and North America may see total benefits of USD657 billion during the 2025-2050 period. This is double the USD328 billion in total cost increases that we estimate countries across South Asia, Sub-Saharan Africa and Central Asia are likely to face as they adopt circular waste strategies. Giving up half of the potential benefits would fund these cost increases and still leave USD329 billion in net savings for Europe and North America.

Figure 26: Costs and benefits of adopting a circular waste programme by region
USD billion, cumulative impact for the 2025-2050 period



Source: World Bank, UN, DEFRA, Turner et al, Standard Chartered

05

Unlocking finance to close a USD6.5 trillion circular funding gap

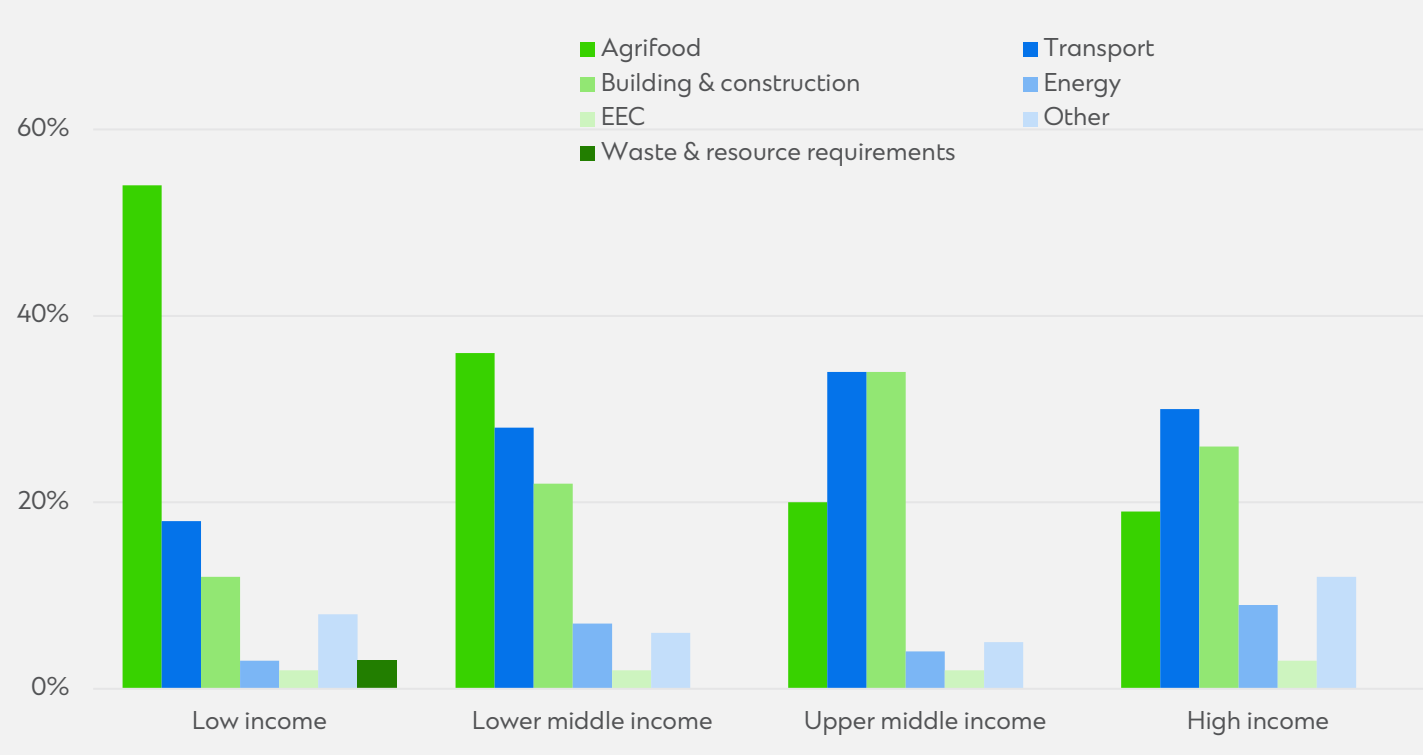
Despite the strong economic, social, and environmental benefits that a circular economy provides, finance is yet to flow at scale towards these solutions. In this chapter we estimate that the circular funding gap ranges between USD6.5-13.4 trillion and highlight a range of financial solutions that may help close this gap.

Most businesses can improve economic resilience by adopting circular solutions. However, not all have the same circular potential. For our funding gap analysis we have included a sub-set of sectors and economic activities that have high material or environmental intensity.

The UNEP Global Material Flows Database provides insight into the broad sectors that account for most raw material demand. The latest data shows that in 2020, 84% of all global material demand was related to three sectors: the food system (agrifood), the building and construction sector, and the transport sector (Figure 27).

To assess the relative environmental footprint of different economic activities we used materiality dependency ratings from the ENCORE (Exploring Natural Capital Opportunities, Risks and Exposure) database. These ratings suggest that activities related to agrifood, building and construction, transport, chemicals, plastics and textiles have significant environmental intensity. This focus is aligned with that of various other major reports, including the IRP, UNEP and the sector focus of many national strategies, including the EU and UK.

Figure 27: Share of material footprint by sector and country income group (2020)*



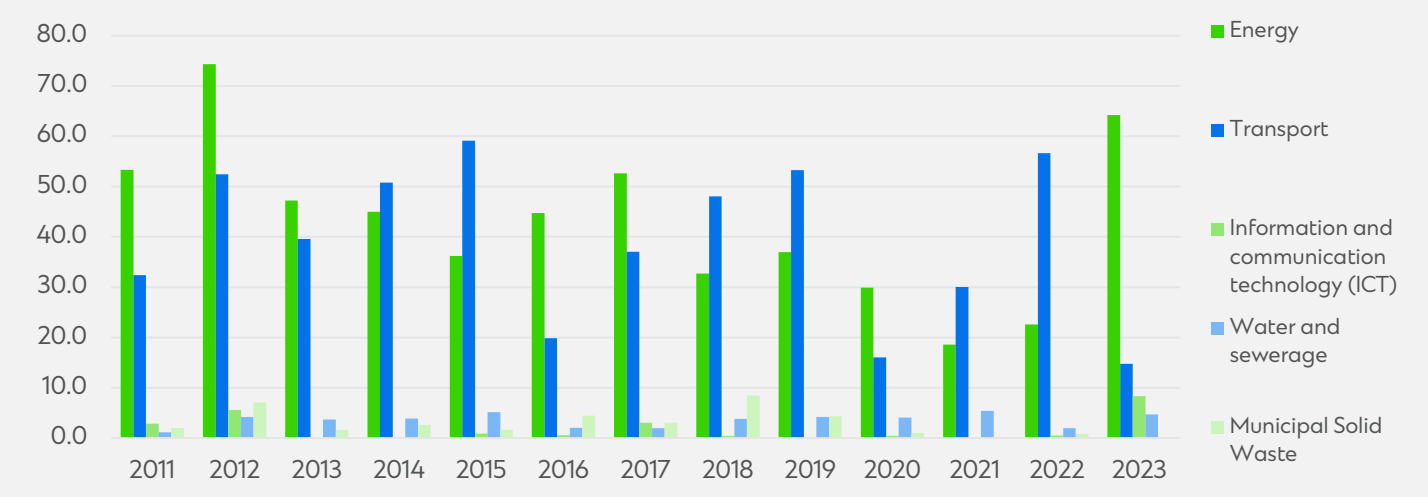
Source: UNEP, Standard Chartered Research * EEC = Electronics, electrical equipment and communications

The circular economy faces a significant funding gap

The lack of commonly agreed definitions and frameworks makes it very challenging to accurately estimate the current level of investment activity directed towards the circular economy. One study found that worldwide public spending on the circular economy totalled cUSD500 billion in 2019/2020 (Schroder, et al., 2021).

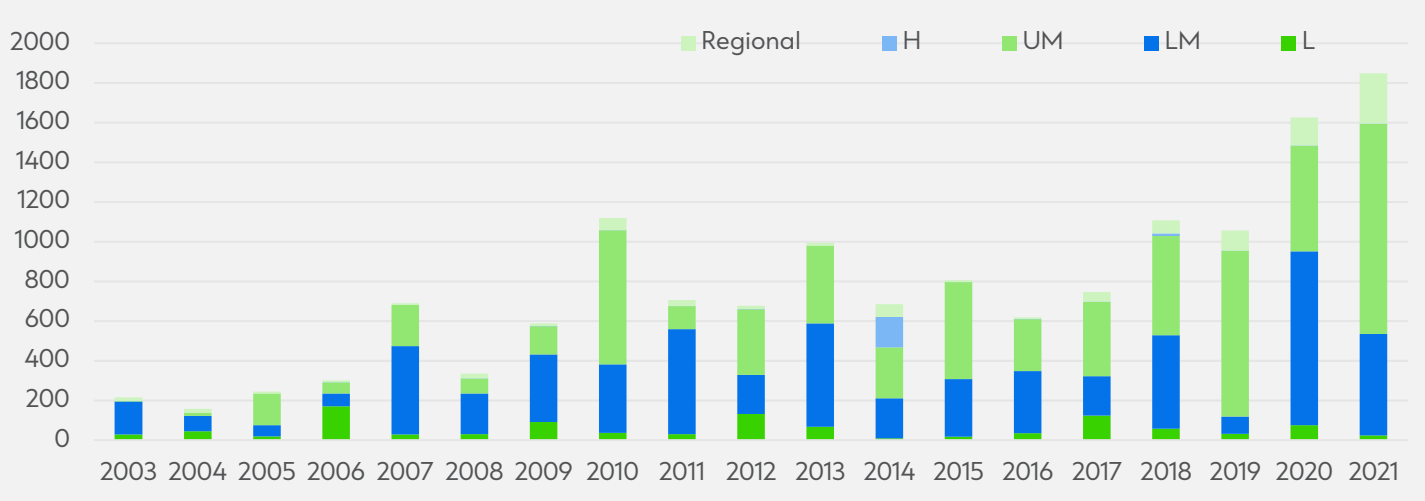
The investment shortfall for the developing world is even more significant as many countries lack sufficient waste collection, recycling, and treatment infrastructure. Data from the World Bank show that total infrastructure investments across the developing world reached cUSD92 billion in 2023 (Figure 28) (World Bank, 2025). Of this, investments in waste and water and sewage treatment accounted for less than 8% while annual investments in municipal waste projects reached just USD400 million during the latest three years for which data is available.

Figure 28: Investments in infrastructure projects with private participation across developing countries USD billion



Source: World Bank, UN, Standard Chartered

Figure 29: Official development finance flows related to solid waste projects across developing countries
USD million, broken down by income level (L=Lower, LM=Lower-Middle, UM=Upper-Middle, H=Higher)



Source: Lerpinierre et al (2025), Standard Chartered

Work from (Lerpinierre, et al., 2025) regarding development finance shows a similar story. Investments directed towards solid waste, water and sanitation projects increased from cUSD4 billion in 2003 to cUSD13 billion in 2023. However, most of this was directed to water and sanitation projects as investments in solid municipal waste projects reached just USD1.8 billion in 2023 (Figure 29).

Creating circular sectors likely requires at least USD7 trillion of investments

Mobilising more public and private capital towards circular solutions is one of the key barriers to achieving a fully integrated circular economy. To assess the magnitude of additional circular financing required to enable a global transition towards a circular economy we have reviewed the investment requirements for some of the key circular end markets for the period until 2035. The main conclusions are shown below but we refer to the appendix where we explain our methodology for calculating these investment requirements in more detail.

After deducting current investment activity, we see a circular funding gap of at least USD6.5 trillion

While we estimate total circular funding requirements to be at least USD7 trillion, we note that some of these may be covered by existing public and private investment activity. Across the activities highlighted above, we calculate that current funding of circular-related investments may reach USD563 billion for the period until 2035. This implies a circular financing or funding gap to cover the above-mentioned investment requirements of at least USD6.5 trillion (Figure 30).

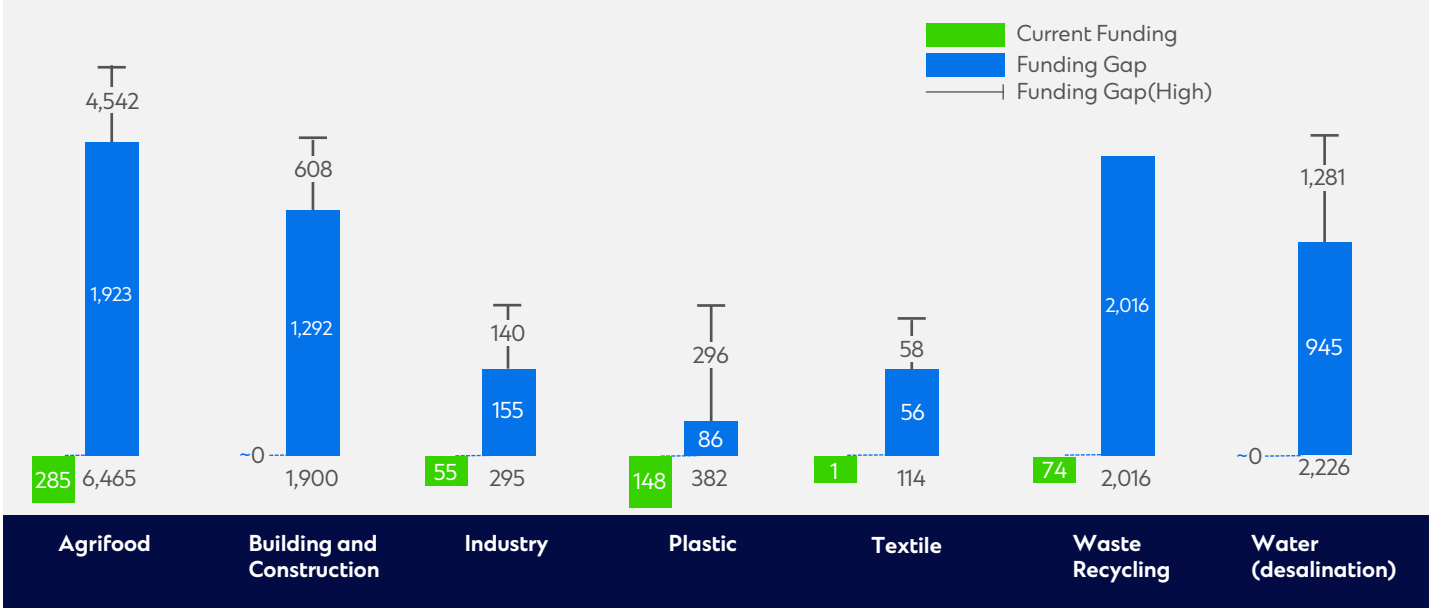


Figure 30: Circular funding gap for the period until 2035 USD billion

Sector	Investment Low	Need High	Current funding	Funding Low	Gap High
Agrifood	2,208	6,750	285	-1923	-6465
Building and Construction	1,292	1,900	Not meaningful	1,292	1,900
Industry (Steel, Aluminium, Cement)	210	350	55	155	295
Plastic	234	530	148	86	382
Textile	57	115	1	56	114
Waste recycling	2,090	2,090	74	2,016	2,016
Water (desalination)	945	2,226	Not meaningful	945	2,226
Total	**7,036**	**13,960**	**563**	**6,473**	**13,397**

Source: : CPI, FAO, WEF, Bloomberg, Nordic Council, World Bank, McKinsey, WRI, Standard Chartered

Figure 31: Circular economy-related financial exposure USD billion,

Investor type	USDbn
Commercial bank lending	20
Regional and development banks	49
Private Equity	42
Public Equity	42
Corporate bonds issued	116
Total	**270**

Source: Organisations, Standard Chartered, Bloomberg

Three points are worth highlighting:

There is a degree of uncertainty regarding our estimates given the previously stated concerns regarding data consistency, accuracy, and availability in relation to the adoption of circular economy solutions.

Most of our estimated circular funding requirements are likely to fall on the developing world given its relative lack of infrastructure across areas such as municipal waste, plastic recycling, and agriculture.

Our overall investment and funding gap calculations do not include some important sectors most notably transport. Therefore, the total circular funding gap may well be substantially larger than our current estimates.

To put our estimate for the circular funding gap into context we have calculated what the total current financial exposure of investors and lenders to the circular economy is. Summing the on-balance sheet exposure of commercial banks, lending by regional and development banks, equity investments both public and private, and corporate bond issuance we estimate that total current financial exposure to the circular economy is USD270 billion (Figure 31).

Our estimate of USD270bn is conservative as this is only based on publicly disclosed information. For example, our USD20bn estimate for commercial bank lending is only based on data for a few European banks with specific circular economy activities. Total bank lending across the entire global banking system is therefore likely to be substantially larger than our estimate.

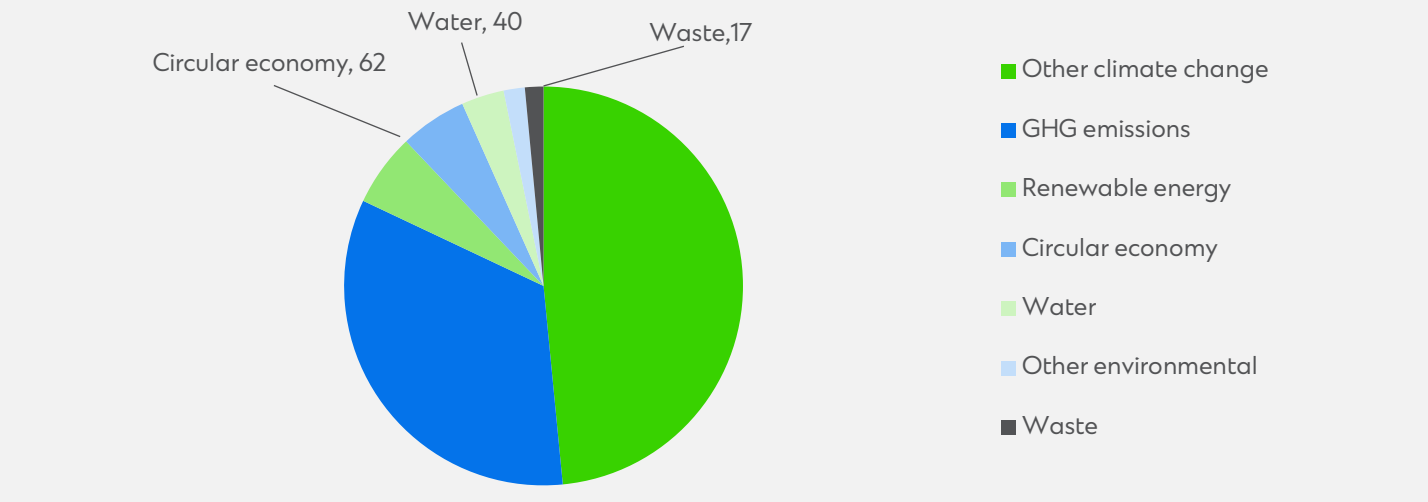
Risk-reducing financing solutions and avoided carbon help close the funding gap

A review of circular economy-related finance flows during the past few years suggests that to increase funding to close the above-mentioned funding gap likely requires a broadening of financial instruments or investment approaches.

Sustainable finance data from Bloomberg shows that the total issuance of sustainability-linked bonds and loans with a focus on the circular economy, waste or water projects reached almost USD119 billion since 2016 (Figure 32). While issuance levels increased rapidly between 2018 and 2021, less than USD20 billion per year was raised between 2023 and 2024 (Figure 33).

