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CIRCULAR ECONOMY HANDBOOK FOR POLICY MAKERS AND PROJECT PROMOTERS

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BIOGRAPHICAL INFORMATION

Dr. Prasek is an independent consultant in environmental, social and governance areas with an experience in around 4000 investment projects across a number of sectors. Till recently he held a position of a Director of Operations at the Environment and Sustainability Department in the European Bank for Reconstruction and Development (EBRD). He was responsible for coordinating environmental and social due-diligence and monitoring of various Bank's investment operations. Dr. Prasek has been the key contributor to the development and implementation of the EBRD's Green Economy Transition Strategy which includes the implementation of the provisions of Circular Economy in the Bank's supported projects. Before joining the Bank, he was an Advisor for the United Nations Conference on Environment and Development (Earth Summit). Dr. Prasek holds a Ph.D. in environmental engineering from the Warsaw University of Technology, and from 1987 to 1991 was Assistant Professor at that university's Institute of Environmental Engineering. Dr. Prasek has published numerous articles in the fields of solid waste management, circular economy, environmental management, environmental aspects of project financing and is a member of many professional organizations. Dr. Prasek is a member of the United Nations Advisory Board on Circular Economy and Independent Expert on Development Financing at IDB Invest.

Contents

Acronyms and Abbreviations

APC	Australian Packaging Covenant
ASEAN	Association of Southeast Asian Nations
B&A	Batteries and accumulators
CCEA	Chinese Circular Economy Association
CE	Circular economy
CPG	Consumer packaged goods
EC	European Commission
EIB	European Investment Bank
ELV	End-of-life vehicles
EPR	Extended Producers Responsibility
EU	European Union
EU28	European Union
EUR	Euro
FMCG	Fast-moving Consumer Goods
GDP	Gross domestic product
GHG	Greenhouse gas
GPPR	Global Plastic Packaging Roadmap
IFRS	International Financial Reporting Standards
IoT	Internet of Things
kg	Kilogram
KPI	Key performance indicator
LWRB	London Waste and Recycling Board
NGFS	Network for Greening Financial Systems
OECD	Organisation for Economic Co-operation and Development
PACE	Platform for Accelerating the Circular Economy
R&D	Research and Development
RDI	Research, Development and Innovation
SDGs	Sustainable Development Goals
SMEs	Small and medium-sized enterprises
TCFD	Task Force on Climate-related Financial Disclosures
TCO	Total Cost of Ownership
TEG	Technical Expert Group
UK	United Kingdom
UN	United Nations
VAT	Value-added tax
WEEE	Waste electrical and electronic equipment
WEF	World Economic Forum
WISP	Western Cape Industrial Symbiosis Programme

Foreword from the Author

The transition to a circular economy requires a radical change in the way we produce and consume. Products are designed for durability, upgradeability, reparability and reusability. Companies develop new business models generating revenue streams from services rather than products, while making more efficient use of resources and materials, and consumers use products efficiently and discard them in such a way that they can be turned into secondary materials that can enter a new production-consumption cycle. The circular economy concept is gaining attention in light of increasing consumption and resource use by a fast-growing population with rising standards of living. This is a new economic model that represents sustainable progress towards efficient green growth. Due to its expected environmental, climate, social and economic benefits, the circular economy is not only being strongly promoted by the EU institutions, as well as a growing number of national and local governments but it is also attracting increasing attention from the business community and from public and private financiers.

Like with any systemic change, the transition to the circular economy requires several elements of the system to change simultaneously. The inertia and resistance of the current linear economic systems prevent the transition from occurring. Concerted actions by a host of stakeholders are needed for change. Governments at all levels, businesses, innovators, academia, investors and consumers all have to play their distinct roles and contribute to the process. The recent years have seen a rapid development of the circular economy business models such as resource recovery, remanufacturing and product life extension, sharing and product service. However, the market penetration of circular business models remains limited and there is a considerable scope for their future growth. Such growth should be supported by a well-functioning, non-distortive policy and regulatory framework, which ensures a level playing field for circular economy business models by eliminating legacy subsidies that reward linear behaviours and by fully pricing in risks and externalities associated with the linear production and use of materials. Such a framework facilitates and accelerates the allocation of capital to circular investments and activities. It stimulates private sector finance and allows optimal leverage of public funding.

There is a general consensus among many experts that in spite of the fact that there are several examples of effective EU, national such as the Netherlands, Sweden, Denmark and Finland and regional policies which support the increasing ‘circularity’ of economic systems, the existing policy frameworks and skills of the policy makers are insufficient to achieve a meaningful acceleration for the transition to the circular economy. Various expert groups have identified several key recommendations for financial and non-financial policy makers, project promoters and public authorities to achieve concerted actions in the acceleration of the circularity measures.

One of the common themes in these recommendations is the need to develop taxonomy, standards and metrics for circular economy to enable better assessment of circular risks versus linear risks. Also, social and environmental benefits of the circular economy should become explicit, quantifiable and disclosed, and should be taken into account in financing decisions. The experts also stress the role of public authorities and the need to increase their capacities. Public authorities, on all levels, can provide incentives to promote circular economy models via, for example, public procurement, subsidies, taxation and funding. They have the legitimacy and means to reward positive externalities. Work also has to be undertaken to set circular economy performance requirements for products and services.

Public authorities and project promoters play an important role in creating circular businesses. The principal objective should be to succeed in correctly identifying, conceptualising and developing circular business models and projects that are both sound and bankable, and congruent with a long-term development vision and strategy for the transition to the circular economy. Awareness-raising both at the level of internal organisations and external stakeholders (including the value chain network) is crucial in this context. They can advise and improve the economic viability and bankability of projects; and visualise collaborative arrangements within the supply chain.

There is also a need for partnership, cooperation and coordination between various stakeholders. Weak policy coordination remains a common feature across countries. At governmental level, responsibility for the areas of policy relevant to circular economy tends to be distributed across more than one ministry. Often, existing decision-making structures and processes do not deal effectively with cross-ministerial topics. Better coordination and cooperation between governing bodies would result in addressing the above issues. Policy coordination requires involvement of stakeholders outside government. The importance of involving private-sector stakeholders, both employers and workers, in policy decisions and in the design of skills development measures is essential.

It is important to strengthen national and local governmental policies to support the widespread implementation of circular business models through, among other things, setting quality standards for recycled and reused materials, or by pushing for innovative initiatives. Further work is required to ensure circular business models become the best option for companies willing to gain competitive advantage and maintain their market share while aligning their goals with society's goals. Barriers both at the company level and along the value chain, as well as from a policy perspective still persist. Overcoming these obstacles and seizing opportunities is key for the transition towards a more sustainable and competitive economic model.

This Handbook is intended for policy makers and project promoters at various national levels to provide initial analysis of various policy considerations and the level of awareness and skills required by public bodies to accelerate the transition to the circular economy. It provides recommendations to different groups of stakeholders, including financial

and non-financial policy makers and project promoters regarding measures which need to be adopted to achieve accelerated transition to circularity. Particular emphasis has been put on recommendations to improve skills and conditions for financing circular economy projects, removing barriers and identify main areas where incentives need to be provided. The Handbook provides examples of successful sectoral and country-wide policy interventions that promote the circular economy and provides references to the most recent sources of information on the Circular Economy.

The Handbook has been prepared as part of the ongoing circular economy program being implemented by the Georgian Society of Nature Explorers "Orchis" within the framework of "Keep Georgia Tidy" Project and supported by the Government of Sweden. This program is the basis for the Georgia's accelerated shift to circularity. It is also a vital contribution to fulfil Georgian commitments under the Association Agreement with the European Union.

The author would like to express his sincere thanks to the Embassy of the Kingdom of Sweden in Tbilisi and the Georgian Ministry of Environment Protection and Agriculture for their invaluable comments and suggestions. Particular thanks go to Erik Illes, Head of the Swedish International Development Cooperation Agency / Deputy Head of Mission, Khatuna Zaldastanishvili, Programme Officer of the Swedish International Development Cooperation Agency and to Professor Solomon Pavliashvili, Deputy Minister of Environment Protection and Agriculture.

1 Introduction

Adopting the circular economy policy has a potential to put economies on the road to transformation to an economic system that uses natural resources in the most efficient way, preserves the value of materials and products by using them circularly, and reduces the negative impact of economic activities on the environment and health. Applying circular economy approaches can cut industrial emissions, reduce the production of and exposure to hazardous substances and contribute to climate change mitigation. With its truly symbiotic effects on the economy and the environment, the circular economy is a way of achieving certain UN sustainable development goals (SDGs).

The transition to a circular economy requires a radical change in the way we produce and consume. In a circular economy, products are designed for durability, upgradeability, reparability and reusability, with a view to reusing materials from which they are made after they reach the end of their life. In the use phase, products are managed with a view to maximizing their utilization capacity and extending their useful life, thus maintaining their value for as long as possible. This is made possible by companies that develop new business models generating revenue streams from services rather than products while making a more efficient use of resources and/or giving new value to end-of-life products and materials. Consumers use products efficiently and discard them in such a way that they can be reused or, if this is technically or economically unfeasible, recycling operators turn them into secondary materials that can enter a new production-consumption cycle. This needs to be supported by the whole ecosystem, from enabling technologies and infrastructures to a form of market organization that facilitates collaboration along and across value chains and a form of governance and regulation that encourages companies to adopt circular approaches to social norms that make circular production-consumption patterns socially preferable. This paradigm is in contrast with the linear economy which is based on the 'take-make-use-discard' model. This is a model which maximizes the amount of products produced and sold but does not focus on preserving materials. Such an approach prevents effective collaboration along value chains and stimulates the 'throw-away' consumer culture with its noxious environmental consequences.

Like with any systemic change, the transition to a circular economy requires several elements of the system to change simultaneously. The inertia and resistance of the current linear economic systems prevent the transition from occurring. Concerted actions by a host of stakeholders are needed for change. Government at all levels, businesses, innovators, academia, investors and consumers all have to play their distinct roles and contribute to the process.

The transition to a circular economy is at an early stage even in the most developed countries of the World. Despite circularity being firmly on the global and national agendas, and many public and private initiatives being developed, the Circularity Gap

Report 2020[1] found that the circularity of the world is going in reverse. Its economy is only 8.6% circular, compared to 9.1% two years ago. The activities of economic operators are influenced by systems that have been developed and optimized for the prevailing linear production and consumption. Regulations, markets, investment tools and practices, including financial risk assessment, are adjusted to linear models, and externalities linked to linear business models are largely not taken into account. This poses a problem for emerging circular models, which have to contend with the challenge of accessing finance, as the financial sector sees circular projects as highly risky and often not bankable. When measuring risk, two main factors have to be taken into account. The first is the creditworthiness of the borrower (or the risk profile of the project), while the second is the value of the collateral (e.g. underlying assets or contracts). As new circular business often does not have a strong track record, these companies can easily be labelled as highly risky. Often initial investments to innovate and access the market are high, which may have implications for margins in the short run but may lead to a quite profitable company in the longer run. The value of the collateral is measured by the market value of the company, where the valuation of assets (and their residual value) plays an important role. Asset valuation in a linear system is quite different from valuation in a circular system.