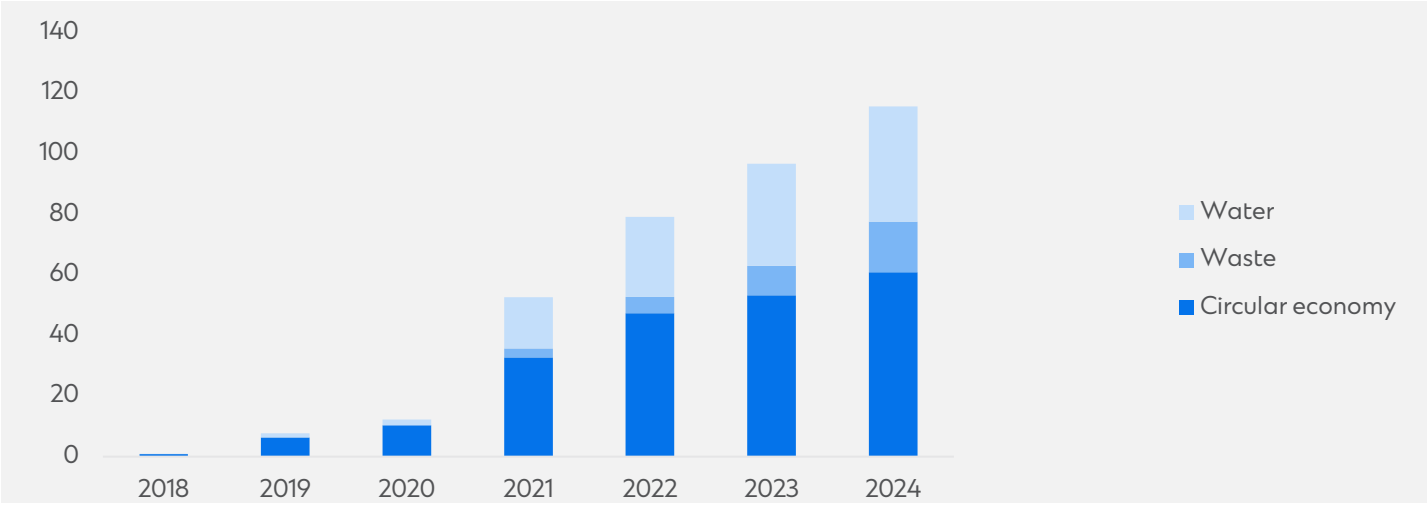
Investor appetite for circular debt appears healthy as indicated by a recent transaction involving Adapteo, a company offering modular or circular building solutions. The company raised EUR2 billion spread across green private-placement notes, green bank loans and revolving credit facilities with investor demand totalling three times the offer size (Adapteo announces landmark EUR2 billion investment grade green financing).

Figure 32: Issuance of sustainability-linked bonds and loans with environmental sub-categories USD billion 2016-2025



Source: Bloomberg, Standard Chartered

Figure 33: Cumulative issuance of sustainability-linked bonds and loans related to circular economy, waste and water projects USD billion

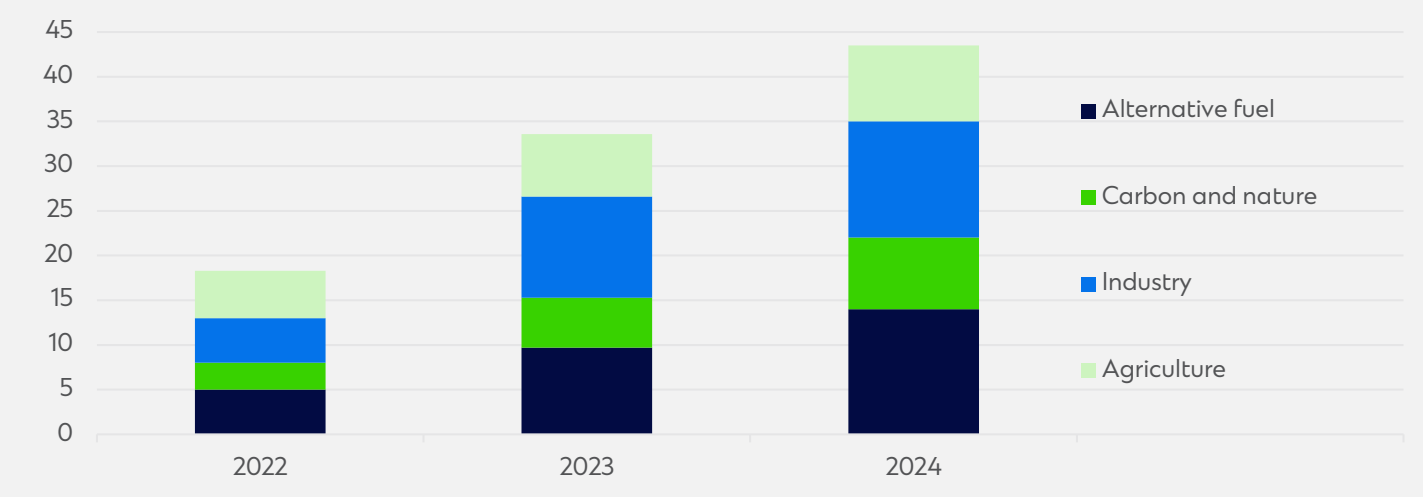


Source: Bloomberg, Standard Chartered

Data for equity-related financing also suggests that finance flows towards circular economy solutions need to increase. Bloomberg's latest Energy Transition Investment Trends 2025 report shows that 40 different solution areas in alternative fuels, carbon and nature, clean industry and agriculture attracted less than USD10 billion in equity funding last year (down from cUSD18 billion in 2022). Across the three years just over USD40 billion was invested in these solutions (Figure 34). The fact that 90% of this equity funding was venture capital and private equity-related suggests that most circular solution providers seeking funding are in the early stages of their development.

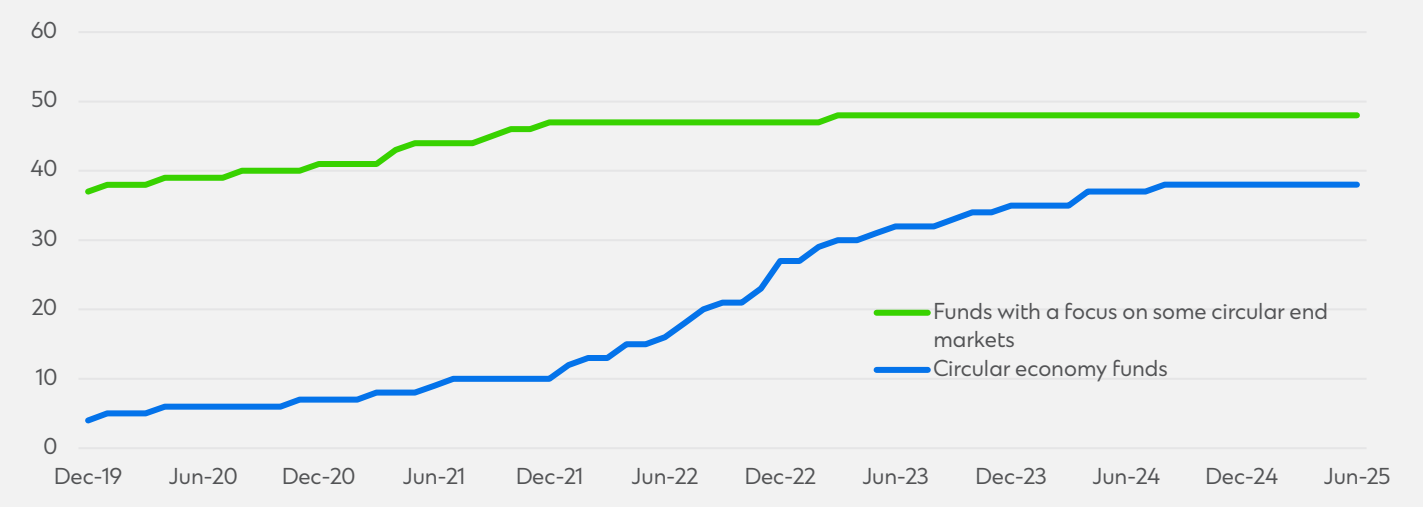
Interest in public equity investments in circularity-related companies has started to pick up during the past few years. The number of circular economy equity funds listed increased from less than 5 in 2019 to almost 40 this year. There are also almost 50 funds with an investment strategy that includes a focus on circular economy-related end markets such as waste, recycling, and clean water (Figure 35). Total assets under management for these funds is USD8 billion in case of the circular economy specific funds, and USD35 billion for the funds that have circular economy markets as part of their broader investment strategy. Given the extent of public and private sector focus on this topic and the investment requirements associated with creating a circular economy, we believe that public equity exposure to circular economy related companies and sectors may increase.

Figure 34: Equity financing in circular-related sectors USD billion



Source: Bloomberg, Standard Chartered

Figure 35: Circular economy related equity funds Number

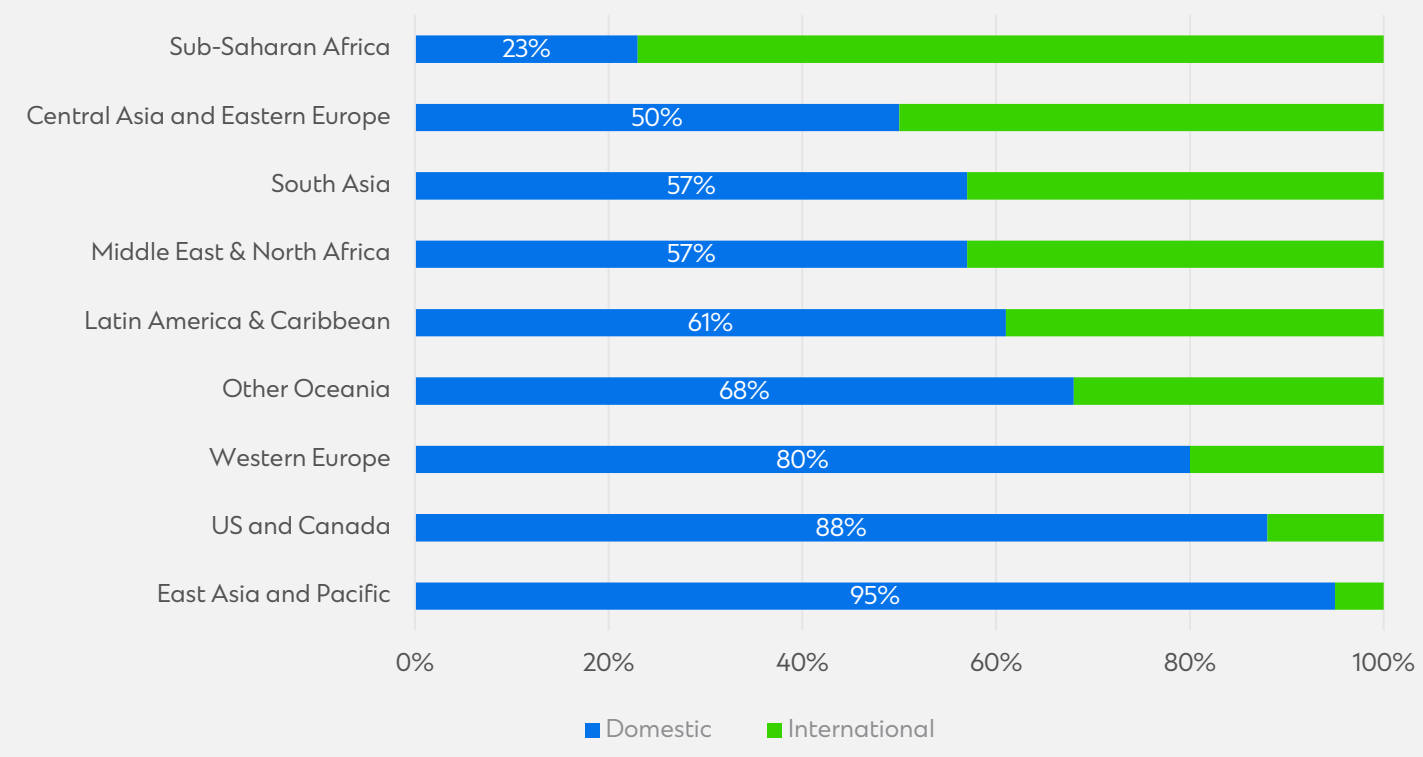


Source: Bloomberg, Standard Chartered

International funding is needed to help scale the circular economy across the developing world

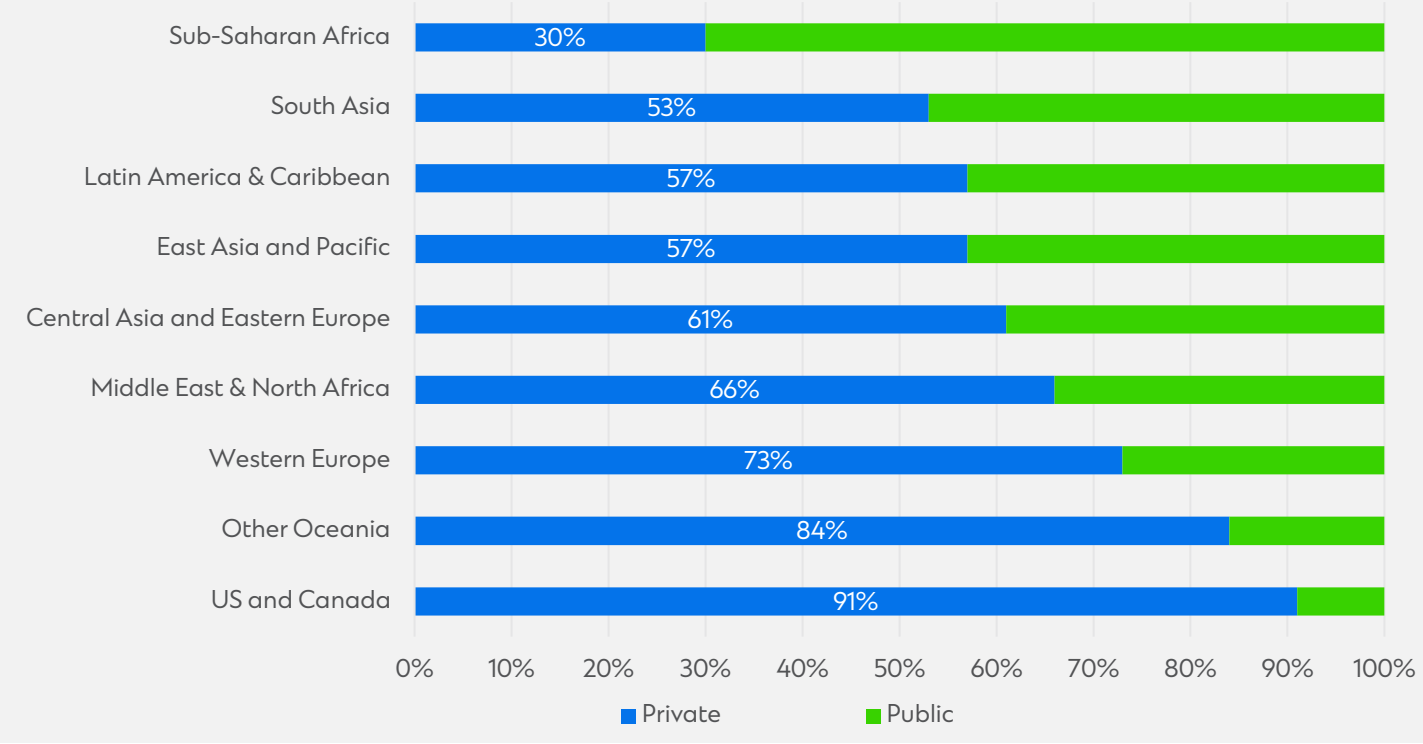
To scale circular economy investments successfully across the developing world requires support from international funding sources. Climate finance data shows that the majority of funding in mature markets was sourced domestically. In contrast, across Central Asia and Eastern Europe and Sub-Saharan Africa, only 50% and 23% of funding respectively was provided by domestic sources (Figure 36). In addition to a greater reliance on international funding for climate projects, we note that developing countries also rely more than countries across the Global North on public rather than private funds (Figure 37).

Figure 36: Climate finance split by funding source 2023



Source: Climate Policy Initiative, Standard Chartered

Figure 37: Climate finance split by private-public source 2023



Source: Chatham House, Standard Chartered

Developing countries rely heavily on foreign and public climate finance funds. This is likely to be the case for circular economy-related projects too. Part of the reason for this in our view is the fact that domestic capital may not be available in sufficient quantity. This means that until private domestic capital markets across the Global South reach sufficient scale, liquidity and capacity, scaling circular economy funding in these countries will require increased engagement from international sources. Governments in developing countries should continue to develop policies and regulations that support the development and risk profile of their domestic private capital markets. Some current regulations such as Basel III rules make foreign investments into developing countries less attractive due to their perceived higher-risk profiles. Incorporating circularity-related risk into regulations such a Basel III could help lower this barrier.

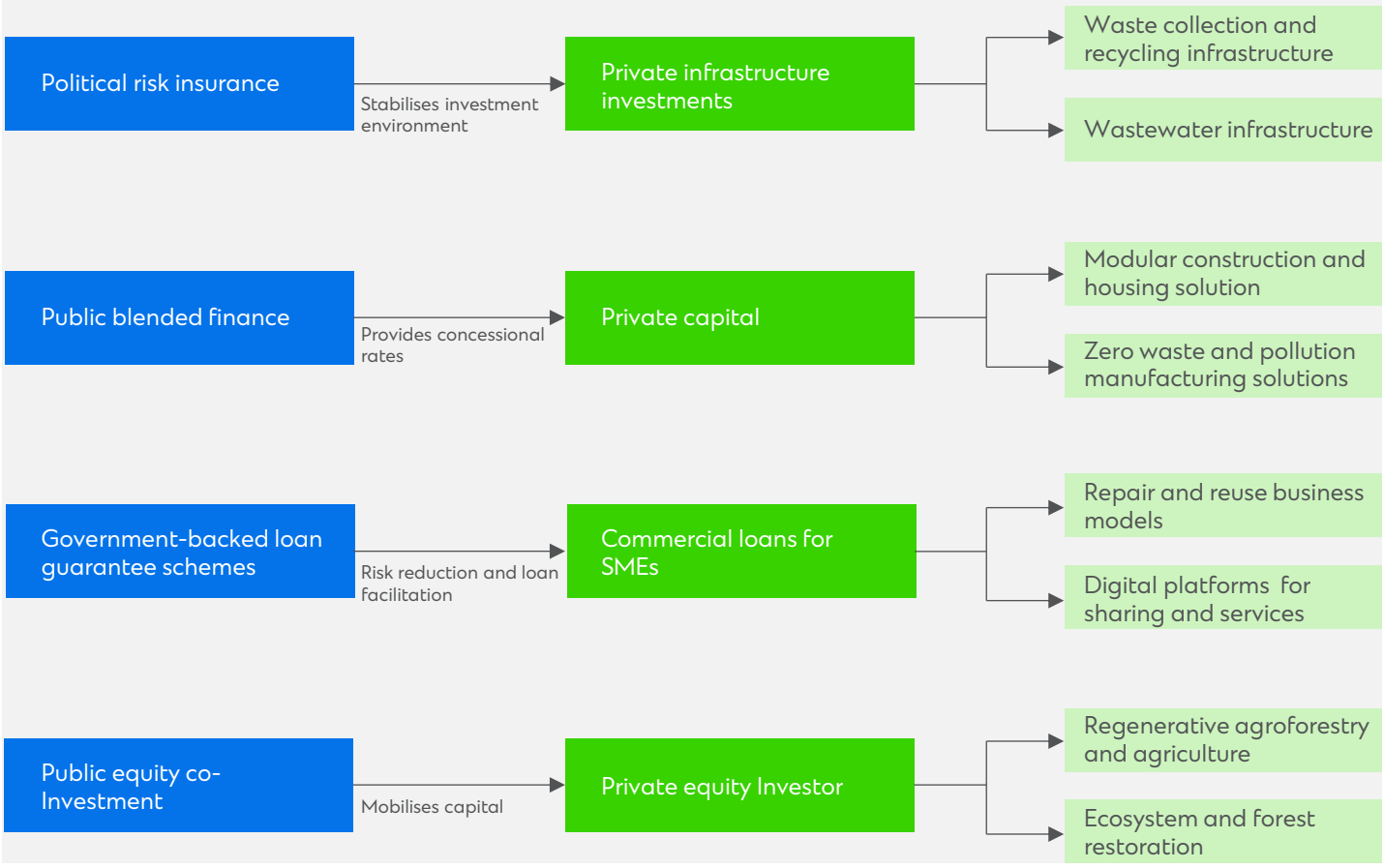
Innovative finance solutions are needed to scale the circular economy

Data for climate finance demonstrates that the universe of finance solutions available to help scale circular economy investing needs to broaden. In 2023, more than 90% of climate finance expected market-rate returns whereas only 7% was made up of concessional finance such as grants, philanthropies, or blended finance (Climate Policy Initiative, 2025).

Data from the CPI shows that the share of concessional climate finance across emerging countries, excluding the least developed nations, was 35% in 2023. We believe that this share is low given the relative risk profile for these countries and the fact that local capital markets are often not developed or liquid enough to provide sufficient private funds.

Blended finance is one approach that could be catalytic in unlocking greater circular economy investments across the developing world as it reduces the risk profile of these investments. There are other financial structures that will help scale funding by crowding-in private capital through risk reduction. These include revenue or return guarantees or insurance mechanisms that offset downside risks such as political risk. Figure 38 lists examples of some of these (Schroder, et al., 2021).

Figure 38: Financing structures that help scale circular economy investments



Source: (Schroder, et al., 2021), Standard Chartered

Other real-life examples of innovative approaches to scaling circular investments include:

Combining government and private funding

One of the potential reasons why circular economy related investments have yet to accelerate sufficiently may be perceived investment risk. Governments may decide to provide guarantees to companies, which reduces credit risk and is likely to draw-in more private capital.

Venture capital teaming up with industry leaders

Venture capital funds can play a key role in not only driving equity funding of circular solutions, but also in applying their deep industry knowledge and access to industry leaders to help integrate a circular operation into the wider supply chain.

Supply chain engagement

Circular challenges and opportunities can be very sector specific and therefore require the development of sector-based circular strategies and policies. Leading businesses play a key role in driving both these strategies and circular adoption in their sectors. They are more established than start up circular companies, tend to have larger balance sheets to help fund investments and, importantly, are very, familiar with the organisation of their sector's entire supply chain and related challenges. All this means that they can help circular companies across the value chain optimise their strategies and offerings.

Avoided carbon as a potential funding source

While measurement and accounting for avoided emissions is challenging, there is growing recognition of the importance of this topic. Circular solutions that dematerialise or extend product life both keep invested energy in use longer and avoid additional carbon emissions in the production of new products and hence may qualify for carbon credits if they can prove that they prevent emissions. The sale of these credits would generate revenues that can help fund the investments needed to establish the circular solutions.

A full assessment of the avoided carbon potential that circular economy solutions have is beyond the scope of this report. However, as an indication, we refer to our chapter on waste recycling. In it we showed that the development of sufficient waste recycling capacity globally can help reduce waste-related emissions by 114% between 2023 and 2050 compared to a 77% increase in a business-as-usual scenario. Furthermore, we calculated that the value of these avoided emissions could reach USD82 billion with the majority of this created by avoiding emissions in Africa (USD28 billion), South Asia (USD20 billion) and East Asia & Pacific (USD15 billion).

Circular solutions reduce emissions relative to the status quo. This suggests that the topic of avoided emissions and related carbon credits as outlined in our chapter on waste is likely applicable to other circular solution areas too. Thus, avoided carbon could become a significant potential funding source for circular investments, provided that uncertainties regarding the functioning of voluntary carbon markets and carbon credits are addressed.

06

Critical levers for scaling circular investment

The level of the funding gap as estimated in the previous section shows that the need to scale circular economy-related investments is high. We have identified four levers that are essential to make this happen.

1. Recognise that the circular economy is fundamental to the delivery of climate and nature targets

During the past ten years countries and corporates around the world have become increasingly active in developing strategies that combat climate change and regenerate nature. Integrating circular solutions fully into climate and nature strategies is clearly apparent in EU Commission policies and regulation relating to product design

(Ecodesign for Sustainable Products Regulation (ESPR) and Energy Labelling Framework Regulation (ELFR), and regulation relating to Product Passports and Right To Repair (PPRTR). These policies make an explicit link between product life extension and reduced energy demand. Other public policy roadmaps are less explicit on this and far less developed which is a missed opportunity given that 55% of all GHG emissions are accounted for by biomass cultivation, mineral and fossil resource extraction and processing for materials, fuels, and food (United Nations Environment Programme, 2024). Circular solutions are ideally placed to address the material and energy intensity of these activities. This view is echoed by analysis from the Ellen MacArthur foundation which states that 45% of the 1.5°C target is dependent on delivery of circular economy solutions (Ellen MacArthur Foundation, 2021).

Adopting circularity lowers GHG emissions and the need for transition investments

All circular strategies – including re-use, repair, remanufacturing, and recycling – reduce demand for new products and virgin materials as existing products, components and materials are used for longer. This allows the circular economy to support climate objectives by:

- **Reducing carbon emissions** to help achieve net zero strategies and targets. We refer to our earlier comments on page 10 and shown in Figure 3 which outlined that GHG emissions fall 25% more in hard to abate sectors if circular solutions are integrated into decarbonisation strategies (Agora Industry, 2024). These reductions come in the form of avoided emissions, for example from not having to produce as much virgin steel or cement. We note that the topic of avoided emissions is gaining traction - see (WBCSD, 2025) and (SystemiQ, 2025) - and could help improve companies' and countries' strategic positioning and perception with investors.
- **Reducing net zero-related investment requirements.** The earlier cited analysis from Agora Industry showed that integrating circular solutions into decarbonisation strategies resulted in a 45% reduction in abatement costs in key sectors. This is due to circular economy strategies not requiring investment in novel, low carbon technologies in contrast to some suggested decarbonisation solutions such as hydrogen or carbon capture and storage which are in early-stage development and can be expensive. Opting for circular solutions can therefore provide a cheaper and more scalable strategy that can reduce GHG emissions more quickly.

Circular solutions also provide nature-positive benefits

Circular solutions not only aid climate targets, they also provide a range of nature-positive benefits. This is important as 90% of terrestrial biodiversity loss is caused by material resource extraction and processing (United Nations Environment Programme, 2024a). Examples of how circular solutions can help improve ecosystems include:

- Regenerative agriculture practices improve soil health, better wastewater infrastructure increases flood resistance, and installing green water infrastructure and restoring marine and wetland environments reduces freshwater stress.
- Reducing the production of waste and increasing the collection and recycling of waste reduces pollution levels which in turn helps to regenerate natural ecosystems.
- Circular solutions may reduce demand for energy, including renewable energy. Zaabi et al estimate that in 2050 more than 70 million tonnes of solar panel waste could end up in landfills in a business-as-usual scenario, but adopting circular strategies could reduce this to 17 million tonnes (Al Zaabi, et al., 2024).
- Adopting circular design in construction, infrastructure and city planning can have a significant nature-positive impact. Adopting nature-positive circular design principles can deliver ecosystem services such as improved water management, better temperature regulation, and more green space and habitat - see (Ellen MacArthur Foundation, 2024) and (Holcim, Systemiq, 2024)

2. Agree on circular definitions, principles, measurement and reporting

One of the key challenges to a wider adoption of circular solutions is that there is currently no universal agreement on the scope and definition of what a circular economy entails, what it can achieve and how best to put it in place. For example, we note that Kirchherr et al identified 221 different definitions of the Circular Economy in scientific literature between 2017 and 2021 alone (Kirchherr, et al., 2023).

Our own analysis suggests that most countries tend to focus on recycling or general waste reduction strategies in selected sectors when developing circular economy policies and strategies. This approach fails to fully capitalise on the benefits a fully integrated, upstream, design-led approach to product life extension can yield, such as improving a country's resilience to natural resource and finite raw material related shocks, reducing a country's raw material intensity risk profile, and reducing a country's dependence on imported raw materials and exposure to related price volatility.

In addition to the definition challenge, we note below that there is currently no uniformly accepted methodology or framework that outlines how circular adoption is to be measured and reported by country, sector, or company. Agreement on this amongst sector leaders, and ultimately amongst governments and international organisations, needs to be reached as soon as possible for circular adoption to accelerate more rapidly.

Measuring circularity on a macro level is work in progress

Several organisations are engaged in developing approaches to measure circularity on a macro level. Examples of these efforts include UNECE in cooperation with the OECD (OECD and United Nations, 2023) the International Organisation for Standardisation (ISO, 2024) the European Environment Agency (European Union, 2024) Circle Economy (Circle Economy, 2025) and the World Business Council for the Sustainable Development WBCSD. These approaches mostly adopt Material Flow Accounting (MFA), Input Output Analysis and Life Cycle Analysis (Ghisellini, et al., 2023).

Providing an overall estimate of a country's circularity, however, is made more difficult because it requires economic, social, and environmental statistics that are not always collected or reported.

Given these constraints, the frameworks developed to date are mostly aligned with the central framework of the System of Environmental-Economic Accounts (SEEA). The SEEA is an international statistical standard for compiling not only economic, but also environmental statistics. The central framework (SEEA-CF) covers physical flows between the environment and an economy as well as flows within an economy. It also records stock levels of environmental assets both in physical and monetary terms and it records monetary flows associated with economic activities related to the environment.

Using SEEA data for a country allows for measuring circular strategies such as recovery and recycling. However, not all aspects of a circular economy are currently measured statistically. Examples of this include flows of goods and services related to sharing, repair, or refurbishment activities. To monitor these and other circular "R" strategies such as 'reduce', 'rethink', 'reuse' and 're-design', requires additional data sources that may not be available.

Another drawback of using SEEA data for measuring circularity is that not all countries currently have adopted and implemented the SEEA-CF or report accounts on a regular basis. The 2024 Global Assessment report showed that 94 countries have implemented the SEEA, and that 67 of these publish at least one account on a regular basis (UNCEEA, 2025).

Circular reporting standards for corporates need to tighten

Understanding the degree to which companies have adopted circularity is also a work in progress, not least as corporate reporting or disclosure standards for circularity have yet to be fully implemented. The need to address this issue is high as it clouds the ability to understand capital allocation to circular solutions by companies over time and make it more difficult for investors to identify which companies are meaningfully exposed to the circular economy, and which are not. This latter point hampers efforts to scale circular capital allocation and may cause capital to be allocated by fund managers or investors to companies that are not significantly exposed to the circular economy. The relevance of this issue was also underscored by a recent briefing paper from the World Economic Forum released in November 2024 (World Economic Forum, 2024). It showed that almost 90% of surveyed corporate executives believe that harmonisation of circularity standards will help enable the circular transformation of industries.

As with measuring circularity on a macro level, several frameworks exist that track corporate progress on the adoption of circularity. We highlight some of these in Figure 39.

Figure 39: Initiatives relevant for measuring circular economy adoption

Organisation	Organisation	Relevance
International Sustainability Standards Board (ISSB)	IFRS S1 and S2	Disclosure regarding commitments and strategies around waste elimination, resource circulation and nature regeneration
Taskforce for Nature related Financial Disclosure (TNFD)	TNFD disclosures	Nature-related corporate disclosures relevant for most circular-related end markets
World Business Council for Sustainable Development (WBCSD)	Circular Transition Indicators (CTI)	CTI provides a range of indicators that measure a corporate's current circularity, how it impacts sustainability and how further improvements can be made
World Business Council for Sustainable Development (WBCSD)	Global Circularity Protocol	Framework in development that by 2026 should guide companies in target-setting, measuring, reporting and disclosing progress on resource efficiency and circularity
Science Based Targets Network (SBTN)	Science-based Targets for Nature	Several of the SBTN targets (e.g. land and water-related) can be used to assess whether a company is focused on circularity
International Organisation for Standardisation (ISO)	SO 59004 – Circular Economy	The ISO 59020 "Measurement and Evaluation of Circularity" framework assists companies in minimising resource usage and increase circular flow of resources.
European Union (EU)	European Sustainable Reporting Standards (ESRS)	ESRS E5 focuses on resource use and circularity and requires companies to disclose information on their policies, actions, targets, financial impacts related to resource flows and risks and opportunities linked to the circular economy.

Source: Standard Chartered

While progress on corporate reporting initiative is positive, in our view several issues remain:

- There is currently no global agreement on what data corporates need to report.
- The EU's European Sustainable Reporting Standards (ESRS) which is associated with the Corporate Sustainability Reporting Directive (CSRD) is the only mandatory framework that currently exists. All other approaches are voluntary.
- Not all suggested circular solutions are uniformly accepted. For example, while recycling waste into energy is seen as a sustainable circular solution by some, critics argue that it locks in waste as a feedstock and may therefore reduce the incentive for further innovation or the design of new solutions that eradicate this waste.

3. Integrate the circular economy into finance risk models

We see low engagement by the financial sector with the topic of circularity as a key barrier for the required increase in circular finance flows. Solutions for this include establishing a generally agreed framework that defines eligible circular activities. We also believe that tools need to be developed that estimate corporate exposure to the risks and opportunities from circular and non-circular activities. Integrating these tools into risk or lending models used by financial institutions would help improve the necessary scaling of circular capital.

Creating a framework to model circular risk will help circular lending

Financial institutions play a key role in enabling circular finance to scale. They are providers of financing to circular investment projects or companies, asset managers of circular projects, or they act as intermediaries between suppliers of circular funding and project owners and developers.

While financial institutions have been active supporters of solutions associated with the energy transition, we have not yet seen the same level of support in relation to the circular economy. There are several factors that might explain why engagement from the financial sector with the circular economy currently lags that of more traditional sustainable development projects.

- The circular economy is a relatively new concept. General awareness of the topic is therefore likely to be mixed across financial firms which constrains the willingness to support financing requests.
- The absence of globally accepted definitions and measurement standards makes risk-return assessments of circular projects more challenging. This may unjustly penalise circular projects.
- Existing risk models used by financial institutions often do not incorporate the long-term risks or negative externalities that a linear economy has on existing business models. The risk assessment of linear projects may therefore be too optimistic both in absolute terms and relative to circular projects.

We believe that these funding challenges could be at least partially addressed if a risk framework was adopted by banks that integrates circular business models into their general risk modelling. In 2022, Circle Economy produced a high-level roadmap that discussed these bottlenecks. It offered best practices in financing circular projects and outlined key actions required to address funding challenges (Circle Economy, 2022).

Two recent publications from the International Finance Corporation (IFC) and the Kopgroep Circulair Financiering (KCF) expanded on this work and provide guidelines for classifying circular solutions and a methodology for modelling the associated risks and opportunities. These two approaches combined could offer strong potential to help address the above-mentioned funding bottlenecks.

Harmonised Circular Economy Finance Guidelines

The International Finance Corporation (IFC) published their Harmonised Circular Economy Finance Guidelines this year (IFC, 2025). The guidelines are meant to assist financial institutions with identifying assets, products or services that qualify as aiding the circular agenda. To that end, the guidelines define eligibility criteria for products and services and include examples of reporting parameters that can assist the monitoring of them. The guidelines include three key circular economy activities: Circular design and production, Circular use, and Value recovery. In addition, the guidelines also recognise activities that enable the adoption of circularity. Importantly the guidelines are compatible with the EU's guidance on circular economy finance and are aligned with the International Capital Market Association's Green Bond Principles. Figure 40 summarise the key activities and shows examples of eligible projects and reporting parameters. The IFC's circular economy finance guidelines are based on a few key principles that are consistent with existing guidelines that support the acceleration of broader climate, blue and biodiversity finance. These principles are:

- Eligible circular projects and services should clearly outline how they will achieve circular economy goals and how these will be measured.
- The contribution that a circular economy project is to deliver should be clear and go beyond the business-as-usual conditions in the local market context.

Circular economy projects and services should not do significant harm or introduce material risk to environmental objectives. Environmental, social and governance safeguards and standards should be applied in the implementation of projects if there are material environmental and social risks.

Figure 40: Circular economy activities and reporting parameters

Category	Description	Project components	Reporting examples
Circular design and production			
- Design	Design phase that incorporates reduction of material inputs, use of regenerative inputs and increased use of reuse, repair and recycling	• Modular design • Standardised equipment • Reused and recycled packaging • Incorporate raw materials from regenerative practices	• Number of circular components • Share of materials designed for durability • Amount of CO2 or food waste avoided and reduced
Production	Production processes that reduce virgin raw material usage and increase production effectiveness	• Use of secondary materials • Use of materials that are nature positive • Use of zero waste and 3D printing techniques • Use of regenerative agri- and aquaculture solutions	• Share of recycled materials • Ratio of circular materials • Reduction of raw material use • Waste decline • Area under regenerative agri- or aquaculture
Circular use	Life extension of products through repair, refurbishment, reuse, retrofitting and remanufacturing	• Reuse of resale or products • Construction of refurbishing or remanufacturing facilities and technologies • Circular approaches to forestry and agriculture and restoration of ecosystems	• Volume of reused, repaired remanufactured products • Change in products derived from end-of-life products • Change in life-cycle GHG-emissions or material use
Value recovery			
Collection and sorting	Collection and sorting of products to enable circularity of end-of-life products and materials	• Deposit return and take-back schemes • Collection and sorting services • Development of waste management infrastructure	• Volume of products collected • Volume of avoided waste • Volume of sorted material • Collection points for waste
- Material reduction	Organic and non-organic material management, recycling and recovery	• Facilities for reuse and recycling • Mechanical and chemical recycling capacity • Biomass waste recovery facilities • Wastewater treatment facilities • Recovery of hazardous waste	• Products derived from by-products and waste • Reduction in life-cycle GHG emissions • Production of food from upcycling and by-products
Circular enablers	Products, services and business models that enable circularity across different segments of the materials life cycle including increased intensity of use	• Virtual marketplaces for secondary materials or products • Digital tools for optimisation of circular solutions • Industrial automation and robotics to promote circularity • Rental or leasing services beyond business-as-usual conditions • Subscription of maintenance and repair services • Sharing platforms • Information services	• Amount of waste avoided • Share of products covered by disclosure of inputs or material passport • Production covered by traceability mechanisms, data and technologies • Use of precision agriculture

Source: IFC, Standard Chartered

Circular risk scorecard (CRS)

While understanding whether an activity is eligible for circularity is an important element to help drive acceptance of the theme, we do not believe that it is sufficient to help scale finance flows at the levels required. For this to happen we believe that risk models used by financial institutions when making investment and finance decisions would also need to be adjusted. These models would need to incorporate the risks associated with a continuation of the current linear economic model and how these risks differ for companies that have adopted circular practices. This is particularly relevant as some work suggests that adopting circular strategies may reduce investment risks and improve risk-adjusted returns (Bocconi University, Ellen MacArthur Foundation, Intensa Sanpaolo, 2021). To realistically estimate a company's linear risks and circular opportunities, these models need to be driven by future cashflows and incorporate a full value chain assessment.

Recently, the Kopgroep Circulair Financieren (KCF), a collaboration between various Dutch financial institutions, published a circular risk scorecard methodology (Kopgroep Circulair Financieren, 2024). The methodology is already supported by several Dutch commercial banks and the Dutch Central Bank , but was recently also presented to a range of government officials and private sector representatives in the UK. We believe that this methodology could be a good first step to help financial institutions incorporate circularity into their risk modelling and investment and finance decision making processes.

The circular risk scorecard (CRS) developed by the KCF assesses the risks faced by circular business models. To do this, the CRS reviews six key risk drivers for a company. To measure risk, 18 variables have been established across the six risk drivers (Figure 41). The overall score for a company's circular risk is calculated as the weighted average of the scores for each of the six risk drivers. The score ranges from 0 (= low risk) to 100 (= high risk).

The KCF has made a first assessment of the CRS by analysing the initial results for more than 100 companies (Kopgroep Circulair Financieren, 2024). This analysis shows that companies with circular business models have a lower risk profile than traditional linear companies. Their data also show that circular companies manage resources and materials better than assessed linear companies. This reduces the risk that circular companies face from resource scarcity and resource or raw material input price volatility.