Value creation is increasingly knowledge- and data-intensive, and services trade has continued to grow at a faster pace than goods. The coronavirus crisis has speeded up these trends as it has exposed the vulnerability of complex value chains and just-in-time production and delivery. Business strategies and trade patterns are being redrawn. The fourth industrial revolution acts as a major driver. At the same time, it can serve as a powerful enabler of the circular economy transition. The digitalisation and new circular economy business models, such as sharing platforms and 'product-as-a-service' systems, are key elements of the new circular economy.

1 Circle Economy (2020). Circularity Gap Report 2020. Retrieved from: https://www.circularity-gap.world/global

2 Circular Economy – Background

Our current linear 'take-make-use-dispose' economy originates in the second industrial revolution, which generated considerable growth in prosperity in the years following the Second World War, but also increased resource use and propagated a consumption and throw-away society. The turn of the millennium saw the reversal of a 100-year trend with natural resource prices decreasing steadily in parallel to economic growth. Since then, real commodity prices have risen in tandem with economic growth and have thereby increased the focus on resource efficiency and security of supply.

While recessions in recent years have temporarily reversed these trends, price volatility and uncertainty remain. With expected future global population growth of about 500-750 million per decade, accompanied by rapid growth in living standards and purchasing capacity in less developed areas, it is predicted that material resource use may double between 2015 and 2050. This raises concern that the earth's finite resources may not be sufficient to sustain the expected increases in consumption and wasteful resource use. The increasing raw materials consumption also increases the costs and related externalities of extraction and transport of resources from more remote and less accessible deposits. Furthermore, it has been estimated that 20% of global material extraction ends up as waste.

In a fully circular economy (CE), the concept of waste is minimised to the extent possible by carefully rethinking and designing products and industrial processes so that resources are kept in use in a perpetual flow, and by ensuring that any unavoidable waste or residues are recycled or recovered. The Ellen MacArthur Foundation has described the circular economy in a system diagram, shown in Figure 1, which comprises two material cycles: a biological cycle, in which residues are returned to nature after use, and a technical cycle, where products, components or materials are designed and marketed to minimise wastage. Such a circular system aims at maximising the use of pure, non-toxic materials and products designed to be easily maintained, reused, repaired or refurbished to extend their useful life, and later to be easily disassembled and recycled into new products, with minimisation of wastage at all stages of the extraction-production-consumption cycle.

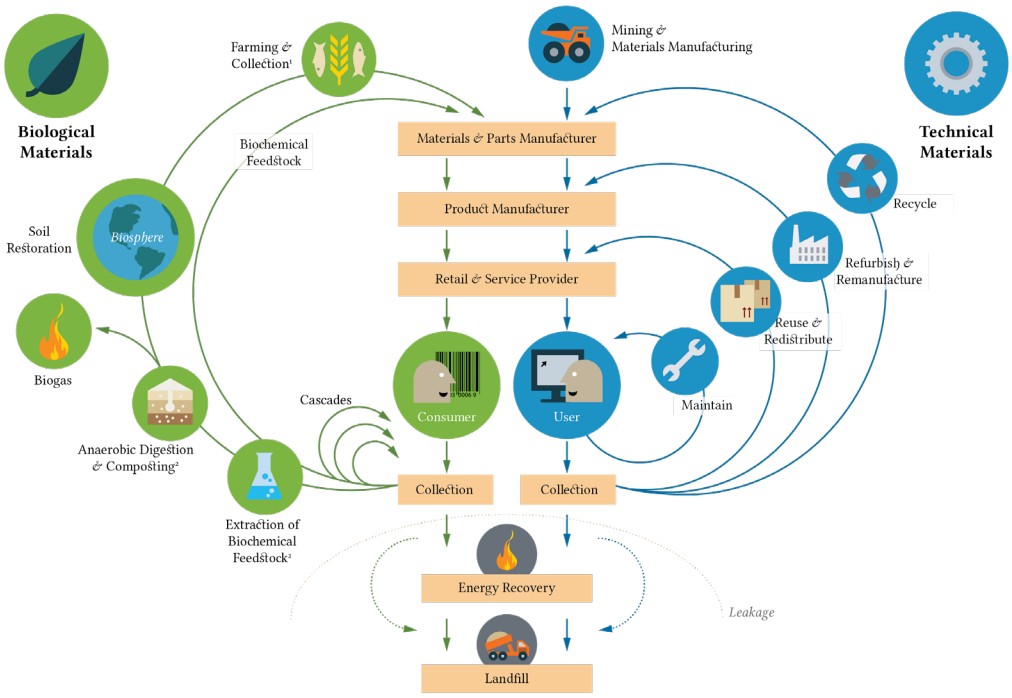

Figure 1 The Ellen MacArthur Circular Economy System Diagram

This circular way of producing and consuming enables a decoupling of economic growth from extraction and consumption of materials. As such, a circular economy offers a way to hedge future resource and material supply risks for companies and increase their resilience to decreasing supplies and increasing price uncertainty and volatility. This will reduce resource dependency and – particularly by spurring innovation – also support competitiveness. It is also argued that the circular economy presents an opportunity for economic and industrial renewal with associated investment needs.

3 The Business Models

The shift to a circular economy requires companies to rethink not only their use of resources but also to redesign and adopt new business models based on dematerialisation, longevity, refurbishment, remanufacturing, capacity sharing, and increased reuse and recycling. Reference is often made to three circular business model categories, each of which focuses on a different phase of the value chain: (a) the design and manufacturing phase; (b) the use phase; and (c) the value recovery phase. These different CE business models can be illustrated in what is called a Value Hill, shown in Figure 2.

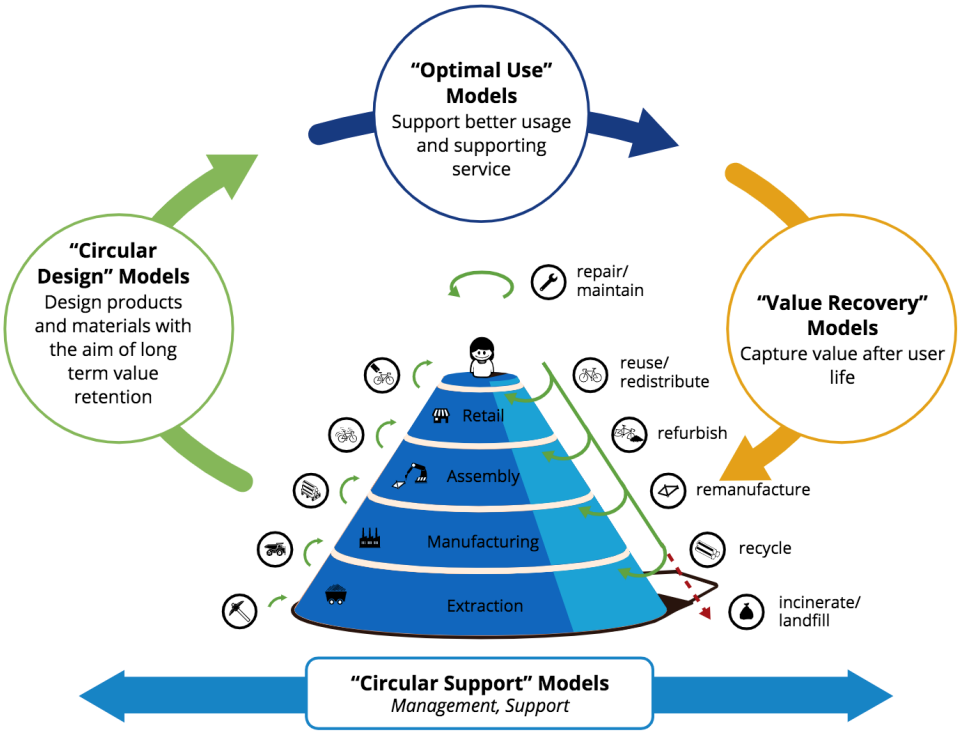

Figure 2 Different CE business models in the Value Hill

Circular Design Models focus on the development of existing or new products and processes that seek to optimise circularity. Products are designed to last longer and/or be easy to maintain, repair, upgrade, refurbish, remanufacture or recycle. Additionally, new materials are developed and/or sourced, e.g. biobased, less resource intensive, or fully recyclable. The risks related to financing such innovations do not differ much from financing other innovation or Research, Development and Innovation (RDI) projects.

Optimal Use Models aim to increase the value and use of a product during an extended life. These business models often build on retained ownership of a product, e.g. by providing a service rather than selling a product, and/or take responsibility for the product throughout its useful life, e.g. through maintenance services, or add-ons to extend the life of a product. Such product-to-service models have financial implications coming from, for instance, the changing nature of cash flows, with increasing working capital to pre-finance clients, balance sheet extension, and re-evaluation of residual value. Related challenges lie in product tracking and legal issues surrounding ownership of collateral and its value. Such risks may be difficult to assess or value, and could lead to difficulties in financing this type of project.

Value Recovery Models focus on maximising recovery and recycling of products and materials after use into new products or useful resources in order to reduce wastage and conserve resources. The development of reverse logistics, i.e. the return from point of consumption to point of production, is essential for this model. It should be considered that for some materials, recycling involves a loss of quality and for products also loss of design, and technical and energy inputs. Acknowledging this, difference can be made between downcycling, which results in lesser quality and reduced functionality, and upcycling, which involves transforming by-products and waste into new materials or products of higher quality or better environmental value.

Circular Support Models focus on the management and coordination of circular value networks and resource flows, and optimising incentives and other supporting activities in a circular network. Circular support models also include the development or deployment of key enabling technologies supporting, enabling and facilitating the other business models.

4 Challenges and Policy Implications of CE Business Models

This section of the Handbook provides basic information on the circular economy business models and analyses key barriers for their implementation. It also provides recommendations regarding potential policy interventions to achieve acceleration and better penetration of these models.

Circular business models – those that serve to reduce the extraction and use of natural resources and the generation of industrial and consumer wastes – operate in a number of economic sectors such as plastics[2] production and reprocessing[3], agribusiness[4], metallurgy. Because these business models use already existing materials and products as inputs, their environmental footprint tends to be considerably smaller than that for traditional business models. This idea is supported by the life cycle analysis literature[5], where it has been demonstrated that secondary raw materials, repaired and remanufactured products, and shared assets typically have relatively small global warming, acidification and toxicity potential. As such, the continued adoption of circular modes of production, to the extent that it displaces production from traditional modes could have important first order environmental benefits.