Figure 41: Circular Risk Scorecard components

Risk driver	Variable
Ability of management team	• Experience of management team with innovation and circular businesses • Diversity of management team
Suitability for circular proposition	• Suitability of product for circular proposition • Incentives to optimise use of products
Security of resources	• Dependency on and availability of (critical raw) material • Ownership and control of resources • Type of relationship with value chain
Circularity of asset	• Design and upgradability • Circular material use product • Durability • Ease of repair
Robustness of contract	• Contract length of portfolio • Contract term flexibility • Incentives for contract renewal
Market competitiveness	• Access to market (entry barriers) • Level of competition/substitution risk • Circular market share • Compliance to (future) green policies

Source: Kopgroep Circulair Financieren, Standard Chartered

4. Drive for harmonised international regulation and policy landscape

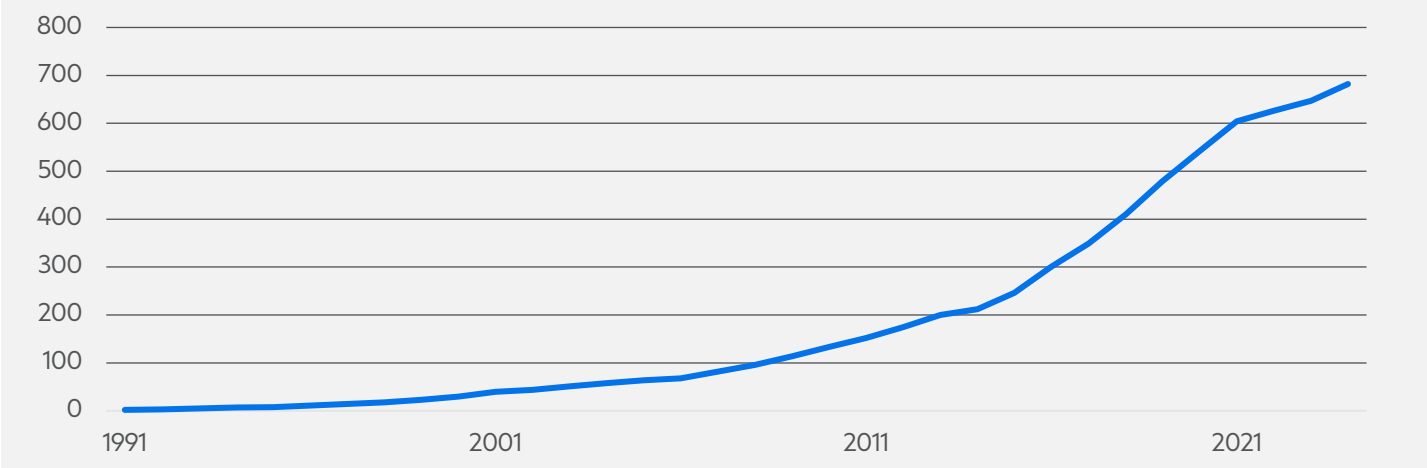
While there is progress on current circular economy policies across regions and countries, as we show in the appendix, more is needed on this front to help accelerate the adoption of circular principles by corporates and consumers.

Almost 80 countries are already engaged with the circular economy

Policymakers around the world are increasingly engaging with the circular economy. Data from the UN, in cooperation with Chatham House, tracks different types of circular economy policies including: national circular and bioeconomy roadmaps; sustainable production and consumptions strategies; and policies aimed at waste management and recycling, producer responsibility, specific products or with a fiscal focus. The data also identifies how advanced a country's circular economy policies are.

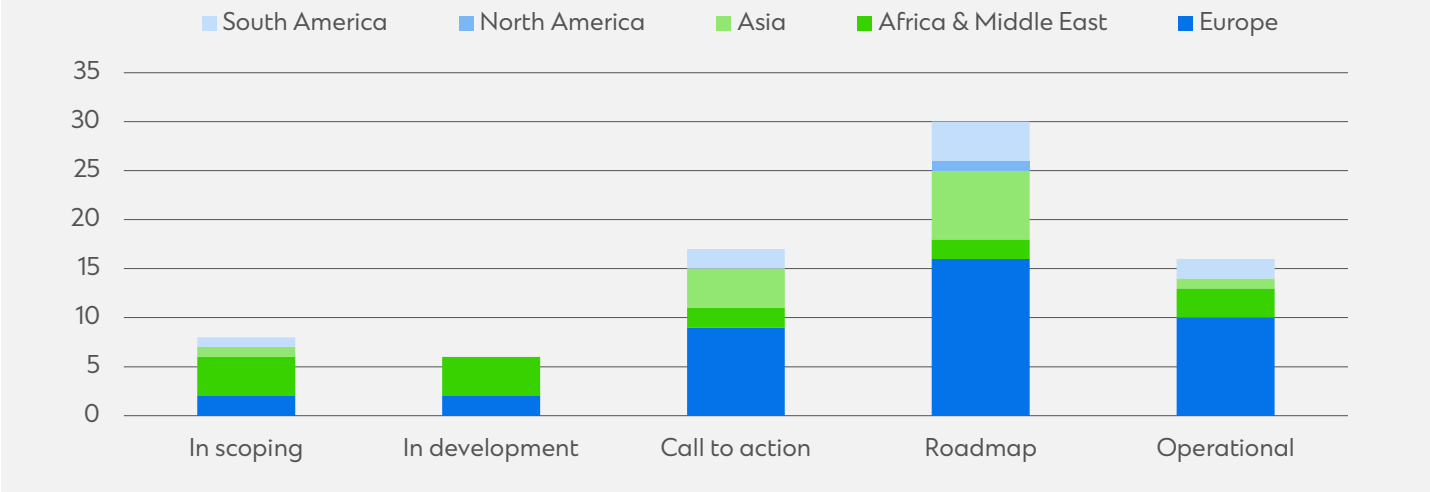
The latest update from Chatham House shows that the number of policies developed by countries around the world that are relevant for the circular economy has increased exponentially during the past ten years and has now reached almost 700 (Figure 42). More than half of these are policies aimed at waste management and recycling (284) and product specific policies (98) (Chatham House, 2024).

Figure 42: Cumulative number of circular economy-related policies developed by countries



Source: Chatham House, Standard Chartered Bank

Figure 43: Number of national circular economy policies by region broken down by stage of development



Source: Chatham House, Standard Chartered

The development of national circular economy policies is progressing too. The most recent data from Chatham House and the UN shows that 16 countries now have an operational national circular economy policy, while 30 have developed roadmaps towards one. In total 77 countries are engaged with the development of national circular economy policies (Figure 43).

From a regional perspective European countries are the most advanced as they account for 56% of those countries that have developed roadmaps for a national circular economy strategy, or that have already put such a strategy into operation. Eight countries in Asia have done the same. The circular economy is also gaining traction in Africa, where three countries have operational national strategies (Mauritius, Nigeria and Rwanda) and 12 more have national strategies at different stages of development.

Europe shows the relevance of policies

The relevance of policies and targets when transitioning towards a circular economy was outlined in a recent publication (Sanz-Torro, et al., 2025). It showed that across 19 EU member states the introduction of circular economy polices resulted in an average 13.3% improvement in the efficiency of 11 circular economy-related variables. The analysis is in line with other work (Arranz, et al., 2023) which showed that strict regulation is the most impactful policy tool for driving circular economy adoption among corporates, but that producer and consumer-focused policies show positive impact too.

Sector-based policies are needed to drive circular adoption

The lack of a generally accepted approach to developing circular policies and to measuring circularity on a macro and corporate level makes it more challenging for shareholders, lenders, and other stakeholders to engage with corporates on circularity. This in turn slows down the adoption of circularity across key sectors and limits the ability to develop cross border trade in secondary materials. This is necessary for enabling economically viable aggregation of secondary materials for reprocessing, remanufacturing and recycling.

To increase the speed at which companies transition towards circular business models and improve capital flows that fund circular solutions, we believe that circular standards and policies need to be primarily sector based. This is particularly relevant for those sectors that stand to benefit most from adopting circular solutions as shown in the previous chapter. Sector-based circular policies can deliver a range of clear benefits:

- They allow for more detailed assessments of the applicability of circular solutions as sector specific constraints can be taken into consideration.
- Solutions and strategies can be developed that are specifically tailored to meet individual sector characteristics.
- Solutions can be developed that take country or regional differences into consideration. For example, certain technologies may be applicable in markets where waste collection and recycling infrastructure are in place, but different solutions are needed where this is not the case.
- Reporting and disclosure requirements can be developed that focus on sector-specific characteristics, parameters, or variables.
- They allow for increased collaboration between different stakeholders within a sector on circular strategies and solutions.

In this regard we see the approach taken by the plastics industry in relation to the circular economy as a good example of how industry can help develop circular solutions and help inform policies and regulation for removing barriers.

Important circular policy and regulation considerations

Despite the evidence that stronger and more comprehensive policies and regulatory frameworks drive and enable faster development and scaling of circular solutions, our analysis shows that this has yet to be adopted by many nations. We also note that the breadth or scope of circular targets and frameworks as adopted by many countries are not yet sufficient. As noted earlier, the link between circular economy strategies and their impacts on climate and nature strategies is often not incorporated fully. With that in mind, we highlight some of the key objectives that circular economy policies need to be focused on in Figure 44. To achieve these objectives, we also highlight specific aspects that need to be included in national circular economy policies to make them more effective (Figure 45).

Figure 44: Key objectives for national circular economy policies

Objective	Description
Maximise resource efficiency and value retention	Reduce virgin material usage through product lifecycle extension and recycling
Improve supply chain resilience	Reduce exposure to pricing and geopolitical volatility through a reduction of cross border/regional raw material dependency. Increase local material circularity
Develop social policies that support job creation	New circular markets need to provide quality job opportunities
Develop circular infrastructure	Development of physical and digital infrastructure needed to support circular solutions
Ensure legislation aligns internationally	Driving circularity globally requires harmonised policies across nations
Innovation, research and development	Support development of new business models, materials and circular solutions
Establish product design standards	Set quality requirements for products that increase durability, repairability and recyclability
Improve disclosure	Ensure that relevant data is collected and reported
Influence consumer behaviour	Improve general awareness of needs and benefits of circular solutions

Source: Standard Chartered

Figure 45: Key elements to make national circular economy policies more effective

Aspect	Necessary components	Characteristics
Product design	• Eco-design • Modularity • Digital passport	• Design requirements with the aim to minimise material usage and environmental impact of a product • Requires products to consist of interchangeable units. Enhances disassembly, repair and reuse. Relevant to all industries and building/construction • Increased product transparency supports supply chain management, compliance with circular regulation and improved repair, recycling, end-of-life management
Product life extension	• Right to repair (RtR) • Re-use programmes • Product as a Service	• RtR legislation reduces demand for new products, waste and material usage • Re-use infrastructure including sharing lowers demand for new products • Establishing clear legal frameworks supports corporate re-use of products
Recycling	• General targets • Infrastructure policies • Extended producer responsibility (EPR) • Deposit refund schemes (DRS)	• Strict recycling targets both on national and sector level are needed to drive down waste and increase the share of re-used goods and materials • Government will need to incentivise investments in recycling capacity and expertise • Corporates will need to be required to be responsible for end-of-life product use • DRS incentivise the collection, recycling and re-use of materials
Waste	• Waste collection targets • General waste policies	• Clear quantitative targets need to be established by country and sector. • Zero waste policies should be the target for each country
Monitoring and reporting	• Corporate and national reporting frameworks	• Regular disclosure of corporate and national performance on internationally agreed circular economy variables is required
Legal structure	• Legal status • Fines and penalties • Green washing	• Circular policies need to be made mandatory • Non-compliance should be penalised with clear and substantive penalties • National policies should include measures that minimise the risk of green washing
Sector specific policies	• Policies, targets and support programmes	• National circular economy frameworks need to include policies with clear quantitative targets that cover the specific conditions of individual sectors • Key sectors include building & construction, chemicals & plastics, textiles, electronics and electrical equipment, agriculture, packaging , transport and energy

Source: Standard Chartered

Social and labour implications for developing nations need to be acknowledged

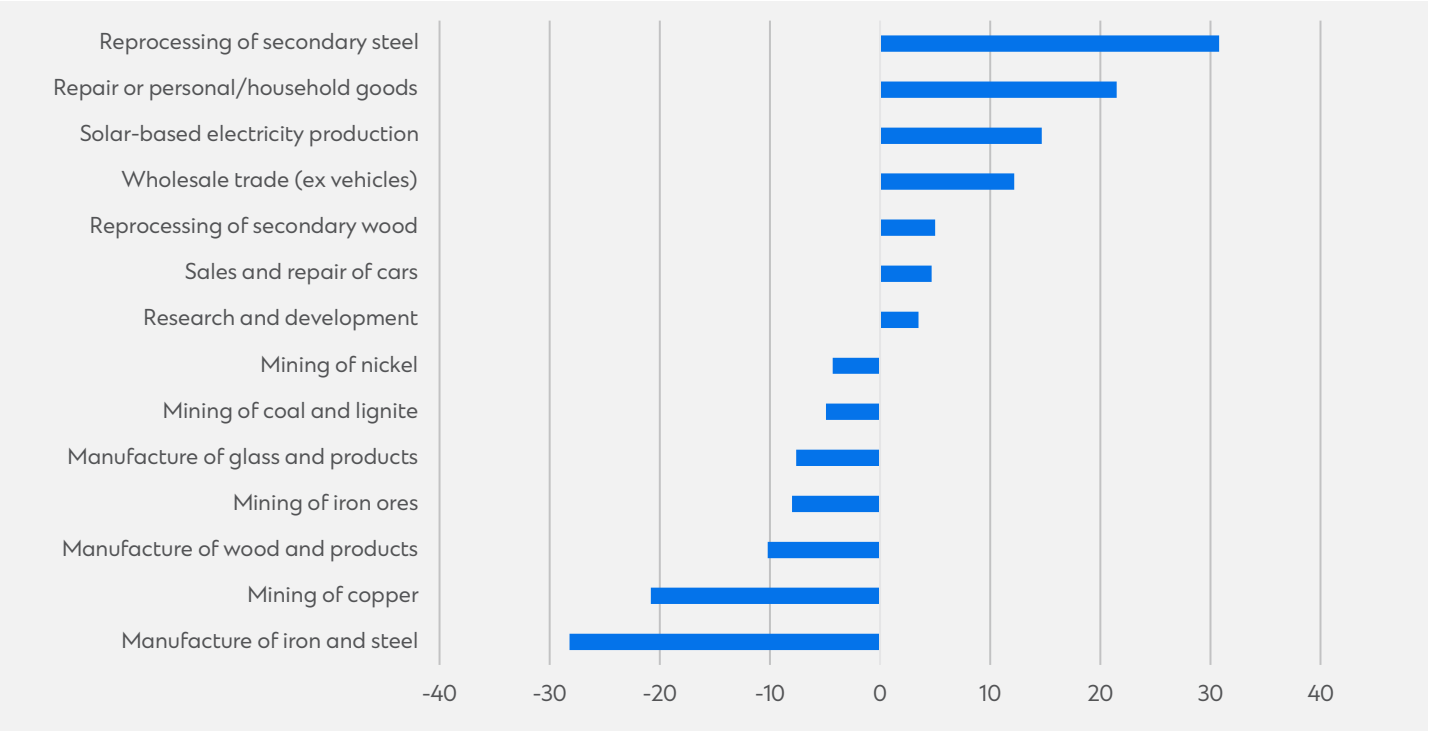
Critical for the success of a circular economy model is that policies need to be developed that not only support the development of circular businesses models, but that also address social issues that may arise because of these policies. Understanding of these issues is limited because they can be very complex, as is employment modelling in general. As a result, most analysis of circular economy models to date has only focused on return on investment and impact on GDP growth. Other important issues, such as if circular economy models redress inequalities between the Global North and South, how job quality may change, and whether a circular economy model helps to reduce gender inequalities, is far less often assessed (Pansera, et al., 2024).

Some of the studies that have tried to model the potential impact of a circular economy on labour prospects include analysis from the International Labour Organisation ILO in 2018 and 2019 (ILO, 2018), (ILO, 2019).

These reports showed that a circular economy approach could generate an increase in net employment of up to 8 million jobs by 2030. Work done for the EU on the impact of a circular economy showed that it could generate almost 700,000 new jobs by 2030 (Cambridge Econometrics, Trinomics and ICF, 2018).

Most estimates suggest that a circular economy yields net employment growth, but that gains are not equally distributed by sector or region. Estimates from the ILO show that on a global basis, employment levels may increase most for steel recycling (31 million new jobs), the repair of personal and household goods (22 million) and solar-based electricity production (15 million). Activities that may experience the strongest decline in job numbers according to the ILO include iron and steel manufacturing (-28 million), mining (-37 million across copper, iron, coal and nickel) and the manufacturing of wood products (10 million job losses globally) Figure 46.

Figure 46: Impact of circular economy on jobs Million jobs, by sector in 2030

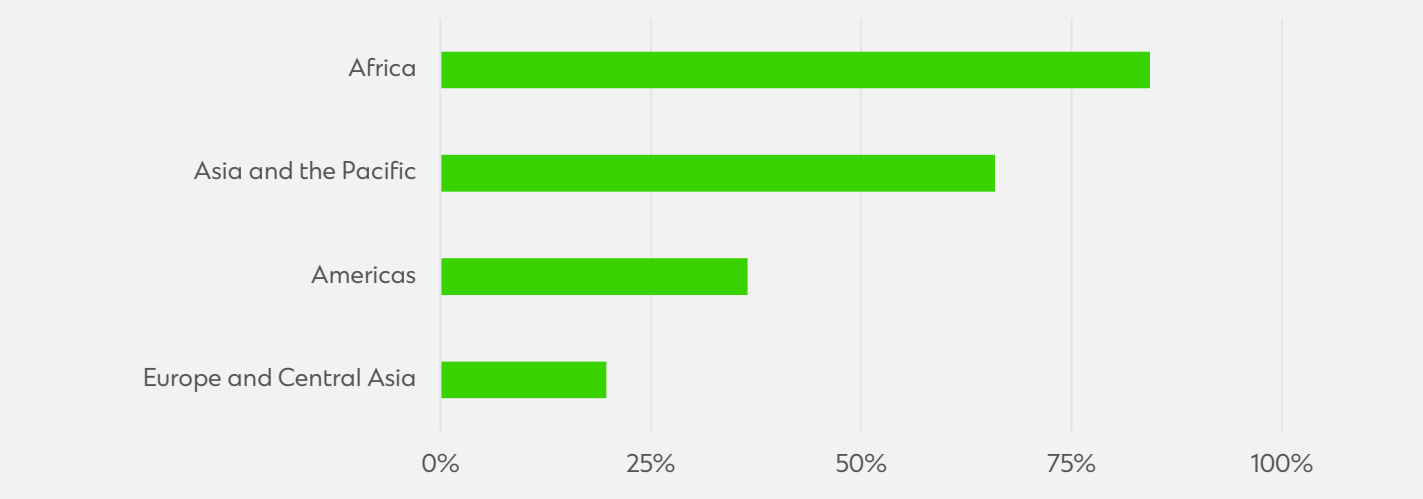


Source: ILO (2018), Standard Chartered

Considerations of the impact of a circular economy on the Global South

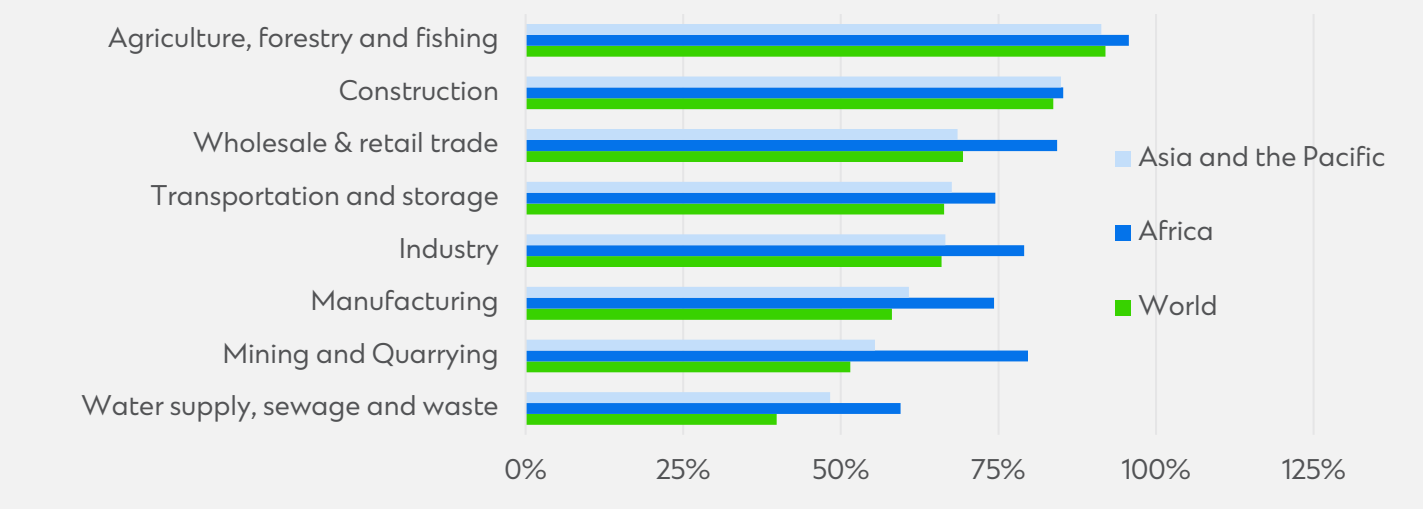
The estimates from the ILO regarding the sectors that may face significant job losses are particularly relevant for the developing world as they tend to account for the lion's share of global production for these sectors. For example, more than 75% of mining and steel production takes place across developing countries according to (Tang, et al., 2023) and the world steel association (World Steel in Figures). The 2018 ILO study indeed estimated that adopting circular economy principles could generate net employment losses in APAC and across Africa of around 5 million and 1 million jobs respectively, unless action was taken to diversify local economies and develop active redeployment strategies for the impacted sectors. Circular economy approaches are generally based on the assumption that employment across an economy is formally regulated. However, this is not necessarily the case in the developing world. The ILO's latest estimates show that in 2019, nearly two billion people globally (or almost 60% of the world's employed population) worked in the informal sector. The share of informal labour is especially high in low-income countries at 89% (ILO, 2023). Data by region shows that in Africa more than 84% of employment is informal while the share in APAC is almost 66% (Figure 48).

Figure 47: Share of informal employment by region%, 2019



Source: ILO (2023), Standard Chartered

Figure 48: Sectors with the highest share of informal employment by sector %, 2019



Source: ILO (2023), Standard Chartered

There are several reasons why circular economy policies need to acknowledge the topic of informal employment:

- Most of the sectors that face the greatest employment risk from a move to circularity also have the highest share of informal employment (Figure 48). This could have significant implications for exposed workers especially since informal employment is often associated with weaker worker rights, lack of social protection and lack of access to healthcare (Circle Economy Foundation, 2024).

- Informal employment related to circular activities across the developing world is focused on reuse, repair, waste collection, sorting and recycling. Estimates from the Fair Circularity Initiative together with Systemiq put the number of informal waste pickers globally at up to-24 million (Fair circularity initiative, Systemiq, 2024). These workers often have poor working conditions including being exposed to health hazards and toxic materials. Moving to a circular economy is likely to put these workers under greater pressure as local recycling demand increases, and under even greater pressure if exports of waste and second-hand goods from countries in the Global North to countries in the Global South also rise.

The above suggests that a successful expansion of the circular economy requires the development of policies that recognise the potential negative employment impacts on key sectors and countries across the Global South. Circular policies should include support programmes that i) help existing companies transition their linear operations towards circularity, ii) provide financial and/or retraining support to affected workers and iii) help developing countries reduce the share of their total economic activity accounted for by their informal economies.

07

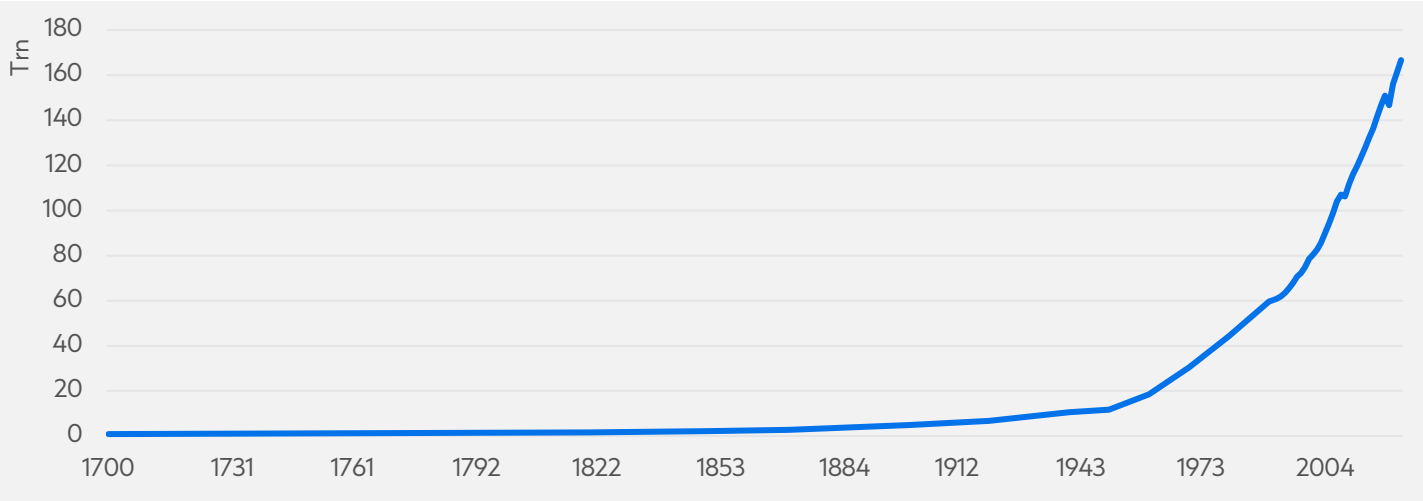
Appendix

A linear world increases raw material usage and waste generation by up to 80%

Since the first industrial revolution around 1760, a range of technological advances were developed that created an economic model that increased GDP by c190x, improved average living standards and supported greater than 10x increase in the world's population to around 8.2 billion people today (Figure 49).

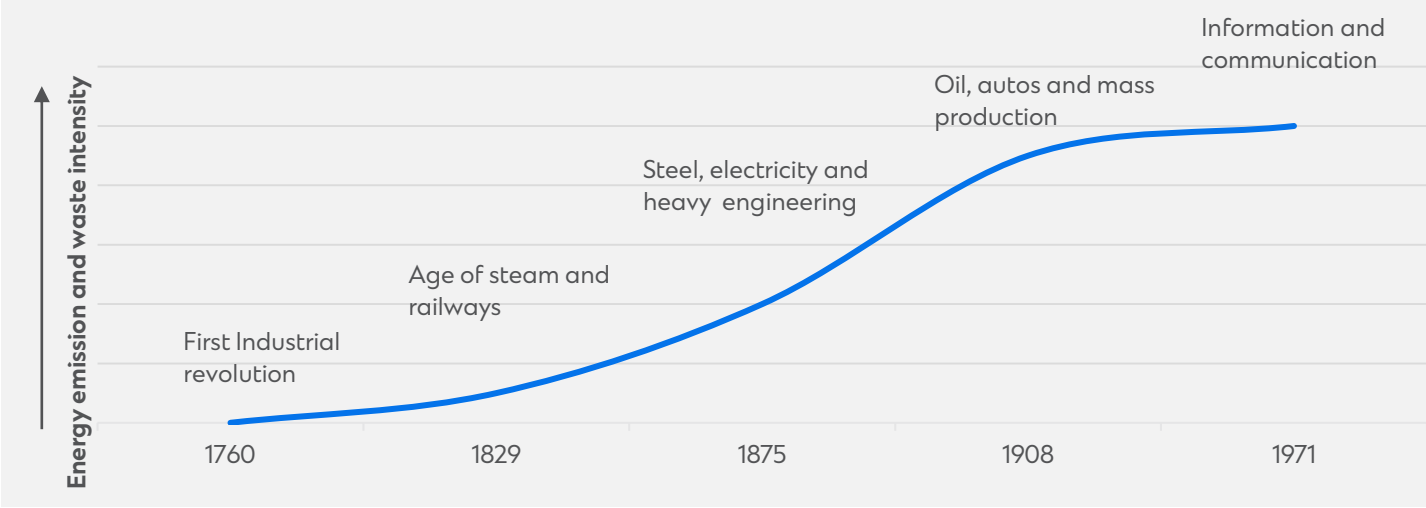
The current economic model, however, has negative externalities including increasing levels of emission generation, resource consumption, and waste production (Figure 50). To support further economic growth in a sustainable way and improve living standards of a population that may reach more than 10 billion by 2050 requires a shift to a more effective and efficient economic model that keep finite materials in use at their highest value for longer, decoupling economic growth from finite raw materials consumption, and which is both nature-positive and regenerative by design.

Figure 49: Global GDP increased 190x since 1700 International dollars (trillion)



Source: Our World in Data, Standard Chartered

Figure 50: Growing impact of new technologies Intensity of economic output through time



Source: Standard Chartered

The current economic system puts natural resources under pressure

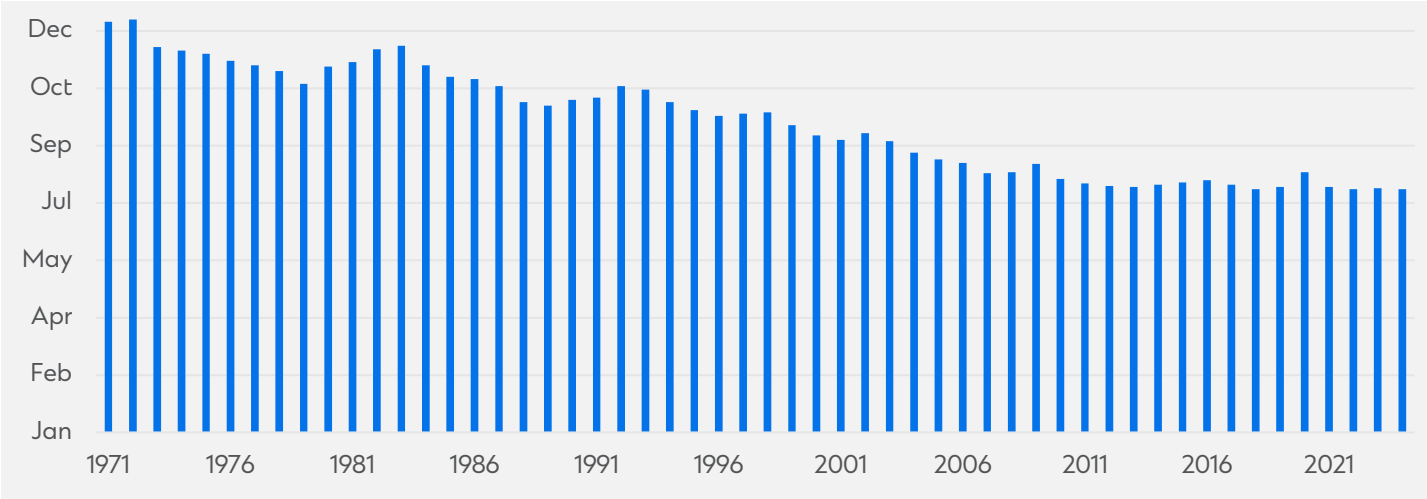
The current economic system is linear in nature. It uses raw materials to manufacture goods that after increasingly shorter period of use are disposed of as waste. Maintaining economic growth in such a system can only be achieved through continuously increasing the extraction of virgin raw materials in the absence of recycling or reusing of goods and materials.

Our current economic model not only leads to an increase in greenhouse gas emissions but also to destruction of natural resources, and drawdown that is faster than the speed at which remaining nature can regenerate. This latter point is made clear by work from the Global Footprint Network. Their Earth Overshoot Day shows the day in a year when global demand for nature's resources and services exceeds what the planet can generate in that year. The most recent data shows that in 2024 this day was August 1 implying that to sustainably meet humanity's current demand for ecological resources requires 1.75 Earths (Global Footprint Network, 2025)(Figure 51).

Reviewing data by country underlines the need for a more sustainable global economic model. More than 5 Earths would be needed if every citizen globally would have the same ecological footprint as an average American or Canadian citizen, while adopting the consumption profile of a typical European citizen would require more than 3 Earths. Current consumption patterns across developing countries are less demanding on the world's resources although still more intense than the world's current biocapacity in the cases of China, South Africa, Brazil and Indonesia (Figure 52).

Figure 51: Earth Overshoot Day

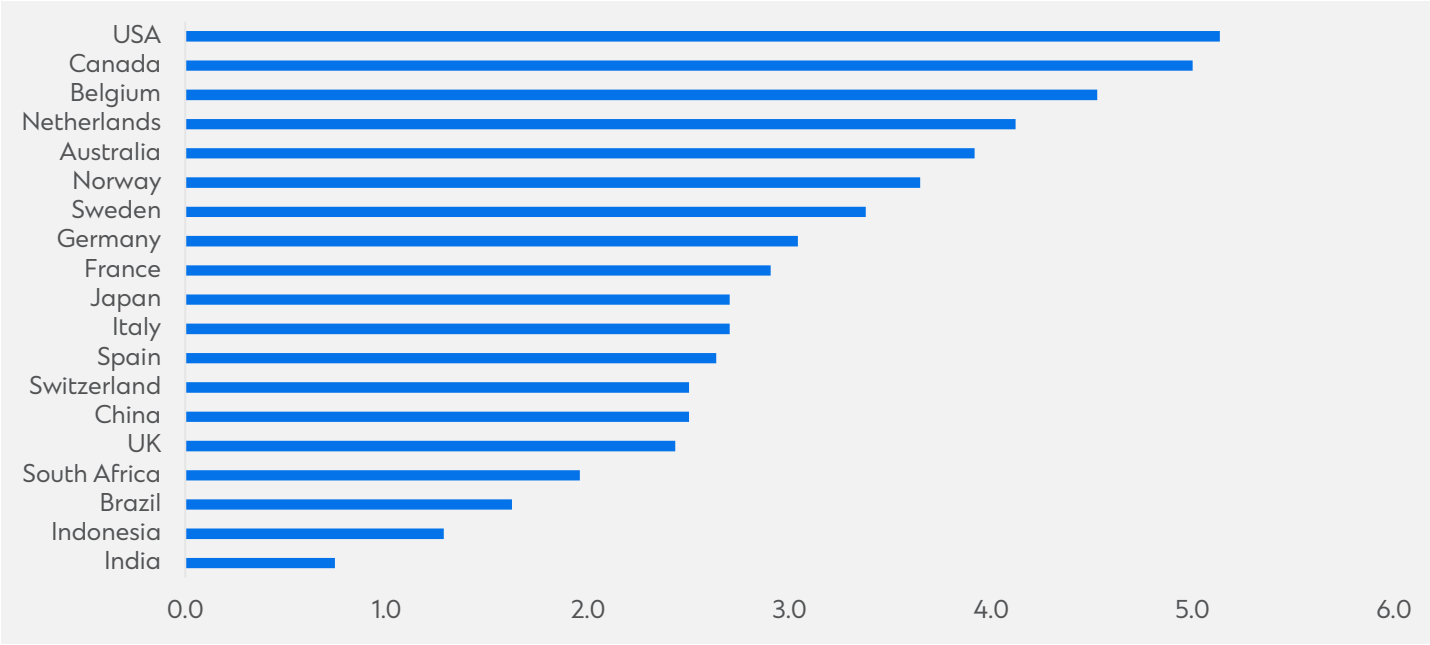
Day at which resource demand is greater than annual capacity to generate



Source: EarthOvershootDay.org, Standard Chartered

Figure 52: Earths required to support humanity's demand

Earths needed to produce the resources needed if everyone adopted the ecological footprint of a certain country (x)



Source: EarthOvershootDay.org, Standard Chartered

Structural drivers put pressure on the earth's resources

The need to change the linear structure of our economic model is not just driven by current consumption patterns. The expected rise of the global population, and most significantly the further expansion of the high consumption middle class across developing countries and continued urbanisation, are structural drivers that will put substantially more pressure on the earth's resources.

Population growth

Population estimates from the United Nations (World Population Prospects) provide a useful insight into the potential consumer demand shifts that may occur during the next few decades. Between 2023 and 2050 the global population is expected to increase by c1.6 billion people according to the UN. Almost 60% of this growth is set to occur across Sub-Saharan Africa (Figure 53). Some of these countries are expected to experience very strong growth of their population between 2023 and 2050 according to the UN (Figure 54). Managing this growth effectively and limiting its impact on key resources will be a major challenge for national, regional and global policymakers.

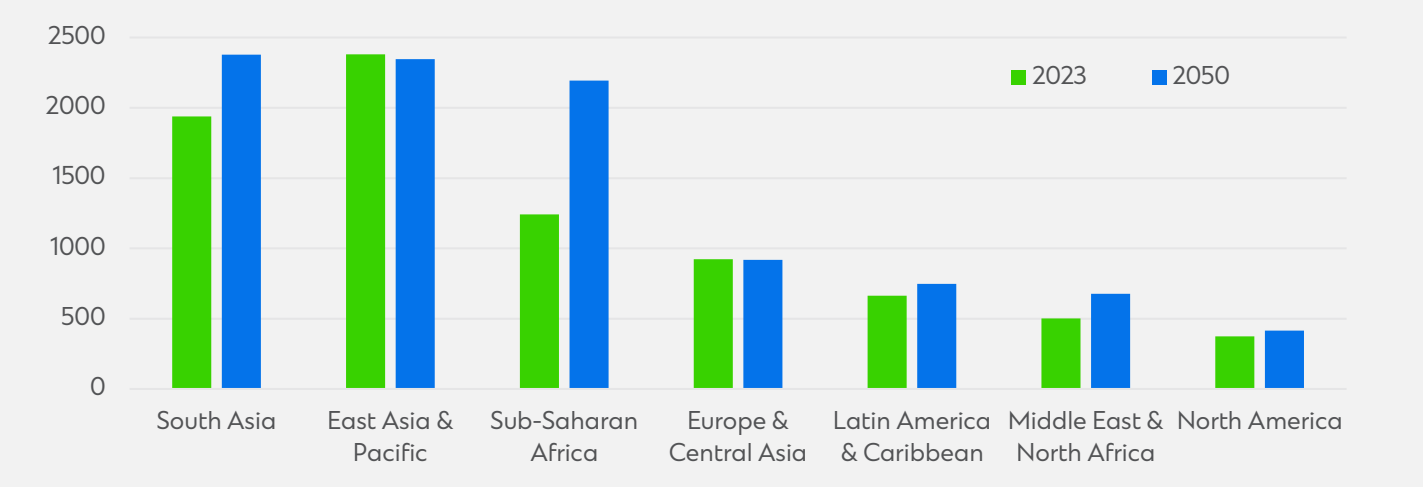
Expanding middle class

Average wealth levels globally as measured by GDP-per-capita have more than doubled from cUSD5,500 in 1995 to more than USD12,500 currently. The middle class across Asia in particular has experienced strong growth, as implied by increases in average GDP-per-capita since 1995 of 6.7x for countries in Central Asia, 5.1x for Southern Asia and 3.7x for South-East Asia (according to data from the UN). Consumer demand increases as income levels rise, creating a need to produce more goods. However, in a linear economic model this leads to more demand for virgin raw materials, the creation of more emissions and the generation of more waste.