The market penetration of circular business models remains limited and is usually no more than 5 to 10% in economic terms[6]. Circular business models occupy a peripheral position in most markets. Recycled pulp and paper, metals, and plastics represent small proportions of global material output, while remanufactured industrial and consumer products represent an even smaller share of global manufacturing. Sharing of under-utilised housing capacity has grown rapidly, but now only accounts for several percent of the annual short stays in most major cities. The same is true for user-oriented product-service system models, which account for less than 1% of the market. The most successful circular model of production – producing secondary

2 Ellen McArthur Foundation (2018), Eleven companies take major step towards a New Plastics Economy,https://www.ellenmacarthurfoundation.org/news/11-companies-take-major-steptowards-a-new-plastics-economy

3 Long, X. et al. (2017), "Strategy Analysis of Recycling and Remanufacturing by Remanufacturers in Closed-Loop Supply Chain", Sustainability, Vol. 9/10, pp. 1-29, https://ideas.repec.org/a/gam/jsusta/v9y2017i10p1818-d114402.html

4 Jagtap, S. (2017), IoT Concepts for Improving the Resource Efficiency of Food Supply Chains, http://www.manufacturingfoodfutures.com/documents/utilization-of-internet-of-thingsconcepts-to-improve-resource-efficiency-of-food-supply-chains-sandeep-jagtap.pdf

5 OECD (2019), Business Models for the Circular Economy: Opportunities and Challenges for Policy, OECD Publishing, Paris. https://doi.org/10.1787/g2g9dd62-en

6 Bocken, N. et al. (2016), "Product design and business model strategies for a circular economy", Journal of Industrial and Production Engineering, Vol. 33/5, pp. 308-320, http://dx.doi.org/10.1080/21681015.2016.1172124.

raw materials from waste – only accounts for 30 to 40% of the physical output of the sectors that it is best established in (pulp and paper and steel)[7].[8] Other forms of circular production – the refurbishment and remanufacturing, the sharing of spare capacity, and the provision of services rather than products – continue to represent a small fraction of the overall output (either in physical or economic terms).

Although it is clear that some of these business models such as resource recovery, remanufacturing and product life extension, sharing and product service[9], [10] have experienced rapid recent growth, much of these have been confined to a handful of economic niches. Sharing models in the accommodation sector or product service systems in the transport sector are frequently cited examples. Transitioning to a more circular and resource efficient economy – one where environmental impacts associated with economic production and consumption are significantly reduced – will require much more widespread penetration of these business models.

There remains considerable scope for the future growth of circular business models. However, any such growth will be subject to economic realities – more widespread adoption of these business models will not take place unless there is a solid underlying business case. In some cases, the attractiveness of the business case may diminish as market share increases. For example, in the context of recycling, it is well documented that the unit cost of recovering steel or aluminium from household appliances is significantly higher than recovering them from relatively simple bulky products like vehicle chassis'. In other cases, the attractiveness of the business case will improve as market share increases. This is especially relevant for those business models characterised by network effects: consumer acceptance of platform models and car sharing schemes is likely to increase as the membership base – and services offered – grows. It may also be relevant for other business models that are characterised by some form of path dependence or that benefit in some way from the emergence of related business models[11]. In the context of remanufacturing, addressing the trade rules that hinder cross border flows of product cores would allow remanufacturing to become more widespread and, perhaps, generate lower costs through either learning externalities or scale economies.[12]

7 Geyer, R., J. Jambeck and K. Law (2017), "Production, use, and fate of all plastics ever made", Science Advances, Vol. 3/7, p. e1700782, http://dx.doi.org/10.1126/sciadv.1700782

8 Van Ewijk, S., J. Stegemann and P. Ekins (2017), "Global Life Cycle Paper Flows, Recycling Metrics, and Material Efficiency", Journal of Industrial Ecology, http://dx.doi.org/10.1111/jiec.12613

9 AmCham (2017), China (Ningbo) Remanufacturing Industry International Cooperation Forum, https://www.amcham-shanghai.org/en/article/china-ningbo-remanufacturing-industryinternational-cooperation-forum-0?lang=en

10 European Commission (2016), Study on socioeconomic impacts of increased reparability of increased reparability - EU Law and Publications, https://publications.europa.eu/en/publication-detail/-/publication/c6865b39-2628-11e6-86d0-01aa75ed71a1

11 Parker, D. et al. (2015), Remanufacturing Market Study, http://www.remanufacturing.eu/assets/pdfs/remanufacturing-market-study.pdf

12 Wang, Y. (2016), Remanufacturing Mission to China, https://connect.innovateuk.org/web/remanufacturing/article-view/-/blogs/newremanufacturing-standards

The business case for circular business models will also evolve alongside broader societal level trends. Changes in policy frameworks, consumer preferences, and available technologies have the potential to stimulate adoption in much the same way as in the past.[13] The emergence of technologies associated with the so called Fourth Industrial Revolution seems particularly promising in the context of circular business models. Improvements in robotics, artificial intelligence, sensor technology, and 3D printing will have widespread consequences, particularly when coupled with increasingly pervasive digital networks. The Internet of Things (IoT), which is just one of the potential implications of these developments, will present an array of opportunities for more efficient food and energy use[14], [15]. Research undertaken by the WEF in New York[16] city suggests that digital connectivity in concert with smart sensors could also vastly improve the convenience of ride sharing, to the extent that 80% of all journeys could be shared.

Not all circular business models are created equal; it is not entirely clear which have the greatest scalability and environmental potential. As such, it may be prudent to avoid targeting policies at specific business models, and instead focus on implementing a policy framework that provides coherent incentives for closing and slowing resource loops, and narrowing resource flows throughout the economy. Also the barriers that hinder the emergence of these business models vary widely according to a business model considered and sectors they are applied in.

There are various reasons why the market share of circular business models may be suboptimal. One shared characteristic of these business models is that they use virgin resources and environmental goods less intensively than traditional businesses that they compete against. These inputs are cheaper than they would be if the externalities – the environmental damages – resulting from their use were addressed. This probably serves to provide traditional business models with a competitive advantage. Policy can help to ensure that the full environmental costs of production and consumption activities are reflected in market prices.

Core to many circular business models, particularly the circular supply, resource recovery and product life extension business models, is the need for collaboration within and across value chains. Externalities resulting from design decisions made by traditional manufacturing firms have implications for the feasibility of material recovery and product life extension activities further downstream. Similarly, the existence of search and transaction costs can make it difficult for industrial symbiosis to emerge

13 Lavery, G. et al. (2013), The Next Manufacturing Revolution, http://www.2degreesnetwork.com

14 Ashman (2017), The Internet of Things: paving the way for renewable energy? – Capgemini Worldwide, https://www.capgemini.com/2017/08/the-internet-of-things-paving-the-way-forrenewable-energy/

15 Jagtap, S. (2017), IoT Concepts for Improving the Resource Efficiency of Food Supply Chains, http://www.manufacturingfoodfutures.com/documents/utilization-of-internet-of-thingsconcepts-to-improve-resource-efficiency-of-food-supply-chains-sandeep-jagtap.pdf

16 WEF (2016), Understanding the Sharing Economy, http://www3.weforum.org/docs/WEF_Understanding_the_Sharing_Economy_report_2016.pdf

across sectors. Policy can help to improve collaboration within and across sectoral value chains. Fostering industrial symbiosis clusters, promoting online material marketplaces, establishing secondary raw material certification schemes, and, more generally, facilitation of cooperation within and across value chains may be worthwhile initial steps.

Policy misalignments are sometimes also hindering the emergence of circular business models. One example concerns the provision of subsidies to extractive and material processing sectors, which can extend into the billions of dollars for fossil fuels (OECD, 2015)[17], metals (OECD, 2017)[18], fisheries (OECD, 2018)[19], and agriculture (OECD, 2016)[20]. Another example concerns the tendency to tax labour inputs at significantly higher rates than capital and natural resource inputs. A recent Club of Rome report on the circular economy (Wijkman, Skånberg and Berglund, 2016)[21] states that "modern tax systems in the EU apply high rates to employment while leaving the use of natural resources tax-free or even subsidized". For the same reason as that outlined above, these policies probably serve to favour traditional modes of economic production. Policy makers could therefore consider what objectives the existing fiscal policy is serving, and whether a fiscal realignment could lead to improved environmental and equity outcomes.

There are also a variety of status quo biases that effectively lend inertia to current patterns of economic development, often at the expense of the emergence of circular business models. One example concerns the elevated price volatility that is present in secondary materials markets. This volatility – which is itself a product of limited market development – probably disincentivizes investment in new secondary production capacity. Another example concerns various trade regulations that serve to limit cross border flows of secondary materials and used products (OECD, 2018).[22] While many of these restrictions serve a clear purpose within the linear economic system, they may hinder the development of the reverse logistics that are central to some circular business models. A final example relates to regulatory exceptions that are often granted to heavily polluting or incumbent firms, thereby hindering the entry of firms with more circular business models. Policy could therefore aim to ensure that existing regulatory frameworks are coherent and

17 OECD (2015), OECD Companion to the Inventory of Support Measures for Fossil Fuels 2015, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264239616-en

18 OECD (2017), MAPPING SUPPORT FOR PRIMARY AND SECONDARY METALPRODUCTION, https://one.oecd.org/document/ENV/EPOC/WPRPW(2016)2/FINAL/en/pdf

19 OECD (2018), Fisheries Support Estimate, http://www.oecd.org/tad/fisheries/fse.htm

20 OECD (2016), OECD'S PRODUCER SUPPORT ESTIMATE AND RELATED INDICATORS OF AGRICULTURAL SUPPORT Concepts, Calculations, Interpretation and Use, http://www.oecd.org/tad/agricultural-policies/full%20text.pdf

21 Wijkman, A., K. Skånberg and M. Berglund (2016), "The Circular Economy and Benefits for Society Jobs and Climate Clear Winners in an Economy Based on Renewable Energy and Resource Efficiency", http://www.clubofrome.org/wp-content/uploads/2016/03/The-Circular-Economy-and-Benefits-for-Society.pdf

22 OECD (2018), International Trade and the Transition to a More Resource Efficient and Circular Economy, https://one.oecd.org/document/COM/TAD/ENV/JWPTE(2017)3/REV3/en/pdf

fit for purpose, and not serving to preserve an existing status quo.

Another major challenge concerning status quo bias relates to consumer behaviour. In some cases, the development of markets for circular products and services appears to be held back by a lack of consumer interest. For example, in most consumer goods sectors, there are only a small number of manufacturers that attempt to differentiate themselves by marketing long lived, but relatively expensive products (the clothing manufacturer Patagonia is one such example). Despite the fact that higher quality products may be cost competitive when considered over their useful life, many consumers prefer to opt for low quality substitutes. Policy makers could therefore consider how existing educational and information programs can be improved to provide individuals with a better understanding of the unintended consequences of their consumption choices.

The use of behavioural insights and nudges, such as through labelling requirements, may be a promising way forward. Policy makers interested in promoting more widespread adoption of circular business models could, in addition to addressing the issues highlighted above, implement a range of additional enabling policy measures. These policies will clearly differ according to the business models concerned, but can be thought of generally as promoting either the supply of circular products ("supply-push measures") or demand for them ("demand-pull measures"). Examples of the former include eco-design standards, strengthened Extended Producers Responsibility (EPR) schemes, and the provision of targeted Research and Development (R&D) funding. Examples of the latter include differentiated VAT rates, recycled content mandates, product labelling standards, and green public procurement.

Finally, one issue highlighted in this review is the importance of rebound effects, whereby initial reductions in resource extraction and use are partially offset via various indirect economic feedbacks. Any future transition to a more resource efficient and circular economy will be at least partially driven by the diffusion of material efficient production technologies and the emergence of more cost competitive circular business models. The resulting reduction in price levels is likely to trigger a rebound effect as consumers allocate the associated savings to additional consumption, and manufacturers substitute towards inputs that have become relatively cheap (probably including natural resources). Policy can influence the composition (and therefore the environmental footprint) of the rebound effect by ensuring that the full social costs of production and consumption are reflected in market prices.

5 Supportive Policy Framework for Circular Economy

As mentioned in the previous section of the Handbook, it may be prudent to avoid targeting policies at specific business models, and instead focus on implementing a policy framework that provides coherent incentives for closing and slowing resource loops, and narrowing resource flows throughout the economy. This section of the Handbook provides an outline of the key elements of such a policy framework.

A supportive, well-functioning, non-distortive policy and regulatory framework is a key precondition for the transition to a circular economic model. Such a framework should be designed to enable the intrinsic value of materials to be preserved or enhanced along production systems and value chains, and to minimise at the same time the level of inputs of virgin materials. There are several examples of effective EU[23], [24], national such as the Netherlands[25], Sweden[26], Denmark[27] and Finland[28] and regional policies which support the increasing 'circularity' of economic systems. However, there is a general consensus among the EU Commission's Expert Group on Circular Economy Financing[29], experts from investment funds as well as experts from national and supranational lending institutions, including the European Investment Bank that the current policy and regulatory framework is not sufficient for circular economy business models and value chains to thrive.

A well-functioning policy and regulatory framework ensures a level playing field for circular economy business models by eliminating legacy subsidies that reward linear behaviours and by fully pricing in risks and externalities associated with the linear production and use of materials. Such a framework facilitates and accelerates the allocation of capital to circular investments and activities. It stimulates private sector finance and allows optimal leverage of public funding.

There is a general consensus among the EU Commission's Expert Group on Circular Economy Financing as well as other groups of CE experts that the following four principles should be considered when formulating these policy interventions:

23 https://circulareconomy.europa.eu/platform/

24 For an overview of the 2015 and 2018 Circular Economy Packages, see, for instance http://ec.europa.eu/environment/ circular-economy/index_en.htm

25 https://circulareconomy.europa.eu/platform/en/strategies/circular-economy-netherlands-2050

26 Sweden transitioning to a circular economy - Government.se

27 https://en.mfvm.dk/focus-on/circular-economy/strategy-for-circular-economy/

28 https://www.ym.fi/en-US/The_environment/Circular_economy

29 Accelerating the transition to the circular economy https://op.europa.eu/en/publication-detail/-/publication/02590134-4548-11e9-a8ed-01aa75ed71a1

- value preservation/creation;
- proportionality (to the level of externality);
- progressive dematerialisation;
- sensitivity to innovation.

In addition, any policy development should be coherent and well-integrated with the effective and timely implementation of existing related policies such as climate related policies. In any case the circular economy policy should avoid rebound or distorting effects, particularly with respect to other policy objectives to reduce greenhouse gas emissions and achieve the SDGs. The policy changes should also reflect the adaptive capacity of the businesses, and include appropriate phase-in and phase-out mechanisms.

The following have been identified as a priority for policy interventions by the EU Expert Group on Circular Economy Financing, which analysed barriers and identified the main areas that have the potential to encourage a greater allocation of finance to circular economy business models and systems:

- subsidies should be removed and the negative externalities of linear economic activities internalised; where this is not politically feasible, subsidies (in a suitable, non-distortive form) to circular economic activities proportionate to their positive externalities should be considered;
- public tools such as public procurement should be used to accelerate the market for circular economy products and services;
- public funds should be activated as a 'de-risking' instrument to mobilise more private capital for scale-ups with a circular scope;
- technical assistance should be provided to help businesses and local administrations understand linear risks and the economic and societal benefits of the circular economy;
- 'response measures' which mitigate the economic and social impacts of communities, sectors and regions particularly exposed to the legacy of linear economic systems (e.g., mining) should be introduced;
- priority should be given to policy interventions that comprehensively address multiple environment, social and governance risks.

6 Recommendations to Financial Policy Makers[30]

Sections 6 and 7 of the Handbook focus on key recommendations to financial and non-financial policy makers as well as public authorities to undertake measures and actions to overcome barriers and skill gaps which pose a significant impediment in understanding the needs, risks and opportunities associated with the promotion of the circular business models and their penetration of the market.

6.1. Linear Risk Disclosure Standards

The current 'linear' consumption model of take (extract), make (produce), use and discard poses inherent risks to the sustainability of markets and companies that operate within them. Without the systematic recovery and reuse of materials, value chains remain dependant on the availability of cheap virgin resources. For an individual company, such linear business models, defined by the reliance on cheap virgin resources, can affect operations and overall profitability through multiple future scenarios, including: disruptions in resource supplies, volatility in resource costs, and decreasing costs of renewable/circular alternatives. Such scenarios have played out already, particularly in precious metals markets where the global supply of a number of materials (e.g. cobalt) is already facing increasing availability risks. As these risks are associated with linear business practices, they are referred to as 'linear risks'.

Most companies and financial institutions are typically not taking these linear risks into consideration in their business decisions, investment credit evaluations, or reporting procedures. This is mainly because of the perception of current market stability and the time-tested success of linear business practices in adapting to changes in global markets. As a result, investors and consumers are largely unaware of the possible detrimental factors that these risks pose on the performance of their businesses or investments.

In order to trigger a shift to a circular economy, the full risk profile of current linear business practices must be disclosed. By evaluating linear risks, the benefits of circular economy models can be better understood in relation to 'business-as-usual' scenarios. The main mechanism for articulating these risks would be through risk

30 Policy makers refer to governments at all levels including national, regional and local administrations. The financial players are commercial banks and other private investors, the EIB and other multilateral development banks, national promotional banks and other public investors as well as consultancies, credit rating agencies, etc. Potential project promoters are private and public businesses (from large corporations to SMEs) whose capacity to innovate and develop viable circular economy business models and concrete projects will be key to ensuring the success of the circular economy transformation process.

and credit evaluations conducted by financiers and investors to provide a better understanding of strengths and weaknesses of linear or circular investments. Specific incentives need to be created to address the inertia of current, well established and time-tested linear business practices, which do not incorporate linear risks in financial evaluations.

Key Recommendations

- *Developing reporting standards for linear risks of investments and businesses and incorporating them into standard accounting practices could help to ensure that linear risks are sufficiently evaluated and disclosed. The reporting standards would provide a methodology for corporates and financial institutions to identify the exposure to linear risks within their portfolios or operations.*[31]

Relevant recent work on the definition of linear risks can be found in the paper Linear Risks by Circle Economy, PGGM, KPMG, EBRD and WBCSD, June 2018[32]. The paper proposes an initial definition of 'Linear Risks' and a framework to help investors and businesses better understand the exposure to effects of linear economic business practices, which will negatively impact an organisation's ability to operate in the market place.

Dedicated linear risk standards could build on current best practice within climate-related risk disclosure systems. A good example is represented by standards developed within the Task Force on Climate-related Financial Disclosures (TCFD)[33] to develop disclosure recommendations for risks related to climate change. The task force states its mission as "to develop voluntary, consistent climate-related financial risk disclosures for use by companies in providing information to investors, lenders, insurers and other stakeholders." Set up at the end of 2016, the Task Force presented its recommendations report on best methods and practices for disclosing climate-related risks in the summer of 2017. Companies and investors are now using these recommendations to incorporate climate risk disclosures in their reporting to shareholders and other stakeholders.

Stemming from the TCFD's recommendations, linear risk disclosures could be documented in terms of companies' governance, strategy, risk management measures, and metrics and targets used to evaluate impacts of these risks. For metrics and targets, linear risk standards would emphasise potential material impacts on companies' income statements and balance sheets.

31 https://www.ellenmacarthurfoundation.org/resources/apply/circulytics-measuring-circularity

32 https://www.circle-economy.com/news/linear-risks-how-business-as-usual-is-a-threat-to-companies-and-investors

33 https://www.fsb-tcfd.org/

The targets for these recommendations are financial regulators, policy makers and representatives of the financial sector. They can all play an active role in incorporating linear risk reporting into financial disclosure practices:

- **The Technical Expert Group (TEG) on Sustainable Finance**[34] in its four areas of focus: i) a taxonomy to define whether an activity is environmentally sustainable; ii) green bonds standards; iii) benchmarks for low-carbon investment strategies; and iv) recommendations on how to improve corporate disclosure of climate-related information. As environmental sustainability and the circular economy are complementary concepts, integrating linear risk considerations in the TEG's working areas would help to make the group's outputs more comprehensive. With respect to the future development of sustainability benchmarks, this would incorporate circular economy concepts into their development of benchmarks to measure the environmental sustainability of investment strategies. The resulting benchmarks would help to link corporations' reliance on materially intensive value chains, scarce resources or volatile commodity markets to the climate impacts of these value chains, resources and markets. Corporations that demonstrate higher levels of circularity in their operations or investments would therefore be more likely to meet the benchmarks.
- **International Financial Reporting Standards (IFRS) Foundation**[35] provide a common set of principles for companies to prepare and publish their financial statements. Companies would then be commonly required to examine their portfolios and operations to determine their exposure to linear risks, and to examine their mitigation measures. Similar to the proposed work with the EU TEG, linear risk disclosure standards would need to be developed with the IFRS Foundation, particularly their International Accounting Standards Board.
- **Network for Greening Financial Systems (NGFS)**[36] could introduce obligatory reporting standards through Central Banks which could play a critical role in disseminating linear risk reporting standards. Central banks define the financial reporting standards that companies registered within the country need to follow in preparing and publishing their financial statements. Central banks can expand on international best practices, like the IFRS, and put forward guidance to locally registered **corporations** to disclose their linear risks within their portfolios and operations. The NGFS could facilitate the introduction of these standards through central banks. The NGFS is a collation of a growing number of central banks to 'enhance the role of the financial system to manage risks and mobilise capital for green and low-carbon investments. Within the EU, the central banks of Austria, Belgium, Finland, France, Germany, the Netherlands, Spain and the UK are members as are the Swedish Finansinspektionen (Sweden's financial regulatory agency) and the European Central Bank. The NGFS has a clear mandate to develop tools for financial systems to scale up finance for

34 https://ec.europa.eu/info/publications/sustainable-finance-technical-expert-group_en

35 https://www.ifrs.org/

36 https://www.ngfs.net/en

environmentally sustainable development, including the design and integration of climate and environmental risk analysis tools for supervisory practices. Linear risks and the potential development of reporting standards would fit well within this work stream.