Urbanisation

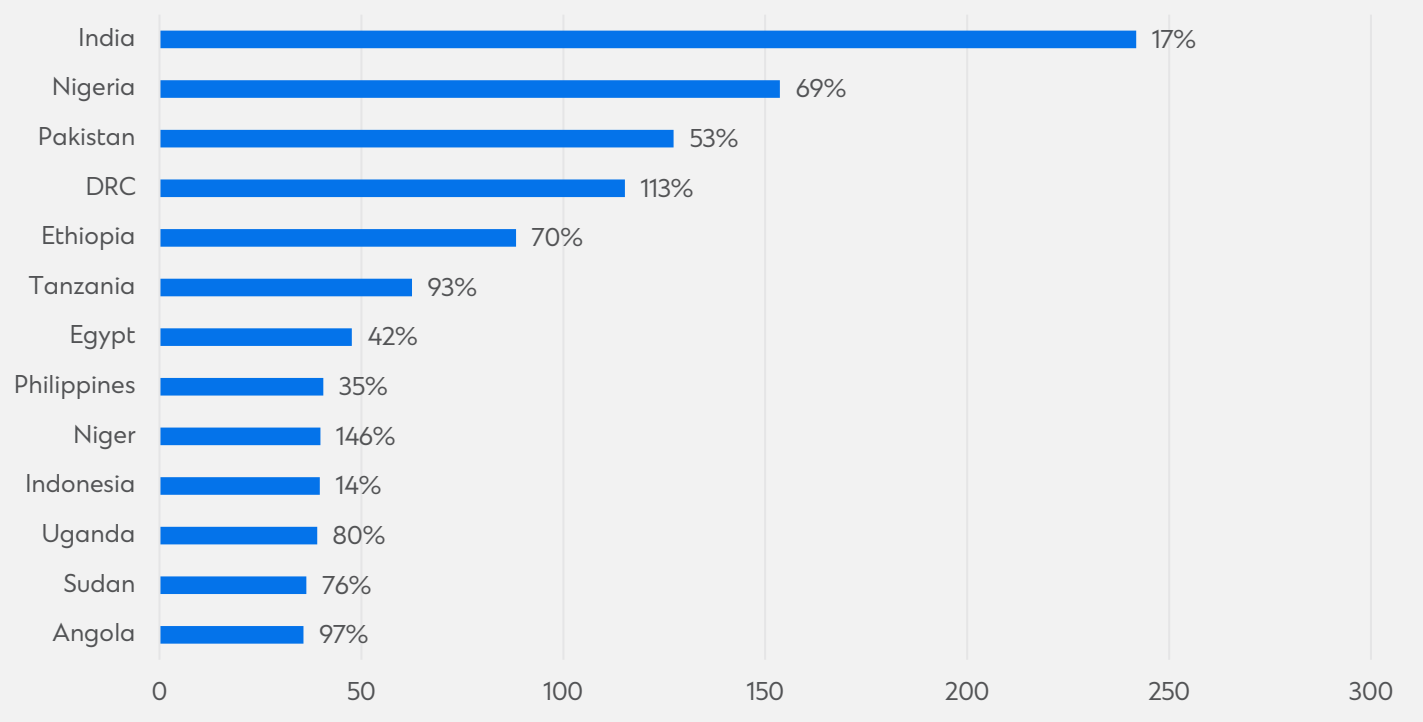
Since the 1960s the share of people living in urban areas has steadily increased. Across developed countries more than 80% of the population now lives in cities compared to c60% in the 1960s. Urbanisation is also becoming a factor across the developing world. More than 35% of people in low-income countries now live in urban areas compared to just 13% in 1960 according to data from the World Bank and the United Nations (World Bank, 2025). Urbanisation matters from a sustainability perspective given thatbecause urban areas contributed around 75% of greenhouse gas emissions in 2020 according to the IPCC (Keith, 2024). Work from the PEAK Urban Research programme suggests that urban land areas may triple between 2015 and 2050 suggesting high demand for virgin raw materials, increased emissions and generally negative impacts on ecosystems (Keith, 2024).

Figure 53: Population estimates by region (million)



Source: United Nations, Standard Chartered

Figure 54: Greatest expected population growth by country 2023 vs 2050 increase (million and %)



Source: United Nations, Standard Chartered

Raw materials, waste, food and water challenges are set to grow

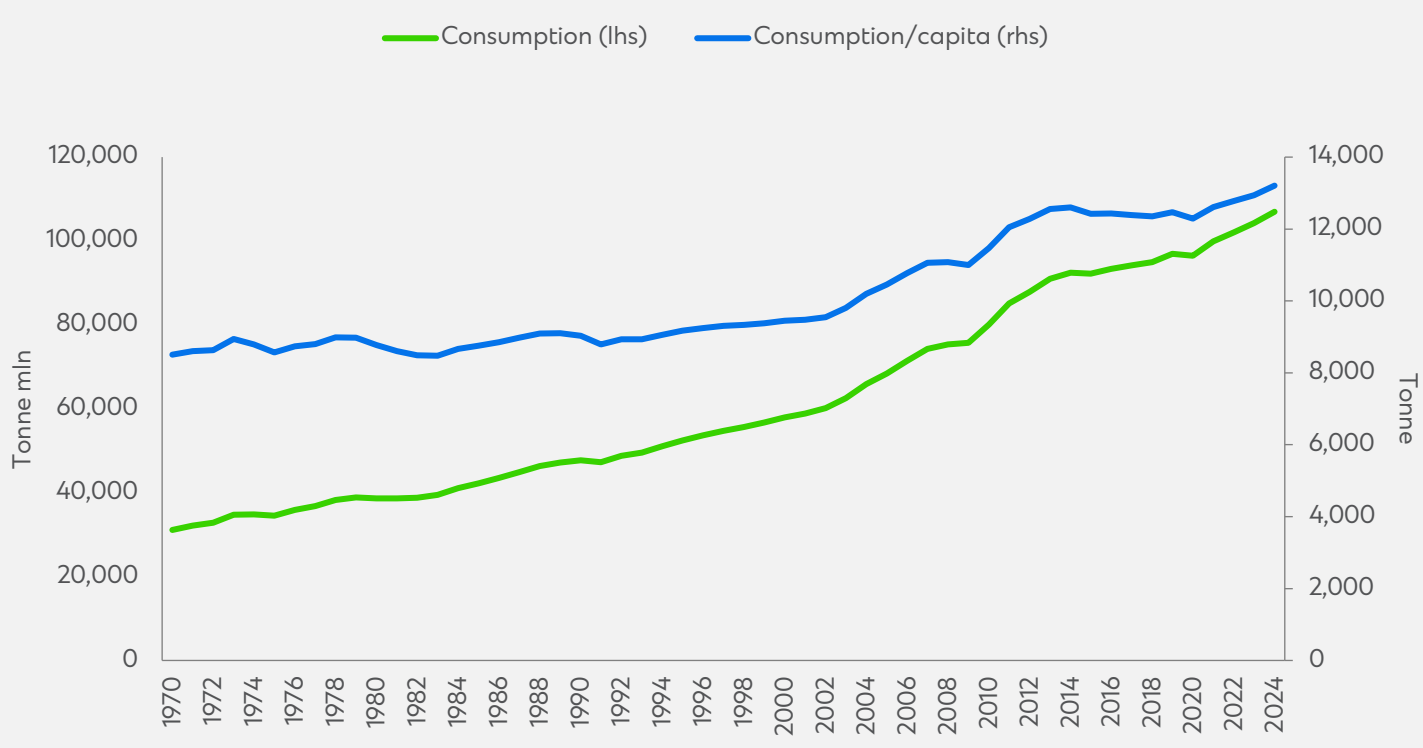
To explain the need for a more effective and efficient circular economic model more clearly, we assessed how raw material consumption, waste generation and demand for food and water could change if the current, linear, economic model remains in place.

Demand for virgin finite raw materials and biomaterials is forecast to increase by 60% over the next 25 years

The key material resources used to support economic development are biomass, fossil fuels, metals and non-metallic minerals. Global demand for these materials has increased from c31 billion tonnes in 1970 to almost 107 billion tonnes in 2024 according to data from the UN's Global Material Flows Database (Global Material Flows Database). Two aspects are relevant when trying to understand the outlook for raw material demand.

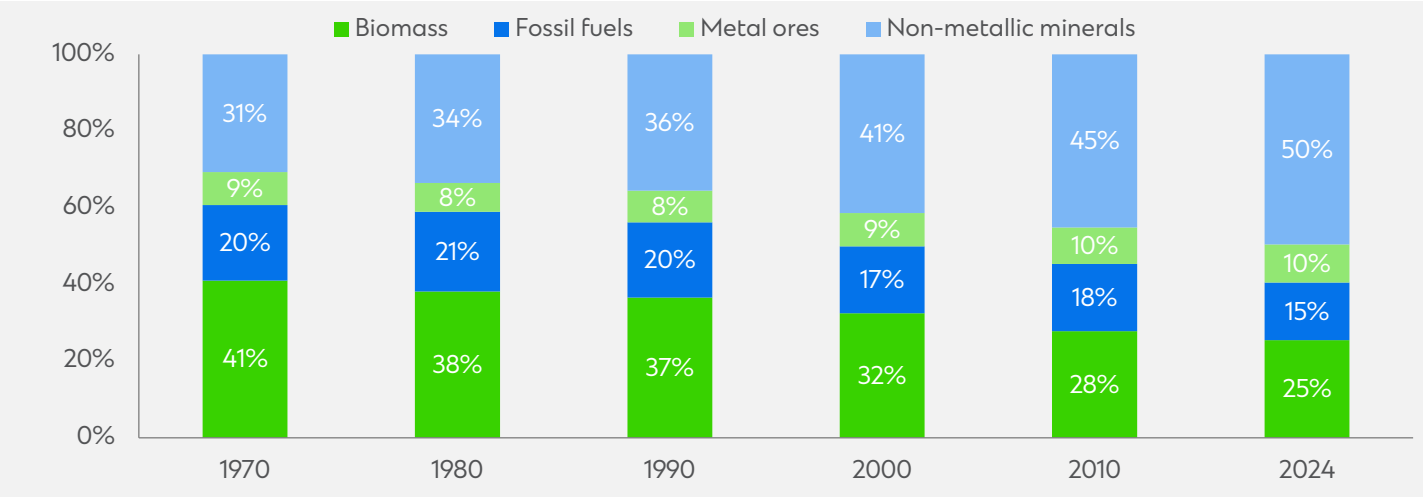
- Raw material consumption efficiency has declined given that on a per capita basis more raw material is needed today to sustain economic momentum than was the case historically (Figure 55).
- A shift in material consumption is taking place with a relative reduction in the use of biomass and a relative increase in the use of finite non-metallic minerals such as sand, gravel and clay for construction and industrial processes (Figure 56).

Figure 55: Raw material consumption growth



Source: UN Global Material Flows Database, Standard Chartered

Figure 56: Global raw material consumption by type



Source: UN Global Material Flows Database, Standard Chartered

As countries transition from rural and agricultural economies to industrialised and urban economies their need for infrastructure development increases which raises their use of non-metallic minerals. This process has certainly taken place across parts of Asia during the past 50 years. Data from the UN Global Material Flows Database shows that domestic extraction of non-metallic minerals in Asia has increased 17x since 1970 to more than 35 billion tonnes in 2024. These minerals now make up 60% of the region's total material extraction compared to just 26% in 1970.

The challenge faced by the world is accommodating further growth in demand for key finite raw materials, and biomass, as other developing regions transition their economies too. For example, non-metallic mineral extraction in Africa and Latin America and the Caribbean currently comprises just 32% and 24% of total raw material extraction respectively. Population growth, urbanisation and economic development across these regions are likely to drive a significant increase in demand for non-metallic minerals going forward. Improving economic output per unit of virgin raw material extracted and biomass used will increasingly drive the need and opportunity for adoption of circular economic solutions.

Modelling work from the UN in their most recent Global Resources Outlook report (Global Resources Outlook 2024) indicates what the raw material challenges the world may face in a business-as-usual scenario. Their base case scenario incorporates a 23% increase in the global population between 2020 and 2060 and a doubling of global GDP-per-capita over that period. Without changes to the economic model, this growth will likely drive an almost 60% rise in demand for raw materials according to their estimates. Meeting this demand will be most challenging for developing countries as the UN estimates that they are likely to face an 80-90% rise in per-capita raw material demand.

Total waste generation is forecast to increase by 80% and cost USD417 billion a year by 2050

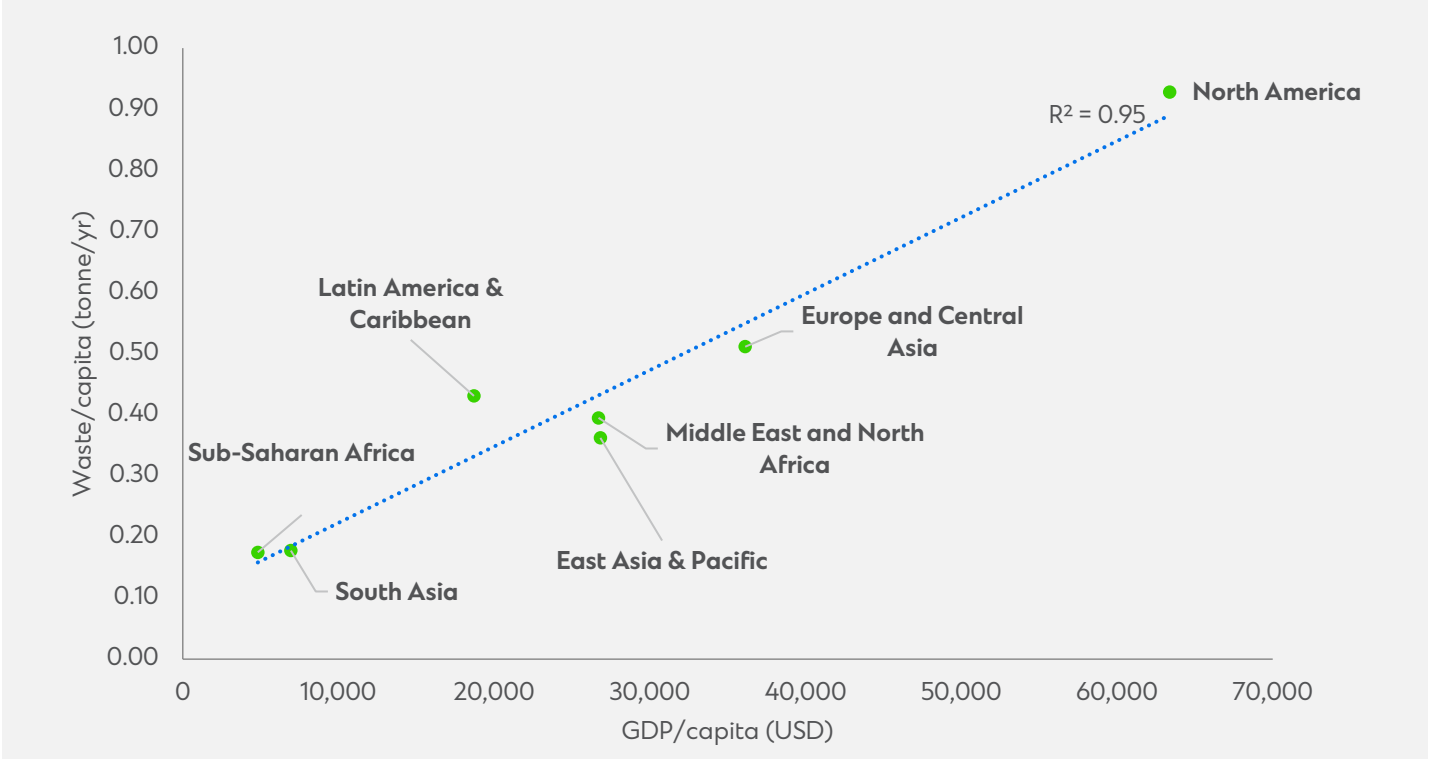
Data from the World Bank suggest that global solid waste production increased from 1.3 billion tonnes in 2012 to more than 2 billion tonnes today, making a significant contribution to climate change, biodiversity loss and pollution. In their 2024 Global Waste Management Outlook report the World Bank estimates that total waste production is likely to increase by almost 80% to 3.8 billion tonnes in 2050 unless strong action is taken to reduce consumption and dramatically increase rates of re-use and recycling (United Nations Environment Programme, 2024). The World Bank also estimates that the direct annual financial cost associated with this scenario would increase by more than USD160 billion to reach USD417 billion in 2050.

Municipal waste data from the World Bank suggest that per capita waste production in North America and Europe is up to 4x higher than for Latin America, South Asia, or Sub-Saharan Africa (World Bank, 2024). Reducing waste intensity levels across the developed world would clearly help lower the current burden of waste production. However, we see several reasons for believing that to successfully address the potential future burden of waste globally requires a strong focus on emerging economies.

- The developing world is likely to see a combination of population growth and the further expansion of the middle class. This implies a strong increase in waste production across these countries unless policies and behavioural changes manage to break the traditional relationship between average income per capita and waste generation per capita (Figure 57). We note that the World Bank supports this view as it estimates that 70% of the potential increase in global waste production in a business-as-usual scenario is likely to be driven by GDP growth and that the strongest growth is set to occur across the developing world.
- Total waste production across a range of developing countries is high especially given the size of their economies. For example, China, India and Brazil account for 32% of global waste production but only 22% of global GDP. The absence of effective waste management programmes may by one reason why some developing countries appear to generate more waste per unit of GDP. Another important driver relates to the fact that some waste production is related to the outsourcing of production from developed countries to the emerging world.

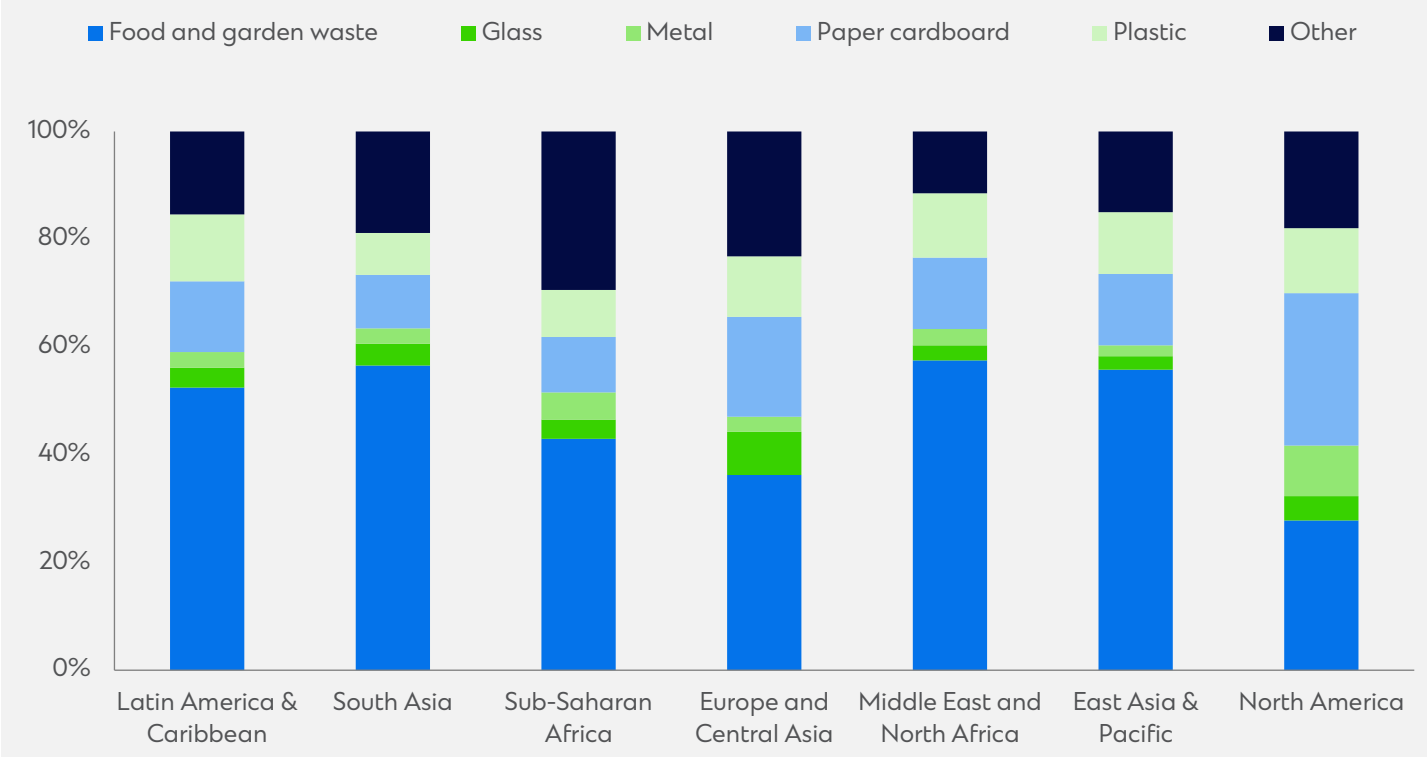
To reduce growth in waste production globally, and especially across the developing world, requires in our view the introduction of strong engagement from policymakers, consumers and corporates. Such policies should also recognise the fact that the nature of waste production changes as incomes increase (Figure 58). Food waste is a more prominent challenge for the developing world today, probably because of a lack of cooling and food-related logistical infrastructure. Waste production in more developed regions tends to be more tilted towards glass, metal and paper cardboard.

Figure 57: Waste generation is correlated with wealth



Source: World Bank, Standard Chartered

Figure 58: Breakdown of waste production

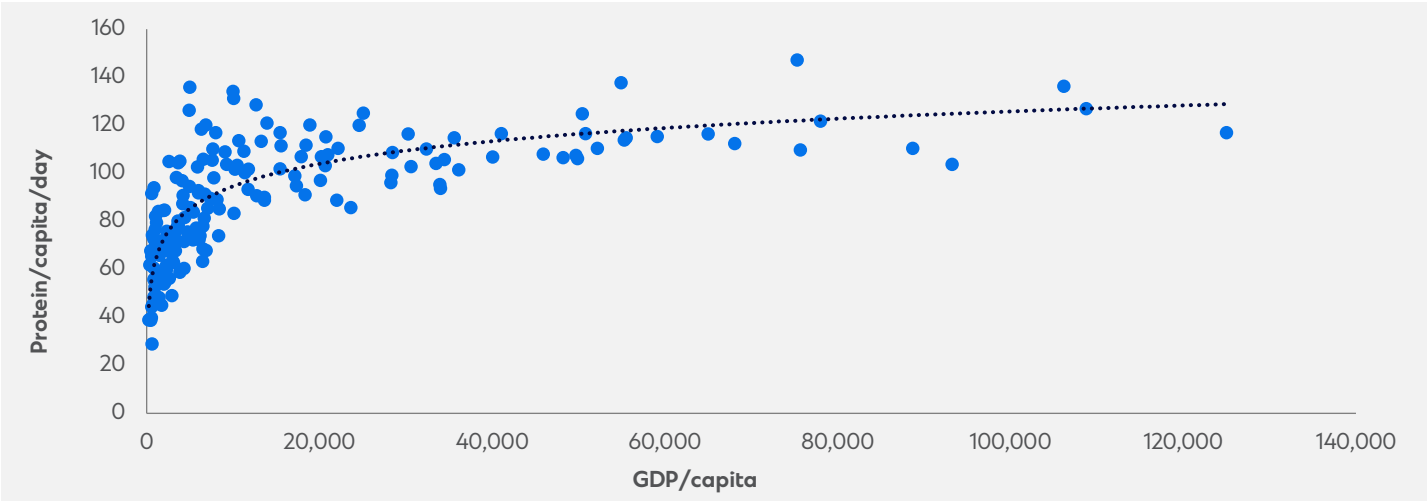


Source: World Bank, Standard Chartered

Growing food demand accelerates land, water and emission challenges

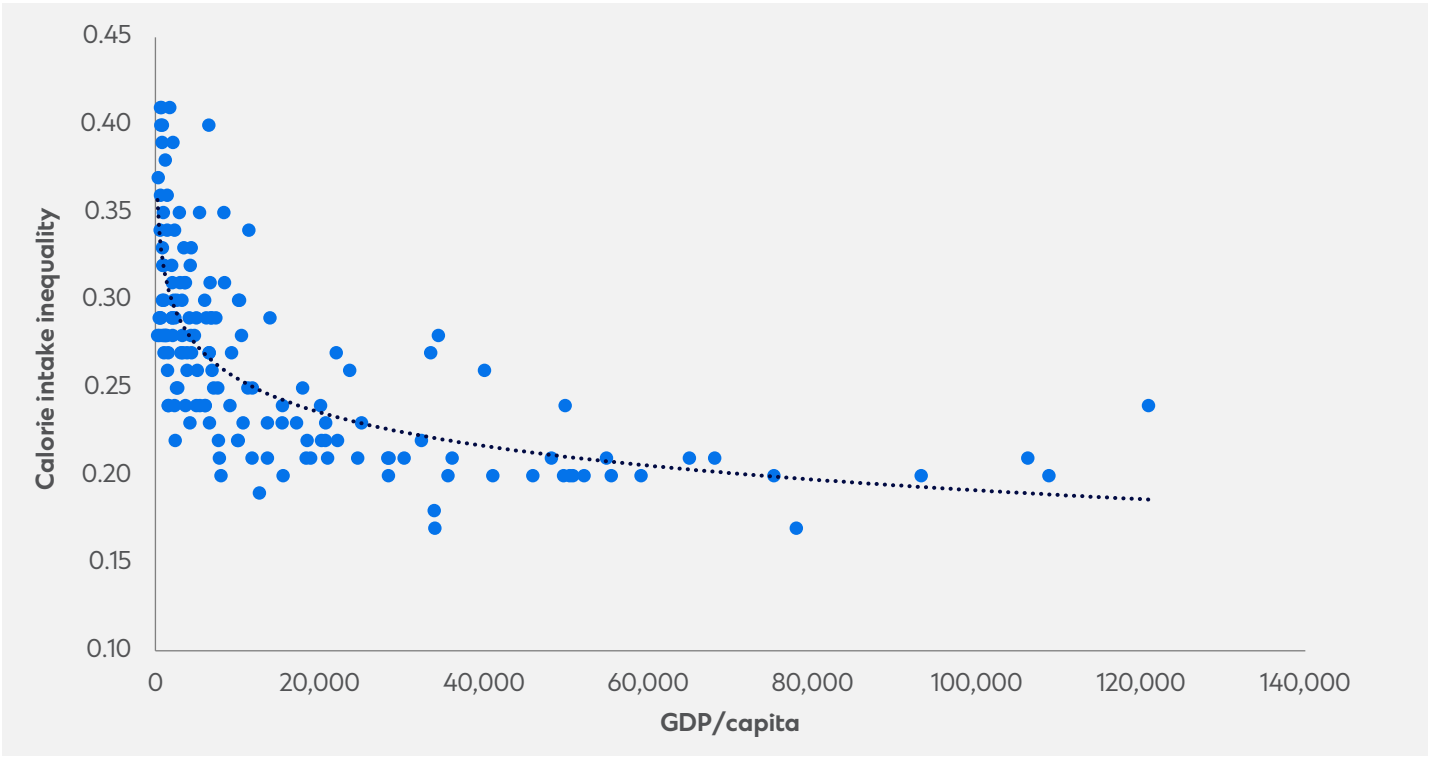
Food-related supply and demand challenges will intensify rapidly unless the global food system is able to shift to more nature positive and regenerative production methods that are both efficient and socially inclusive, particularly for farmers and rural communities. The growing challenges of meeting food demand are mainly driven by developing countries where an increase in income and population size is likely to not only lift aggregate demand for calories but also lead to a dietary shift towards higher protein consumption (Figures 59 and 60).

Figure 59: Protein consumption increases with income 2022



Source: FAO, World Bank, Standard Chartered

Figure 60: Variation in calorie intake per capita per country 2020, greater income correlates with more equal calorie access

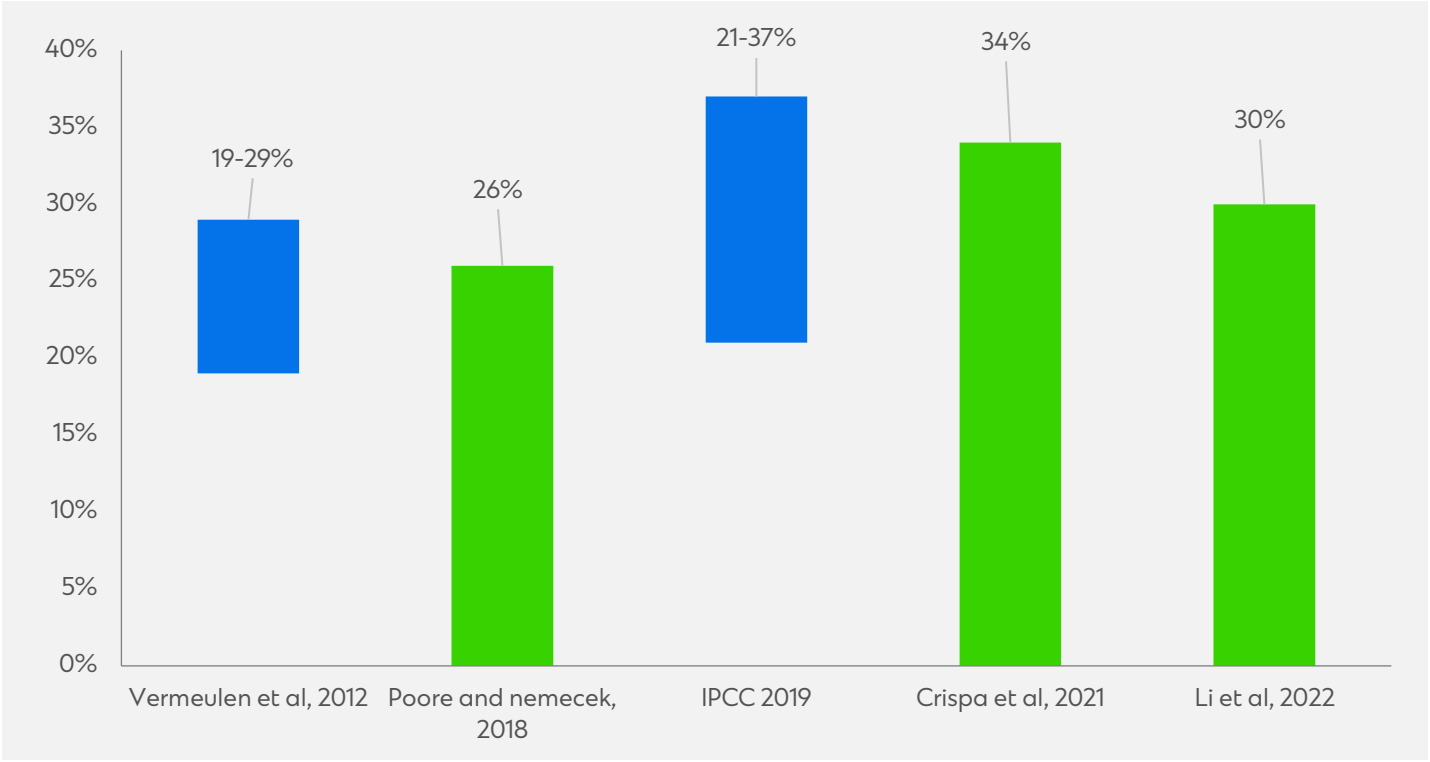


Source: FAO, World Bank, Standard Chartered

The environmental impact of the global food system is already significant with some estimates suggesting it accounts for more than 30% of global GHG emissions (Figure 61) while agricultural also accounts for 70% of global freshwater consumption (Vermeulen, et al., 2012), (Poore, et al., 2019), (IPCC, 2019) (Crippa, et al., 2021), (Li, et al., 2024)).

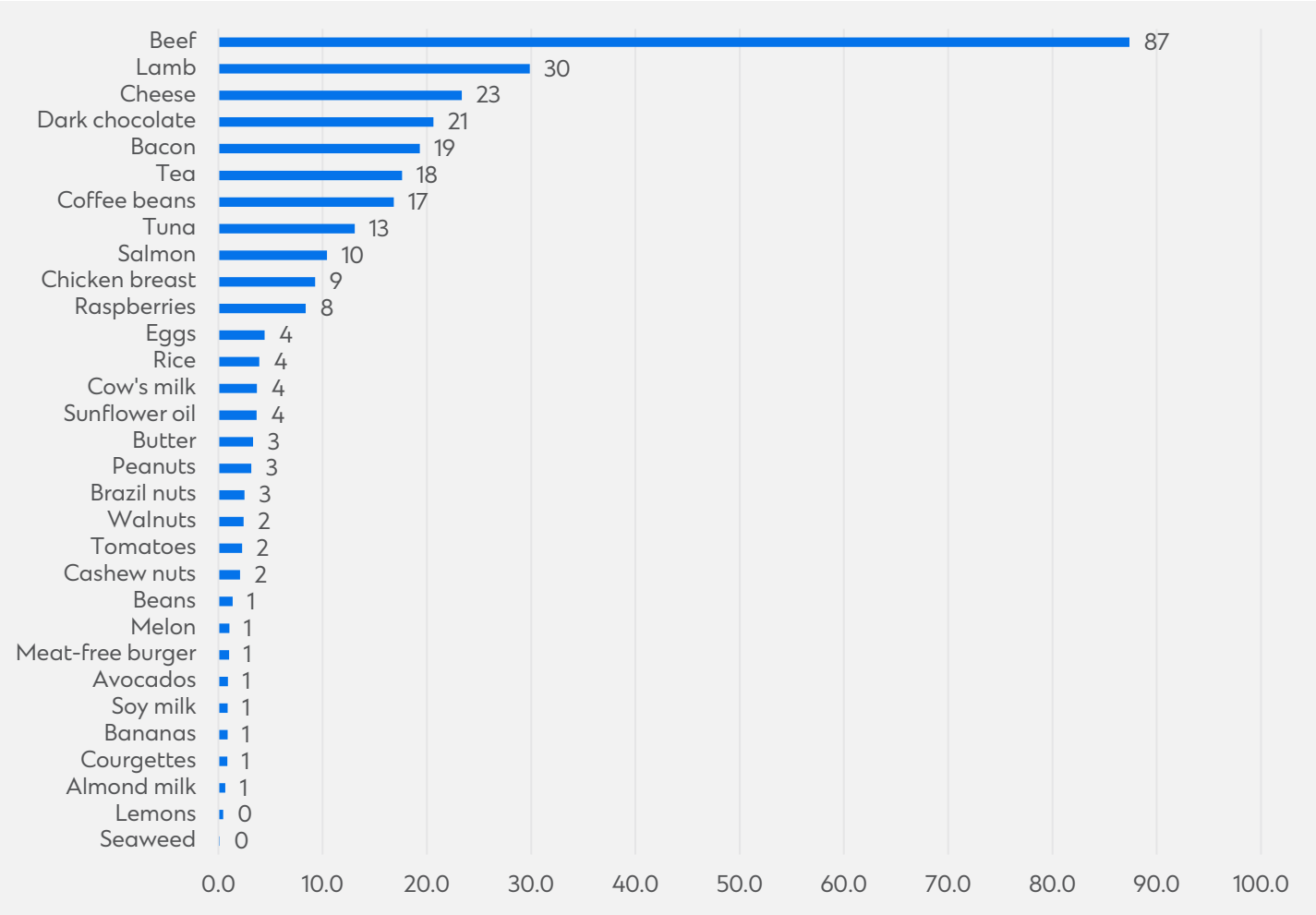
Analysis from Springmann et al (Springmann, et al., 2018) shows how much more challenging the environmental impact of the food system may become in a business-as-usual scenario. Their calculations show that a rise in income levels and population size may lift food-related GHG emissions to 2.6x the maximum sustainable level. Blue water use (i.e. freshwater excluding rainfall) and crop land needs meanwhile would likely rise by 65% and 67% respectively.

Figure 61: Food system and GHG emissions Share of GHG emissions driven by global food system



Source: authors, Standard Chartered

Figure 62: Emission intensity of key food items
CO2eq/kilogram of product



Source: Poore and Nemecek, Standard Chartered

Pressure on freshwater availability is forecast to intensify

The environmental and social challenges created by strong demand growth for raw materials and food are not the only reason we advocate for a more circular economic model. The increasingly challenged supply of fresh water is another.

Global freshwater usage has increased c6x since 1900 to more than 4,000km³ per year in 2022 (FAO). This increase has contributed to global groundwater depletion and has contributed to an annual increase of the area of drylands that face drought and severe water stress. As a , in 2015 around 500 million people lived in areas that experienced desertification and associated water stress. Furthermore, some 2 billion people lack access to safely managed drinking water services while 3.6 billion people lack access to improved sanitation services (World Bank, 2021).
The expected increase in the world's population will further increase demand for freshwater which, in turn, puts more people at risk unless efficiency enhancing strategies and investments are adopted.

The water related challenges are likely to spread geographically. At present a range of mostly developing countries already withdraw unsustainably high shares of their water resources as freshwater for use in agriculture and industry or for domestic use (Figure 63). Water demand in these countries is likely to increase even more as their economies develop (Figure 64).

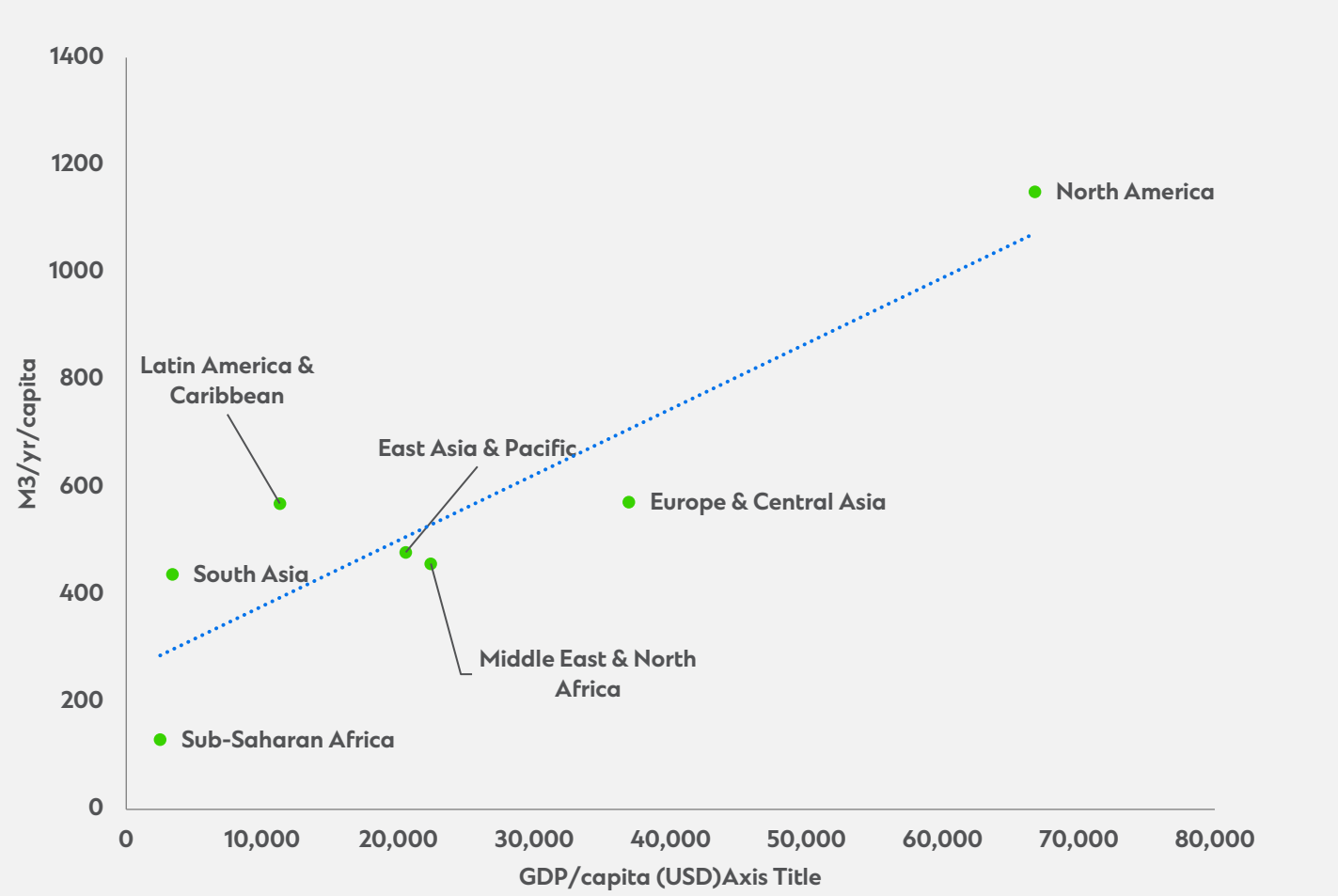
Sub-Saharan Africa is not really represented among the countries highlighted in Figure 16. The reason is that a lack of proper water infrastructure keeps per capita water consumption levels artificially low (Figure 64). Greater investments in water infrastructure are critical if African countries are to meet their Sustainable Development Goals. The impact of greater water access, however, will be that available freshwater resources are likely to come under more pressure. To limit that risk requires countries to stimulate corporates and consumers to adopt more efficient water-use strategies and broaden the sources of water supply.