Adopting standards for the disclosure of linear risks can help accelerate the transition of businesses to a circular economy. This is because, first of all, companies that previously did not consider their exposure to the availability of critical resources or other linear risks begin to evaluate the sustainability and efficacy of their current business and risk management practices from a new perspective. By doing that, companies can then begin to consider circular alternatives to mitigate these risks. Second, investors can benefit from increased transparency and more complete information on risks of their investments. This can act as an incentive for investors to invest in more circular practices as these can mitigate linear risk. Last, value chains would benefit from identifying their potential weaknesses due to linear risks. Value chain actors would be more willing to collaborate to address these weaknesses.

6.2. Definition of Circular Economy Finance

The concept of the circular economy is increasingly refined thanks to the theoretical and analytical work conducted by several academic and research organisations. Still, the link between the circular economy and investments and technologies is less established. There are companies that demonstrate how circular economy concepts can be embedded successfully into existing business models. These companies are exemplary but do not reflect the current market understanding of circular economy approaches. One of the issues preventing a more widespread adoption of circular economy practices is that businesses and financial institutions lack a common framework for guiding whether an investment supports the circular economy or not. Without this definition or guidance, companies struggle to identify circular economy opportunities within their own portfolios or operations.

A clear definition of what constitutes circular finance, and therefore circular economy investments, needs to be developed to give markets and companies guiding principles for identifying and structuring their investments and business models. This definition needs to be specific in order to provide a clear scope of what constitutes circular finance, while providing sufficient flexibility for companies from all sectors to be able to customise this definition for their individual operations.

Key Recommendations

- *Further refine the definition for the circular economy and develop a definition of circular economy finance.*

This could be done in the form of a taxonomy of circular economy activities and benchmarks for their environmental performance. This should build on the most authoritative work on the circular economy, and be compatible with and complementary to the ongoing work of both the TEG for Sustainable Finance and the initiatives of IFIs. The resulting definition of the circular economy finance would establish a common framework for businesses to guide their own identification and reporting of circular economy finance. One of important sources for this work is the EIB Circular Economy Guide. Beyond the TEG, the multilateral development banks have set up a cross-institutional working group to define and track climate finance among the banks. Like with the TEG, circular economy technologies and business models could be introduced in the working group's discussions to become a subset of what is defined as climate finance.

A common definition for the circular economy would be an invaluable tool for identifying circular economy investments. While companies have an increasingly good understanding of the concept of the circular economy, giving concrete expression to these principles in their business is less evident. A common and widely acknowledged definition of circular economy finance, which outlines the value chain solutions and business models that contribute to a circular economy, would give companies an idea of how the circular economy works in practice. Within the EU, this definition will be critical for tracking and reporting the EU's own investments in the circular economy. Beyond the EU, the definition would have global applications where governments, other institutions and any firm could learn from the EU's best practice to guide their own investments and policies.

6.3. Technical Assistance for Circular Economy Businesses

Gaining access to finance for circular business models and investments is an essential hurdle that needs to be overcome in the transition to a circular economy. Part of the challenge comes from the inability of businesses to clearly identify and communicate benefits of their circular concepts in terms of profitability, risk mitigation and increased sustainability of operations. Potential circular businesses often have limited capacity to articulate benefits of their circular economy business models to financiers and investors. Strengths of circular businesses, such as decreased exposure to resource price volatility or a more consistent cash flow through 'product-as-service' models, are not being embedded in business plans and proposals shared with financiers.

This lack of capacity and experience in communicating circular economy benefits has a negative impact on financiers' perception of circular economy businesses. In using the same evaluative methods as a linear investment to articulate a circular economy project's benefits, businesses entrench the concept that linear business practices are the most profitable and present less risk. If circular economy businesses

were able to provide more comprehensive assessments of their business plans to financiers that take into consideration the reduction of linear risks and increased stability of cash flows, then financiers would be able to understand advantages of pursuing and supporting circular economy investments. An interesting platform to support circular businesses is being provided by London Waste and Recycling Board (LWRB).[37] The LWRB provides support to businesses of all sizes and at different stages of their lifecycle, from startup to maturity which includes creation of jobs through developing new business models and revenue streams from waste products and circular technologies, with the potential to add significant GDP to London's economy.

Companies also often lack capacity to identify circular economy opportunities in their current operations. Shifting away from linear production and consumption models requires firms to view their inputs and outputs from a different perspective in which materials and products are only a means to providing a service and where there is a potential additional value to capture in all resource flows. Therefore, companies that could potentially benefit from adopting circular business models and technologies are unaware of opportunities they are missing.

In order to overcome these issues, the capacity of businesses should be increased to enable them to identify circular opportunities in their operations, and assess and communicate benefits of circular practices to financiers and investors. Circular business models and technologies often do not have sufficient levels of market penetration for firms to consider them as viable alternatives to current practices. Cost-effective e-waste recycling is a relevant example of a technology that has a significant market value but is underutilised to date despite this fact. Recovering gold, copper and other metals from e-waste is now cheaper than extracting these metals from virgin sources in mines.[38] Despite these advantages, less than 20 per cent of e-waste today is properly recycled.[39] Businesses must have tools and training is needed to communicate competitive advantages of circular economy investments in comparison to linear practices. The objective is to have a market of circular economy businesses that can successfully access finance to expand their operations due to their competency in and awareness of the inherent strengths of their circular economy approaches.

Key Recommendations

- *Establish technical and financial advisory services to support the development of business models for circular economy businesses or projects seeking finance that effectively capture and articulate the benefits of circular economy strategies.*

37 https://www.lwarb.gov.uk/what-we-do/circular-london/circular-economy-investment-for-businesses/

38 Global E-waste Recycling Sales Market 2018 and Industry Forecast 2025.

39 Zeng, Mathews and Li. 'Urban Mining of E-Waste is Becoming More Cost-Effective Than Virgin Mining.' Environmental Science and Technology. 52, 8, 4835-4841.

The technical assistance for circular economy businesses should address multiple barriers to scaling up the use of circular technologies:

- provide support to businesses to identify, disclose and where possible mitigate linear risks in their portfolios and operations. Beneficiaries would receive training and expert input to assess their level of exposure to linear risks. Companies that already employ circular economy business models would receive support to communicate benefits of these approaches to potential financiers using the mitigation of linear risks to demonstrate their competitive advantage. Technical and financial advice would help to make linear risk evaluations a mainstream part of companies' reporting and increase market understanding of operational and potential financial benefits of pursuing circular strategies that mitigate these risks;
- provide support for existing businesses to introduce circular economy technologies and business models in their operations. Companies would receive expert input to identify opportunities to extract additional value from waste streams and reduce their material intensity while increasing their ability to create value. Both larger corporates and SMEs should benefit from this support. Large corporates would be able to address inefficiencies or linear risks in their supply chains, while SMEs would have the potential to transform their business model to align with circular economy principles;
- increase the capacity and market representation of start-ups pursuing circular economy business models. Circular economy technologies and business models have the ability to transform markets; however, young companies need access to capital in order to invest in and scale up their operations. Technical and financial advice will help start-ups to develop business plans focused on circular economy approaches to share with financiers. This support will promote the adoption of circular business models and technologies and increase finance for circular economy businesses;
- make sure that SME organisations have the necessary capacity to provide specialised advisory or counselling services to their members and SMEs in general to become more circular. Since SMEs would first turn to their own organisations to have support on how to go from linear to circular, it is important that SME organisations are in a position to respond to this demand in order not to delay the systemic chance that the circular economy needs to take off.

The most relevant players for providing circular economy advisory services are: public financial institutions such as multilateral development banks and promotional banks, specialised agencies, consultancies and experts as well as educational institutions such as technical universities. There are several potential avenues for these actors to provide technical and financial assistance to businesses seeking to adopt or scale up their use of circular technologies and measures.

The strengthened technical and financial advisory services could increase the uptake of circular economy technologies and business models while facilitating access to finance for circular economy businesses. This could have two major impacts. First, it could stimulate the market of circular economy businesses that employ similar strategies to gain competitive advantage using resource management. The market for circular economy technologies would then benefit from the increased economies of scale as technologies become more widely adopted. Second, it could help to communicate benefits of circular economy approaches to financiers. Investors who currently prioritise support for linear business models would see financial benefits of supporting circular investments. This would help to build financial institutions' and financiers' understanding of circular economy approaches and their understanding of potential risks of supporting linear business models. In addition, a well-structured technical assistance programme could accelerate the emergence of new competences and skills and create growing market opportunities for providers of circular economy advisory services. A useful example of this approach is a toolkit for policymakers led by the Ellen MacArthur Foundation, with the Danish Business Authority and the Danish Environmental Protection Agency as key contributors.[40] It is also worth reviewing examples to stimulate circular economy initiatives at the municipal level provided by the Finnish Innovation Fund – SITRA.[41]

6.4. Dedicated Financial Instruments for the Circular Economy

Moving to the circular economy will require a significant increase in demand for finance to support circular economy businesses and products. The current volume of 'circular finance' is insufficient to support a transformation in how the value of materials is captured and preserved. While circular economy technologies and business models exist, they cannot reach the level of market penetration necessary to have impact on the operations of value chains. In order to transform value chains, companies with circular economy business models and products need to be able to access finance to scale up their operations. Access to finance must be available across all sectors, as the transformation to the circular economy must take the form of a systematic shift.

In the transitional period when the mainstream financial institutions are not fully willing or able to consider the potential of the circular economy and do not invest in circular economy projects, the objective is to ensure the access to finance to a growing number of businesses that develop viable projects; although they will require a specific approach for managing financial risks. Public finances that aim to stimulate national and regional economies, job creation, infrastructure development and environmental mitigation could be deployed in such a way that they also support

40 https://www.ellenmacarthurfoundation.org/assets/downloads/government/EMF_TFPM_FullReportEnhanced_11-9-15.pdf

41 https://www.sitra.fi/en/projects/interesting-initiatives-taken-municipalities-support-circular-economy/

the circular economy. Ideally this is done through suitable financial instruments that are designed with the circular economy in mind so that all important barriers and challenges to circular economy projects are considered in the design of the instrument.

For example, at the EU level, the provision of circular economy finance could be channelled through the new or existing instruments such as the EU InvestEU[42]. Specifically, a share of the EUR 38 billion InvestEU budget could be dedicated to circular economy investments. A combination of equity, guarantee and risk-sharing financial instruments could be introduced in InvestEU to target circular economy investments. The four windows of InvestEU all speak to the potential benefits of the circular economy. Therefore, a common proportion of each window could be dedicated to supporting the circular economy. This is promoted by the approach that determines the overall proportion of InvestEU for climate change and the environment, where 50 per cent of the sustainable infrastructure window must contribute to the EU's objectives on climate change and the environment, while a common 30 per cent target is applied overall.

If InvestEU finance for the circular economy follows this approach, where a common percentage of the fund's resources are dedicated to the circular economy, it should be done preferably as a dedicated allocation separate from the 30 per cent for climate change. Taking a cross-cutting approach to the allocation of circular finance across InvestEU's windows reflects the multi-sectoral realities of the circular economy, where its application cannot be defined solely within the label of sustainable infrastructure, innovation or SMEs.