Figure 63: Fresh water withdrawal as % of available fresh water resources2021, a ratio of >100% implies requirement for water import or desalination

Country	%	Country	%
Kuwait	3851	Sudan	**119**
UAE	1533	Oman	**117**
Saudi Arabia	974	Jordan	**103**
Libya	817	Tunisia	**98**
Qatar	431	Sri Lanka	**91**
Yemen	170	Barbados	**88**
Pakistan	162	South Korea	**85**
Egypt	141	Singapore	**83**
Algeria	138	Iran	**81**
Turkmenistan	135	Tajikistan	**70**
Bahrain	134	South Africa	**67**
Israel	132	India	**66**
Syria	124	Armenia	**60**
Uzbekistan	**122**	**Iraq**	**60**

Source: FAO, World Bank, Standard Chartered

Figure 64: Fresh water use per capita versus GDP/capita
Average by region, 2020 (Trendline in dashed format)



Source: World Bank, Standard Chartered

A review of policies across the world shows that circularity is gaining momentum

The European example shows that establishing clear circular policies and targets can help increase an economy's rate of circularity. This implies that the rate of circularity globally is likely to increase as other countries and regions have started to become more engaged with developing circular policies. We show examples of circular policy developments for key regions and countries below.

European Union

The European Union has some of the most advanced circular economy policies in the world today. In March 2020, the European Commission adopted the new circular economy action plan (CEAP). The plan, which includes 35 actions, is part of the EU's Green Deal and seen as essential to achieving the EU's 2050 climate neutrality target and to halt biodiversity loss. Most recently the European Commission has adopted its 2025-2030 working plan for the Ecodesign for Sustainable Products Regulation (ESPR) linked to the Commission's Energy Labelling Framework Regulation (ELFR). In combination these efforts build on the EU Commission's commitment to the vision of a circular economy and set the regulatory conditions for significant growth of circular economic activity across the EU single market and potentially with other trading partners over the next decade. The introduction of Digital Product Passports has the potential to significantly increase data and information availability and transparency, which will help enable trade, repair, refurbishment and remanufacturing, and improve recycling economics.

United Kingdom

During the past five years, the United Kingdom (UK) incorporated several policies that aim to advance the circular economy. These policies follow the Resources and Waste strategy for England that was published by the Department for Environment, Food and rural Affairs ((UK Government) and align with the UK's commitment to reach carbon neutrality by 2050. One of the key circular economy-policies adopted by the UK is the Circular Economy Package (CEP). The CEP includes a revised legislative framework for reducing waste and establishing waste management and recycling pathways. Earlier this year, the UK government announced that it intends to publish a new circular economy strategy that will focus on reducing waste and increasing the reuse of materials across several key industries (link). The priority sectors identified by the UK government are agri-food, chemicals and plastics, construction, textiles and transport.

USA

In contrast to most of the other key regions, the US does not have a comprehensive national circular economy framework. The most prominent national strategies that have been proposed include the National Recycling Strategy (EPA, 2021), the National Strategy for Reducing Food Loss and Waste and Recycling Organics (EPA, 2024) and the National Strategy to Prevent Plastic Pollution (EPA, 2024). These initiatives, however, are voluntary in nature. Legally binding circular requirements have only been developed in some US states. These often focus on Extended Producer Responsibility (EPR), E-waste recycling programs and a ban on single-use plastic.

China

China has developed circular economy-related policies and regulations since the early 2000s (Yang, et al., 2020). In 2005 the Chinese State Council issued "Opinions on accelerating the development of the circular economy", while the 11th Five-Year plan starting in 2006 implemented the circular economy as a key policy objective. This was followed by the publication of the Circular Economy Promotion Law in 2008 (Bleischwitz, et al., 2022). It its 14th five year plan, which was published in 2021, the Chinese government announced its intention to fully implement the concept of the circular economy and to build a multi-level resource recycling system (Xinhua News Agency, 2021).

China's focus on circular economy-related areas has shifted over time. Originally policies primarily aimed to improve resource efficiency and productivity especially owing to the energy intensive nature of China's developing industries. Later policies focused on improving the circularity of industrial systems and processes while the most recent programmes also focus on broader environmental, biodiversity and social-related areas.

India

In 2023 the Confederation of Indian Industry in conjunction with the Indian government published India's National Circular Economy Framework (Confederation of Indian Industry, 2023). It outlined that adopting a circular economy approach has the potential to reduce waste generation and water consumption by 50% and 20% respectively by 2050. Furthermore, it has the potential to reduce carbon emissions by 40% by 2050, create 10 million jobs and have a projected economic value by 2050 of USD2 trillion.

The framework highlights 11 areas that it believes will be key in trying to transition the Indian economy towards a circular model. These include waste (all types), batteries, end-of-life vehicles, solar panels and rubber and tyre recycling. The areas that provide the greatest immediate value opportunity from a switch to circularity, and that have a higher environmental benefit because of it, are plastics, construction materials, electrical and electronic goods and mixed municipal waste.

Southeast Asia

Adopting circular economy principles has strong potential for the countries that make up the Association of Southeast Asian Nations (ASEAN). Estimates from the Economic Research Institute for ASEAN and East Asia (ERIA) show that a circular economy could lead to economic growth of USD324 billion and create 1.5 million jobs across Asia. Sectors with strong potential include manufacturing, agriculture and forestry (BIMP, 2023).

In 2021, the member countries of the ASEAN Economic Community adopted its Framework for the Circular Economy (ASEAN, 2021). The overall goal of the framework is to create a resilient regional economy that makes efficient use of its resources and can deliver sustainable growth. Individual countries across the ASEAN region are also developing their own circular strategies. For example, as part of its circular economy roadmap and national action plan 2025-2045, Indonesia published a policy paper which showed that implementing a circular strategy could boost Indonesia's GDP by more than 10% and create 4.4 million jobs, 75% of which would be for female workers (Kementerian PPN - Bappenas, 2024).

Africa

The circular economy has gained political traction in Africa through initiatives such as the African Circular Economy Alliance (ACEA) and the African Circular Economy Action Plan, which was mandated by the African Union and endorsed during the 17th African Ministerial Conference on the Environment (AMCEN). As a result, almost all African countries have at least one CE-related policy, including reducing plastic bag usage, waste management strategies, sustainability plans, and regulations concerning extended producer responsibility.

An analysis conducted for the Directorate-General Environment of the European Commission showed that Africa should focus on five priority sectors when trying to maximise the benefits from a circular economy approach (Rademaekers, et al., 2021). These are Agriculture, Construction and housing, Plastics and packaging, Electronics and ICT and Waste management. The benefits from adopting circular approaches in these sectors include improved trade balances, reduced pollution, forest and soil restoration, enhanced biodiversity and the creation of 11 million jobs.

Brazil

In 2024 Brazil's President signed a decree creating Brazil's National Circular Economy Strategy (ENEC). This strategy is focused on the elimination of waste and pollution, increasing the circulation of materials and products and the regeneration of nature. Brazil's strategy is focused on strengthening regulation, increasing innovation, reducing waste, making financial support available and improving intergovernmental coordination.

Circular investment requirements

To assess the magnitude of additional financing required to enable a global transition towards a circular economy, we have reviewed the investment requirements for some of the key circular end markets. We highlighted the key conclusions of this earlier in the report and show our methodology behind these estimates below.

Agrifood: USD2.2-6.5 trillion

The FAO estimates that the agriculture and forestry sector needs over USD1.1 trillion per year until 2030 to be aligned with a 1.5°C global warming scenario. Our review of their analysis suggests that some USD675 billion of this amount covers circular solutions. These include regenerative farming, food loss and waste reduction, land rehabilitation and restoration and water management (CPI & FAO, 2025). Work from A&O Shearman (CPI / A&O Shearman, 2024) supports the FAO estimates and suggests that annual investments of USD1.2 trillion are needed between 2030 and 2050. This suggests that for the agricultural and forestry sector to transform towards an operating model that helps limit global warming to 1.5°C would require total investments of USD6.5 trillion in circular solutions.

1.5°C-related investment requirements provide an upper bound estimate for circular agrifood investments. A more moderate estimate is provided by using targets adopted by countries as part of their Nationally Determined Contributions (NDCs). A country's NDC outlines its commitment to reducing GHGs and how it intends to adapt to the impacts of climate change. The investment implications of NDC commitments are typically much less aggressive than those associated with 1.5°C scenarios. Analysis from the FAO suggests that to meet the NDC targets requires some USD2.2 trillion to be invested across six circular economy-related agricultural and forestry activities by 2035. We see this as the lower bound for circular investment requirements associated with the agrifood sector.

Building and construction: USD1.3-1.9trn

An estimated 37% of global energy-related emissions can be attributed to the building and construction sector (Climate finance leadership alliance, 2022). A wide range of circular solutions can be applied to improve the material and emission intensity of this sector. However, creating a building sector aligned with long term net zero targets requires a substantial increase in investments or repurposing of existing investments to take into account circular principles. Estimates from organisations such as the IEA and McKinsey suggest that incremental investment needs to align the building sector with net zero are USD340-500 billion per year (IEA, 2024) and (McKinsey, 2022). This implies a total incremental investment requirement until 2035 of USD3.4-5.0 trillion. The Ellen MacArthur Foundation estimated that circular solutions can reduce emissions from the built environment by 38% (Ellen MacArthur Foundation, 2024). Assuming that emission reductions are proportionate to the investment requirement implies that 38% of the incremental building investment requirement may relate to the adoption of circular solutions. This suggests that circular building investment needs may reach USD1.3-1.9 trillion during the next ten years.

Steel, aluminium and cement: USD210-350 billion

Industries such as steel, aluminium and cement can choose to adopt circular solutions as part of attempts to reduce their virgin material consumption and their emission footprint. Over the next 10 years Bloomberg estimates that USD1.3 trillion of clean-industry investments are needed. Historically Bloomberg's data suggest that 16% of clean industry investments were related to industry-focused circular economy solutions. If this ratio remains constant, cUSD210 billion of the USD1.3 trillion of required clean industry investments relates to circular solutions during the next ten years.

Another way to estimate the circular investment requirements for these hard-to-abate sectors is by using the Net Zero Industry Tracker analysis from the World Economic Forum (World Economic Forum, 2024). Their calculations show that to reach net zero requires USD2.2 trillion of investments across steel, aluminium, and cement by 2050 or USD0.9 trillion by 2035 assuming equal annual investments. Of this almost USD350 billion would be for circular-related investments on our calculations.

The plastic sector: USD234-530 billion

Data from Circulate Initiative (The Circulate Initiative, 2025) show that investments into circular plastic solutions averaged USD24 billion per year during the 2018-2024 period. In 2024 investments reached USD17.9 billion, 83% of which were directed at plastic waste collection, sorting and recycling. This is far below what is needed to scale plastic waste collection, sorting and recycling capacity. Using data from the Nordic Council of Ministers for plastic costs we calculate that USD530 billion in capital investments are needed to build out sufficient plastic collection, sorting and recycling capacity by 2035 (Nordic Council of Ministers, 2023). Not only are plastic related investments too low, they are also overly directed towards high-income countries. Just USD11 billion or 6% of circular-related plastic investments since 2018 were directed towards emerging economies even though they account for 94% of plastic leakage into the ocean according to data from the Circulate Initiative. Data for 2024 shows that circular-related plastic investments in Africa accounted for just 0.2% of total investments (Circulate Initiative, 2025).

Another indication of circular investment requirements associated with plastic may come from the earlier mentioned report from the World Economic Forum (World Economic Forum, 2024). Their net zero estimates for the chemical sector shows that a total of USD2.6 trillion of investments are required by 2035. Of this 9% refers to waste management, most of which relates to plastic recycling. The World Economic Forum calculations therefore suggest that plastic recycling investment requirements are USD234 billion during the next decade.

Addressing plastic waste effectively not only requires an increase in waste treatment facilities but also the development of waste collection capabilities especially across the Global South. To underline how big this challenge is we refer here to work from PEW Charitable Trusts and Systemiq. They estimate that 500,000 additional people will have to be connected to waste collection services every single day until 2040 if long term plastic waste recycling targets are to be met (Pew Charitable Trusts and Systemiq, 2020).

Textiles: USD115 billion

Global textile waste reached c92 million tonnes in 2020 and at current rates is forecast to reach 134 million tonnes in 2030 (Fashion for good, 2022). However, less than 1% of annual material use by the textile industry is reused (World Business Council for Sustainable Development, 2025). Data from BloombergNEF shows that cumulative investments into the textile recycling industry globally reached less than USD1 billion during the past 10 years (BloombergNEF, 2025). McKinsey suggests that optimising textile recycling in the EU alone requires up to EUR7 billion of investments by 2030 (McKinsey, 2022). Estimates from Fashion for good suggest that USD60 billion could be needed globally to increase recycling capacity to allow the textile industry to meet SDG-compliant targets (Fashion for good, 2020).

Using low and high textile recycling CAPEX estimates from McKinsey for traditional closed loop recycling systems we calculate that recycling all textile waste globally in 2035 requires between USD53-115 billion in investments.

The value opportunity associated with a move towards circularity for the textile industry is significant. Estimates from the UN indicate that it could generate USD700 billion in economic value by 2030 (United Nations Environment Programme, 2023). Circular textile solutions such as reuse and repair risk cannibalising the existing business model of textile retailers. Therefore regulatory, policy and investment support is likely needed to mobilise textile companies to transition their linear operations to a circular-based model.

Waste recycling capacity: USD2.1 trillion

Earlier in this report we showed modelling results for the cost and capital investment requirements associated with developing waste recycling capacity across 80 countries. Our calculations suggest that to develop a global circular waste strategy may require cumulative incremental investments until 2050 of cUSD2.1 trillion globally. We note that almost 90 90% of these investment requirements relate to countries in Asia, Africa and Latin America and the Caribbean.

Scaling water desalination: USD2.2 trillion

Improving water security is a major challenge for many countries, not least across the developing world. Circular solutions that help address these challenges include water recycling, water conservation, technologies used to deal with flood and drought resilience, and desalination.

Perspectives on inclusion of desalination as a circular solution vary widely. However, if it is powered by renewable energy, uses appropriate brine management, and is complemented with clear water demand reduction, water efficiency and wastewater reuse strategies, desalination may be a viable solution.

Demand for desalination is significant as two thirds of the world's population experience severe water scarcity at least one month each year while over two billion people live in countries where water supply is inadequate (UNICEF, 2025). Corporate potential is significant too as just 8% of freshwater withdrawals by industry and for domestic use is treated for reuse globally according to Water Resources Group (Water Resources Group, 2025). Overall water-related investment needs are very significant, with the OECD estimating that they exceed USD1 trillion per year (OECD, 2022).

To provide an indication of the potential circular investment requirements associated with reducing water scarcity we have run a simple scenario focused on desalination. Using data for the gap between renewable water availability and water consumption by country we can calculate how much investment in desalination plants is needed if desalination is used as the primary tool to fully eradicate a country's water gap. For this calculation we restrict ourselves to 37 countries that, according to estimates from the World Resources Institute, are likely to have high or very high water scarcity in 2040 in a business-as-usual scenario (World Resources Institute, 2015) and that border an ocean. The latter condition is stipulated as desalination mostly uses seawater.

A recent publication by Rosa et al provides baseline water gap data by country as well as how this may change under different global warming scenarios (Rosa, et al., 2025). Their data suggests that the cumulative water gap for the countries reviewed is 345 km3 per year. This gap rises to 371km3/year if global warming is limited to 1.5 degrees and to 406km3/year in a 3-degree warming scenario. Capital expenditure costs for existing desalination plants range between USD1,000-2,000 per m3 per day (Chunke, 2024). Applying these costs to the above-mentioned water gaps implies that removing the baseline water gap fully through desalination could cost between USD0.9-1.9 trillion. These costs would rise to USD1.1-2.2 trillion in a 3-degree warming scenario. It is unlikely that desalination would be the only technology used to solve a country's water scarcity problems, but countries that border an ocean may consider using it if these problems become severe.

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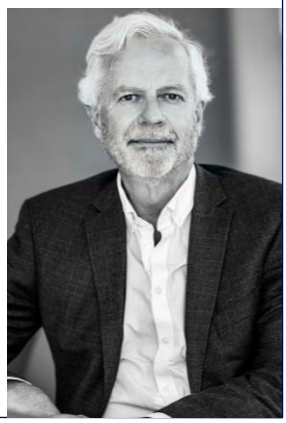
Prior to his role at EMF Andrew was a strategy Partner with McKinsey & Company and a Global Managing Director for information technology strategy at Accenture. Andrew holds master's degrees in psychology and business administration.



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Standard Chartered Innovation Hubs

Innovation Hub model has been established in the sustainability office to enable Standard Chartered to identify and deliver new innovative solutions for our clients and markets. The Hubs collaborate and work to develop insights, help define and contribute to standards setting on key sustainability topics for the industry as a whole, and to develop new financial products and services in partnership with teams from across the Bank.

In total there are five Innovation Hubs: Adaptation Finance, Nature Finance, Blended Finance Programmes, Carbon Markets, and Circular Economy.

Standard Chartererd's market reach and deep innovation expertise uniquely positions it to take a leading role in the support circular economic business growth globally, and to develop and scale deployment of financial solutions for the transition to a circular economy.

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Disclaimers

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The information included in this document may contain 'forward-looking statements' based upon current expectations or beliefs as well as statements formulated with assumptions about future events. Forward-looking statements include, without limitation, projections, estimates, commitments, plans, approaches, ambitions and targets (including, without limitation, ESG commitments, ambitions and targets). Forward-looking statements often use words such as 'may', 'could', 'will', 'expect', 'intend', 'estimate', 'anticipate', 'believe', 'plan', 'seek', 'aim', 'continue' or other words of similar meaning to any of the foregoing. Forward-looking statements may also (or additionally) be identified by the fact that they do not relate only to historical or current facts.

By their very nature, forward-looking statements are subject to known and unknown risks and uncertainties and other factors that could cause actual results, and the Group's plans and objectives, to differ materially from those expressed or implied in the forward-looking statements. Readers should not place reliance on, and are cautioned about relying on, any forward-looking statements. In particular, there is additional uncertainty around the evolution, impact and risk surrounding climate change that cannot be evaluated in the same way as more conventional financial risk due to the long-term, complex and novel nature and the different interaction with non-climate-related risks and vulnerabilities.

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Please refer to the latest Annual Report and the financial statements of the Group for a discussion of certain of the risks and factors that could adversely impact the Group's actual results, and cause its plans and objectives, to differ materially from those expressed or implied in any forward-looking statements.

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Basis of Preparation and Caution Regarding Data Limitations

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