The InvestEU circular economy funding would be disseminated through the instrument's designated implementing partners, namely the EIB group, national promotional banks and multilateral development banks. These institutions have both the capacity and the connections to local business communities to effectively deliver the circular economy finance to help companies apply or scale up their use of circular economy business models and technologies.

Key Recommendations

- *Establish a dedicated proportion of finance within selected financial instruments to support circular economy investments and businesses.*

The provision of circular economy finance could be channelled through new or existing financial instruments. A combination of equity, guarantee and risk-sharing financial instruments could be introduced to target circular economy investments. Funds or instruments for the circular economy would help to scale up finance for circular economy businesses and products. The budgetary guarantee and its contribution to equity investments and risk-sharing instruments would help to leverage additional external

42 https://europa.eu/investeu/home_en

finance attracted to the decreased risk of investments. This would help to increase the market penetration of circular technologies and business models, with the goal of reaching a scale sufficient to have a meaningful impact on how supply chains operate and retain the value of materials. Businesses seeking finance for circular economy investments would also benefit from increased access to and availability of finance.

6.5. Mobilising Private Sector Financing – Recent Developments

The circular economy plays a crucial role in helping companies and governments build back better from the Covid-19 pandemic. Financial institutions can support businesses to capture new growth opportunities and build resilience to future shocks. This is why many banks and funds are actively helping clients to transition to new circular economy models, financing circular deals and investments and strengthening the knowledge base in this area. While there are costs involved in this transition, the increased resilience gained should result in long-term material gains for everyone involved. The last two years have seen a steep increase in the creation of debt and equity instruments related to the circular economy. While no such fund existed in 2017, by mid-2020 ten public equity funds focusing partially or entirely on the circular economy have been launched by leading providers including BlackRock, Credit Suisse, and Goldman Sachs. Since 2016, there has been a tenfold increase in the number of private market funds, including venture capital, private equity and private debt, investing in circular economy activities. A similar trend is visible in bank lending, project finance, and insurance.

Existing examples provide early indications as to how the circular economy can create value for asset managers, banks, and other financial services firms. They demonstrate its potential to attract inflows. The circular economy can help meet demands from regulators and other stakeholders. In addition, building circular economy expertise and know-how can help financial institutions to engage with corporate clients, for whom the circular economy has increasingly become a boardroom topic.

Now is the time for finance to capitalise on this momentum and help accelerate the circular economy transition. While the recent growth in financing is promising, far more capital and activity will be needed to scale the circular economy and fully seize its opportunity. All aspects of finance will play an important role in bringing forward the transition to a circular economy. Investors, banks, and other financial services firms have the scale, reach, and expertise to stimulate and support businesses to make the shift. This is not just about investing in perfectly circular companies or divesting from extractive ones, but about engaging with and encouraging companies in every industry to make the transition.

Obviously, the key issue for the financial sector is risk and how it could be managed. When measuring risk, two main factors have to be taken into account:

- Creditworthiness of the borrower (or the risk profile of the project).
- Value of the collateral (e.g. underlying assets or contracts).

As discussed previously, new circular business often does not have a strong track record, these companies can easily be labelled as highly risky. Often initial investments to innovate and access the market are high, which may have implications for margins in the short run but may lead to a quite profitable company in the longer run. The value of the collateral is measured by the market value of the company, where the valuation of assets (and their residual value) plays an important role. Asset valuation in a linear system is quite different from valuation in a circular system. It is clear that the current development is an opportunity for many countries, including Georgia to create and shape the markets.

Key Recommendations

- *The Governments needs to scale the circular economy by setting direction, providing incentives, financing infrastructure and innovation, and using blended finance mechanisms to de-risk investments and attract private sector capital. This approach should be based on experiences of other countries to both follow their successes and avoid their mistakes.*

7 Recommendations to Non-Financial Policy Makers

7.1. Development of a Policy Framework Conducive to the Circular Economy

Public fiscal, industrial, environmental and regional policies do not yet provide a clear societal goal for the circular economy and a coherent definition of the role of different actors and affected stakeholders in this regard. Typically, economic operators tend to avoid risks of disruption and defer costs of the initial changes that need to be made for the transition to the circular economy. They will continue in their 'business-as-usual' practices as long as price signals favour the linear model. From the perspective of the classical market theory, scarcity of resources will be solved through the economic mechanism of higher prices and therefore lower demand. But recent analyses of true price and true cost show that the price mechanism quite often results in non-optimal valuation, and therefore inefficiency in allocation[43]. One of the reasons is that markets fail to internalise externalities, especially if the consequences occur in the long run. These failures tend to be even stronger when property rights cannot be easily assigned to certain resources, like air or water. Some call this market failure, because of the limited responsibility of businesses. Others call it system failure, because only governments can be responsible for including external effects into price mechanisms. In the end, the impact remains the same: an optimal situation in the market economy can lead to a suboptimal situation in a broader societal and environmental perspective.

In the case of the market failing to give correct price signals, public policy should provide the right incentives. While there is a positive development, public policy does not yet stimulate sufficiently changes in economic operators' behaviour. Most notably, the 'polluter-pays' principle is not properly applied in the form of a suitable market-based instrument to internalise externalities associated with the linear material consumption.

For the shift to a circular economy to occur, the following policy elements are missing:

- the metrics are insufficient for measuring the progress towards the circular economy at EU, national and regional level or within individual sectors and supply chains, and for helping with the risk assessment of linear versus circular approaches. For example, quantifying through material flow analysis has already provided data relevant to monitoring the circularity of an economy, and provides a useful baseline to allow comparison between different countries and to provide a metric to inform decisions on national targets of circularity. However, subsets of material flow data may also provide useful indicators - for instance, comparison of imports and exports

43 'A New Vision of Value: Connecting corporate and societal value creation' or Trucost, see www. trucost.com

of virgin raw materials and their scrap (for instance aluminium, steel); flows of specific substances or elements; levels of reuse and recycle; methods of disposal of waste; recycling indicators for separate waste types and elements; and industry/sector-specific indicators, for example construction/demolition waste recycling. Non-material measures are also relevant to the circular economy - particularly those associated with social change (e.g. sustainable consumption, growth of sharing, extent of reuse/repair) or changes in business models (e.g. making durable and repairable equipment, remanufacturing).

- the existing waste recycling and landfilling targets doubtlessly contribute to promoting material recycling. However, these are aggregated high-level national targets and often do not provide sufficient incentives for local authorities and waste producers (businesses and final consumers) to engage more strongly in achieving the targets and more generally in promoting the circular economy;
- instruments that could give clear price signals to economic operators and make secondary materials more competitive are lacking. On the contrary, there are still subsidies that reward the linear model, and the price of primary materials do not internalise negative environmental externalities;
- with the exception of some product, the extended producer responsibility (EPR) principle is not applied to the full extent in support of the circular economy. For example, most countries concentrate on packaging, waste electrical and electronic equipment (WEEE), end-of-life vehicles (ELV), batteries and accumulators (B&A), waste oils and graphic papers, while food processing/agribusiness is only randomly considered. The responsibility of dealing with the collection and disposal of many end-of-life products and materials is allocated to public authorities and not to their producers, which is against the 'polluter-pays' principle;
- in many countries, a significant proportion of recyclable materials is still either landfilled or incinerated due to a lack of proper economic incentives for their separation and segregated collection at source, thus leading to the loss of valuable resources;
- performance criteria and benchmarks for materials and products are absent: many products are still designed as single use, disposable, and non-recyclable and include hazardous substances, which prevents upcycling, reuse, or recycling. Many of these products enter markets without any barrier or price disadvantage. Information on circular aspects of products is not available for downstream clients and consumers.

Policy makers have many tools in hand to address these policy gaps, change the perception, attitudes and behaviour of economic actors, and set rules and requirements for products on the market in order to accelerate the transformation

to a circular economy. Both at national and regional level, the policy framework needs to be updated and, if necessary, transformed in order to have a coherent and comprehensive set of environmental, fiscal, industrial, and regional development policies. In this way, policy makers can stimulate economic operators to consider circular economy approaches and business models, and apply them.

Key Recommendations

- *Develop metrics and indicators to complement the existing macroeconomic indicators adopted at national level, in order to measure, monitor and benchmark the circular economy performance also at regional, local, sector and corporate level. Circular economy indicators should become a mainstream part of statistical reporting. The new indicators should, as much as possible, build on and complement the existing statistical and reporting systems.*[44]
- *Consider setting targets using suitable indicators, possibly developing a cascade system of national, regional and sectoral targets. Where mandatory targets are not politically feasible, set non-binding aspirational targets that can serve as a basis for voluntary agreements with industries and/ or facilitate the emergence of market-based compliance instruments. These new targets need to be reviewed in relation to exiting commitments and obligations, and need to pursue a growing level of ambition not only in terms of quantities but also in terms of quality, e.g. targets for the quality of secondary materials.*
- *Map where national fiscal policies provide subsidies and price signals in favour of the linear economy. On this basis, set in motion a process of reviewing and removing linear economy subsidies to create a level playing field for the circular economy. Consider fiscal incentives for the sustainable management of materials and products with a circular design, e.g. through VAT.*
- *Expand the scope of 'extended producer responsibility' schemes to additional products in order to raise funds for the waste collection and recycling of these products. Analyse where the existing EPR systems need to be modified in order to favour the production of high-quality secondary materials, e.g. via modulated fees. More importantly, use EPR schemes to encourage innovative business models with growing levels of circularity which aim at increasing the integration of materials loops.*
- *Consider setting ambitious national target dates for ending landfilling. Reduce landfilling and incineration by applying increasing taxes on these activities and using revenues from these taxes to fund the development of separate waste collection and management systems. It is important to calibrate taxes well and accompany them with policy measures to increase the demand for recycled materials, so that waste diverted from landfills and incinerators is recycled and used as secondary raw materials.*

44 https://www.ellenmacarthurfoundation.org/resources/apply/circulytics-measuring-circularity

- *Develop benchmarks for circular aspects of product performance, including benchmarks for durability, reparability, recyclability, minimum recycled content and hazardous substances content, and apply these benchmarks to remove underperforming products from the national market (e.g. via implementing measures such as those stipulated by the EU Eco-design Directive that extend to non-energy related products). Stimulate the adoption of high-performance products through fiscal and 'reputational' incentives (e.g. reduced VAT, eco-labels). Make the information about circular aspects of products available in business to business and business to consumers transactions through product information requirements (e.g. the product passports) or publicly accessible databases.*
- *It is also recommended to conduct checks and revisions of existing and planned relevant sectoral policies which may conflict with the objectives and actions described above. Contradicting policy provisions could introduce a bias in favour of the linear economy and reduce the effect of policy interventions which support long-term circular economy objectives.*

A policy framework, consisting of coherent sectoral policies, creating a level playing field and additional stimuli for the circular economy, will greatly reduce the risk associated with circular economy projects. Businesses and their investors will understand the long-term policy objectives. A clear regulatory environment providing certainty about regulatory requirements for products and their environmental performance will gradually ensure that circular projects are able to compete with linear ones. The reduced market and policy risks will reduce financial risks of circular economy projects, thus making them more bankable.

7.2. Public Authorities Acting as Facilitators of the Circular Economy

When the market and regulation fail to generate favourable conditions for the transition to the circular economy, public authorities can play a critical role as facilitators of change. They may have the best information to identify the potential for the circular economy at different regional scales. They have the ability to bring together potential circular business partners who do not normally interact on the market. They can use public funds to create revenues for circular economy projects, as such funds can help achieve public objectives, e.g. through public procurement. Public authorities currently rarely assume this facilitating role despite their unique position. Often, public authorities are not aware of their potential role, or may not have sufficient technical and human capacity and political support. Public tenders are usually focused on the procurement of new assets which exclude reused and upcycled materials and products. Public tenders are typically focused on price, not on the total cost of ownership/total cost of use, and do not include 'externalities' including end-of-life, disposal costs.

Public authorities at all levels should realise their unique position to influence the transition to a circular economy. They should invest in building capacity both internally and externally within areas under their administration to enable and support circular economy projects. Promoting an organisational culture of 'circular economy enablers' will support the introduction of innovative models of public governance that stimulate the circular economy and improve service to the public.

Key Recommendations

- *Undertake analyses of circular economy potential at the local, regional and national scales including major material flows, industrial capacities and new business models. Develop regional and national circular economy strategies that include collaboration with other countries and regions; on the regional level, ensure that regional authorities include circular economy opportunities in their smart specialisation strategies. Provide information to the business sector to make it easier for businesses and especially SMEs to exploit the potential of the circular economy.*
- *Link the circular economy to other societal challenges and transitions, such as climate change in order to create a coherent strategic environment for businesses and facilitate synergies across different public initiatives. As an example, public authorities can promote the introduction of advanced collection, sorting and recycling technologies, efficient materials processing technologies and production methods that support the integration of increasing circularity within new and existing business models, and they can facilitate the creation of new types of expertise and jobs. The positive externalities (reduced greenhouse gas emissions, electricity from renewable resources, etc.) should be recognised, favoured and rewarded. In turn, the circular economy can help improve the sustainability of the 4th industrial revolution and its acceptance by society.*
- *Create collaborative and interactive platforms for closer connections between businesses that normally do not interact on the market. Develop innovative forms of collaboration within and between value chains and innovative ways of sharing costs and benefits of circular economy projects between companies who otherwise have no market incentive to collaborate. Act as a guarantor if the risk for individual companies of being engaged in circular projects is too high. A good example is the Platform for Accelerating the Circular Economy (PACE) which is a public-private collaboration platform and project accelerator. PACE currently includes over 40 committed partners who are leading a portfolio of projects. Project focus areas include plastics, electronics, food & bioeconomy and business model and market*

transformation across China, ASEAN, Europe and Africa.[45]

- *Introduce circular economy approaches in the public sector, e.g. by applying circular business models in public enterprises.*
- *Allocate public funds to circular projects that bring significant benefits to the community to ensure that these projects materialise and are financially viable. This may include direct payments for public services but also indirect support such as guarantee schemes.*
- *Stimulate demand and create new markets for circular products and services through public procurement. Apply lessons learned from experiments in the past and experience of other countries (e.g. green deals on circular procurement in Flanders and the Netherlands)*[46].

The national and regional authorities have a key responsibility in creating national and regional circular economy strategies and linking them to national and regional industrial development and innovation strategies. National, regional and local authorities will also play a critical role in developing innovative governance models and tools to facilitate circular economy collaboration between sectors and businesses. All public authorities who spend public funds through public procurement can play a role in creating markets for circular products. All public sectors with substantial annual spending, e.g. infrastructure, health and education, should introduce circular economy procurement policies.

If public authorities and organisations assume the role of enablers, they can create conditions for scaling up markets for circular economy products and services. Their intervention can also reduce the risk that goes with circular economy projects and make projects financially viable. The involvement of an organisation with a statutory role can by itself provide more certainty about the quality or viability of the project. Financial commitments by a public organisation may provide certainty for financial revenues from the project and public procurement contracts typically present a lower risk of non-payment, which in turn facilitates access to finance and reduces risk for investors. Public enterprises whose objective is to deliver public service may be more open to circular economy projects because they look for long-term sustainability rather than any short-term maximisation of profit.

45 http://www3.weforum.org/docs/WEF_PACE_Platform_for_Accelerating_the_Circular_Economy.pdf

46 https://www.inno4sd.net/green-deal-for-circular-procurement-in-the-netherlands-434#:~:text=To%20stimulate%20the%20circular%20economy,arrangements%20inspired%20by%20circular%20principles.

8 Recommendations to Project Promoters

There is a significant synergy between policy makers and project promoters to achieve concerted actions in the acceleration of the circularity measures. This section of the Handbook focuses on key recommendations to project promoters to achieve this effect.

8.1. Identify New Circular Economy Sources of Revenue and/ or Review the Organisation's Strategy

Business and financial complexities inherent in many circular economy projects pose an additional challenge to project promoters when approaching investors or seeking finance. Project promoters, in particular SMEs, do not have the expertise and resources to structure and prepare a sound credit story to investors and improve their bankability prospects. As a result, projects that have the potential of being commercially viable fail to access finance or the right form of finance.

The principal goal of project promoters should be to succeed in correctly identifying, conceptualising and developing circular economy business models and projects that are both economically sound and bankable, and congruent with a long-term development vision and strategy for the transition to a circular economy. Awareness raising both of internal organisations and external stakeholders (including within and across value chains) is key in this context.

Organisations often lack dedicated internal resources with necessary time, expertise and skills to lead and coordinate in the conceptualisation, preparation and implementation of circular economy strategies, initiatives and projects. The lack of required skills and expertise is particularly important as the availability of advisory services specialized in the circular economy is limited in the market. As a consequence, organizations struggle to acquire and develop the necessary knowledge to identify and assess circular economy business opportunities and initiate innovative business models and projects. Organizations should consider allocating specific resources to develop an internal capacity to better identify and develop circular economy projects.

Key Recommendations

Each organisation has its own strategic and operational dynamics and business culture which determine the preferred 'direction' for creating and implementing required changes supporting circular economy initiatives. The recommendations

presented below are general and may need to be customised to different project promoters to reflect this diversity of approach and management culture.

- *Introduce and institutionalise management involvement at the highest level in defining/ interpreting 'circular' as a strategic priority for business and operations, identifying and formulating measures that can be undertaken to introduce circular principles in the organisation and in the business model;*
- *Review existing organisational and operational arrangements to identify and assess existing activities that have the potential to trigger circular behaviours and generate business opportunities;*
- *Explore and elaborate new business model options that incorporate:*
  - *strategies to create circular value which act directly upon material and product resources in the business model (e.g. repair, material recycling/ upcycling);*
  - *value proposition strategies which deliver circular value to customers (e.g. product-to-service system, asset sharing);*
  - *strategies to create value through networks which support the involvement of actors beyond the company borders in order to achieve circularity across networks (e.g. industrial symbiosis, value chain collaboration).*

To implement these recommendations, specific tools and management systems need to be developed. Some resources (e.g.www.circulator.eu) are already available and could be used as a basis for further developments and methodological work leading to:

- circular strategies and visions which reflect the involvement and response of key staff and relevant value chain actors, e.g. clients, suppliers, governmental bodies, shareholders, etc.;
- cost-benefit models which evaluate circular and linear risks and allow comparison of alternative business scenarios;
- customisable action plans that are based on the collaborative involvement of key staff in the organisation and that enable implementation strategies to be optimised based on resources available and expected market response;
- key performance indicators (KPIs) for goals and accountability that are consistent and aligned with sectoral, regional and/or country targets.

8.2. Establish Collaborative Arrangements Across Different Organisations within and between Value Chains

Organisations are in general reluctant to engage in collaborative partnerships and share business-related information with other businesses as a basis for developing circular

economy business models and projects. This is due to the inadequate knowledge about circular economy opportunities and the lack of capacity to identify and implement concrete actions and to the limited incentives to cooperate within existing linear value chains.

Key Recommendations

- *Contribute to the formation and strengthening of collaborative circular economy communities, partnerships and networks ('Communities of Circular Economy Practice') within economic sectors, value chains and regions as a means of increasing the knowledge base and sharing experiences on circular economy policy, strategy, business models and projects.*

The structure, duration and organisation of these 'Communities of Circular Economy Practice' could evolve in time depending on their specific purpose, which may include:

- Promoting general awareness and knowledge exchange between various circular economy stakeholders (e.g. on how to optimise the procurement of circular products and services by developing common quality/performance and commercial requirements);
- providing policy feedback jointly to public authorities and regulators on the removal of barriers to the development of the circular economy in specific geographical, sectoral or technological contexts;
- developing circular economy projects involving innovative technologies and business models (e.g. defining the value proposition, finding solutions to technological challenges, sorting out contractual arrangements between partners and with customers, financial modelling, and financing strategy and risk mitigation measures.

These recommendations will help to bring mainstream activities of businesses into the circular economy. It will increase awareness and understanding of risks linked to the linear economy, increase knowledge/information about opportunities and lead to a clearer identification of the leverage points for circular change in businesses. It will also enhance knowledge and capacities for implementing necessary transformation processes leading to circular business models (at value chain level) with broader benefits for the economy as a whole (at regional/national level).

In addition to positive impacts on knowledge creation, setting up collaborative partnerships and networks to prepare innovative circular economy projects can align

business interests and improve the definition of roles and responsibilities between various partners involved. The resulting optimization of risk allocation can improve the economic viability and bankability of projects, with better access and conditions for financing, and make projects more attractive for investors.

8.3. Assess and Disclose Environmental and Social Benefits

Monitoring of market, economic and financial parameters is a standard practice for businesses, including SMEs. However, the practice of measuring, assessing and making informed decisions based on environmental and social impacts of business activities (products and services) is not yet consolidated, especially for the life-cycle footprint of products and materials. Several methodologies are gradually emerging and increasingly being adopted. Most fail, however, to reflect risks and impacts associated with linear business practices and do not provide the tools to manage response actions and mitigating measures.

Key Recommendations

- *Develop reliable and standardised environmental and social impact assessment methods and tools applying systemic and life-cycle approaches;*
- *Measure, assess and disclose the environmental and social performance, and track progress towards sustainability and business objectives;*
- *Develop metrics and indicators that describe social benefits of the organisation's circular activities from the perspective of the SDGs.*

The use of environmental and social impact assessment methods and tools applying systemic and life-cycle thinking will provide business managers and potential investors with better and objective information on the environmental and social performance of circular economy projects and business models, and contribute to a better overall assessment of their economic viability and sustainability.

9 Policy Barriers and Enablers

Although increasing numbers of companies have begun their journeys towards circularity, a more widespread implementation of circular business models is needed. To facilitate this process, it is important to identify what can support circular economy business model implementation and what, instead, represents a barrier to such a process. Public sector policy makers play an important role in developing policies which direct the private sector towards business transformation. As such, policy enablers, barriers and recommendations, both at national and local levels, can inform the transition from linear to circular business models. This section of the Handbook identifies key enablers and existing and potential barriers and provides top level recommendations to better utilise the enablers and overcome the barriers.

From the national and local policy perspective, **important enablers are:**

- **Governmental Circular Economy priorities in developing smart specialization strategies.** Through partnerships between public institutions, businesses and research institutions, national smart specialization strategies aim at supporting sustainable and inclusive growth. By including the transition to a circular economy as a priority in these national strategies, national and local authorities can promote innovation in favour of circular business models.
- **Multi-stakeholder platforms.** Government and other policy making bodies should collaborate with universities and industry associations in conducting relevant research. Thanks to additional collaboration with businesses and citizens, policies and projects can be viewed from both private and societal perspectives, allowing value to be maximized for all.
- **Citizen engagement and individual level of awareness.** The active participation of citizens is essential in pushing local sustainability agendas forward. Citizen bottom-up initiatives in favour of a circular economy contribute to achieving the systemic change needed for circular business transformation to occur.
- **Plans and targets.** For example, climate plans and carbon neutral targets, especially at city level, to guide local council efforts.
- **Engagement in policy development.** Bottom-up approach to policy development that leads to greater social engagement. Policies in favour of key national clusters to foster cooperation and innovation by promoting the agglomeration of economic entities collaborating towards circularity.
- **Awareness raising.** Awareness raising campaigns, possibly focused on action-based initiatives (clean-up activities, hands-on workshops, etc.).
- **Dedicated support.** Encouragement of local artisans to promote reusing and repairing of materials/goods (e.g. supporting cobblers, tailors, etc.).

Key policy barriers include:

- **Taxation and regulatory barriers to the use of secondary raw materials.** Market-based incentives supporting the transition towards circularity are lacking. Most importantly, due to current taxation patterns, virgin raw materials are often cheaper than secondary ones, weakening incentives to engage in business transformation. Other than costs, regulations also get in the way of using secondary raw materials.
- **Absence of integrated recycling plan.** Many countries have no integrated recycling plans. The development of such a plan would allow for the collection of sufficient waste volumes required for efficiency to be achieved.
- **Prices.** Externalities not being included in cost-benefit analysis, meaning environmentally-damaging products are relatively cheap. Lack of distinction in regulations between circular and non-circular businesses (e.g. double tax for upcycled products).
- **Piecemeal approach.** Lack of a holistic approach to circular economy initiatives (e.g. reused products do not diminish recovery targets).
- **Public procurement led by financial criteria.** Public procurement decisions are based predominantly on financial criteria, often without consideration of the environmental costs associated with linear business models. Given their important contribution to an economy's Gross Domestic Product (GDP), by not shifting demand from 'traditional' to 'circular' goods, local authorities do not contribute to incentivizing the shift of businesses to circular business models.
- **Poor waste management legislation.** Poor and inconsistent legislation concerning waste management represents a barrier for the achievement of a circular economy. In the absence of strong and consistent legislation, the risk occurs of having to face the inefficient high costs associated with the recycling of mixed waste, which ultimately reduces the residual value of recycling.
- **Lack of mandatory goals around circular targets.** In addition to the lack of specific measurements enabling firms to assess their circularity progress, precise mandatory goals are missing. Setting clear, mandatory objectives can help project promoters in implementing projects linked to circular economy.
- **Generally weak policy support.** Changing priorities due to electoral/political cycles. Policies not allowing to take residual value into consideration for circular economy business models.
- **Poor policy communication and enforcement.** Lack of transparency in collective schemes, as well as of information and statistics of collecting systems.
- **Poor infrastructure, economies of scale.** Lack of infrastructure constraining individuals' ability to engage in pro-environment behaviour and possibilities for circularity to emerge.

- **Legal barriers.** Legal barriers to making new products from waste streams. Procurement laws based on ownership challenging circular economy business models (i.e. leasing).

Many recently carried out surveys[47] indicate that strengthening local governmental policies to support the widespread implementation of circular business models through, among other things, setting quality standards for recycled and reused materials, or by pushing for innovative initiatives brings quick and measurable results. Further work is required to ensure circular business models become the best option for companies willing to gain competitive advantage and maintain their market share while aligning their goals with society's goals. Since the adoption of the EU Action Plan for the Circular Economy in 2015, changes in favour of circularity have been numerous and impressive in many countries both EU Member States and others. Yet, barriers both at the company level and along the value chain, as well as from a policy perspective persist. Overcoming these obstacles and seizing existing opportunities is key for the transition towards a more sustainable and competitive economic model.

A review[48] of various national, regional and local strategies to enable the transition to the Circular Economy identified synergies, differences and skills gaps which require actions and mitigating measures. These have been summarised in Table 1.

Table 1 Summary of Public Sector Skills Gap and Mitigation Measures

Public Sector Skills Gap	Mitigation Measures
Information and Awareness	
Insufficient awareness of the role of public authorities to promote CE	• Invest in building capacity both internally and externally within areas under their administration to enable and support CE projects • Contribute to the formation and strengthening of collaborative CE communities, partnerships and networks ('Communities of Circular Economy Practice') within economic sectors, value chains and regions as a means of increasing the knowledge base and sharing experiences on CE policy, strategy, business models and projects

47 Stakeholder Views Report Enablers and Barriers to a Circular Economy by R2pi http://www.r2piproject.eu/wp-content/uploads/2018/08/R2pi-stakeholders-report-sept-2018.pdf

48 Circular economy strategies and roadmaps in Europe: Identifying synergies and the potential for cooperation and alliance building https://www.eesc.europa.eu/sites/default/files/files/qe-01-19-425-en-n.pdf

Public Sector Skills Gap	Mitigation Measures
Insufficient inclusion of CE principles in the national curriculum and other public information programs	• Policy makers could consider how existing educational and information programs can be improved to provide individuals with a better understanding of the unintended consequences of their consumption choices.
Lack of advisory capacities to assist businesses, in particular SMEs	• Establish technical and financial advisory services to support the development of business models for CE businesses or projects seeking finance that effectively capture and articulate the benefits of CE strategies
Regulatory Framework	
Lack or insufficient regulatory framework supporting CE	• Remove subsidies and internalize externalities of linear economic activities • Introduce Green Procurement Rules • Develop reporting standards for linear risks of investments • Provide a common set of principles for companies to prepare and publish their financial statements
EPR principle does not exist or is not applied to the full extent in support of the circular economy	• Expand the scope of EPR schemes to additional products in order to raise funds for the waste collection and recycling of these products • Analyse where the existing EPR systems need to be modified in order to favour the production of high-quality secondary materials, e.g. via modulated fees • Use EPR schemes to encourage innovative business models with growing levels of circularity which aim at increasing the integration of materials loops
Unclear definition of CE	• Develop taxonomy of CE activities and benchmarks for their environmental performance
Taxonomy, Standards and Targets	
Insufficient metrics to measure progress towards CE	• Develop metrics and indicators to complement the existing macroeconomic indicators adopted at national level, in order to measure, monitor and benchmark the CE performance also at regional, local, sector and corporate level

Public Sector Skills Gap	Mitigation Measures
Lack or insufficient provision within public financial instruments to promote CE	• Review the rules and priorities of the existing public funds and establish a dedicated proportion of finance within selected financial instruments to support CE investments and businesses.
Lack of unified standards for Eco-Design	• Develop benchmarks for circular aspects of product performance, including benchmarks for durability, reparability, recyclability, minimum recycled content and hazardous substances content • Stimulate the adoption of high-performance products through fiscal and 'reputational' incentives (e.g. reduced VAT, eco-labels). • Make the information about circular aspects of products available in business to business and business to consumers transactions through product information requirements (e.g. the product passports) or publicly accessible databases. • Develop reliable and standardised environmental and social impact assessment methods and tools applying systemic and life-cycle approaches
Insufficient application of CE principles to public investments	• Introduce circular economy approaches in the public sector, e.g. by applying circular business models in public enterprises • Allocate public funds to circular projects that bring significant benefits to the community to ensure that these projects materialise and are financially viable. • Stimulate demand and create new markets for circular products and services through public procurement.
Waste recycling and landfilling targets are insufficient to promote CE activities at regional and local levels	• Consider setting targets using suitable indicators for national, regional and sectoral targets.
Insufficient co-ordination between various regulatory authorities and governing bodies	• Establish a coordinating function at a high level to ensure coherent and consistent approach. Conduct checks and revisions of existing and planned relevant sectoral policies which may conflict with the objectives and actions of CE approaches.

Public Sector Skills Gap	Mitigation Measures
Coordination and Partnerships	
Insufficient mapping of CE potential	• Undertake analyses of CE potential at the local, regional and national scales including major material flows, industrial capacities and new business models. • Develop regional and national CE strategies that include collaboration with other countries and regions. • Ensure that regional authorities include CE opportunities in their smart specialisation strategies. • Provide information to the business sector to make it easier for businesses and especially SMEs to exploit the potential of the CE.
Insufficient coordination with other policies	• Link the circular economy to other societal challenges and transitions, such as climate change in order to create a coherent strategic environment for businesses and facilitate synergies across different public initiatives. • Promote the introduction of advanced collection, sorting and recycling technologies, efficient materials processing technologies and production methods that support the integration of increasing circularity within new and existing business models, and they can facilitate the creation of new types of expertise and jobs.
Lack or insufficient work through partnerships	• Create collaborative and interactive platforms for closer connections between businesses that normally do not interact on the market. • Develop innovative forms of collaboration within and between value chains and innovative ways of sharing costs and benefits of CE projects between companies who otherwise have no market incentive to collaborate. • Act as a guarantor if the risk for individual companies of being engaged in CE projects is too high

10 Summary of the Key Recommendations

Table 2 Summary of Key Recommendations

Recommendation	Expected Results
Characterise circular economy projects through metrics and taxonomy	Definitions, metrics and taxonomy will enable better assessment of circular risks versus linear risks. Also, social and environmental benefits of the circular economy should become explicit, quantifiable and disclosed, and should be taken into account in financing decisions.
Promote and clarify the enabling role of public authorities	Public authorities, on all levels, can provide incentives to promote circular economy models via, for example, public procurement, subsidies, taxation and funding. They have the legitimacy and means to reward positive externalities. Work also has to be undertaken to set circular economy performance requirements for products and services.
Build capacity to make the transition to a circular economy	Public authorities and project promoters play an important role in creating circular business. The principal objective should be to succeed in correctly identifying, conceptualising and developing circular business models and projects that are both sound and bankable, and congruent with a long-term development vision and strategy for the transition to a circular economy. Awareness-raising both at the level of internal organisations and external stakeholders (including the value chain network) is crucial in this context. They can advise and improve the economic viability and bankability of projects; and visualise collaborative arrangements within the supply chain.

Ensure cooperation and coordination between governing bodies	Weak policy coordination remains a common feature across countries. At governmental level, responsibility for the areas of policy relevant to circular economy tends to be distributed across more than one ministry. The country studies[49] indicate that processes to facilitate systematic policy coordination across ministries are rare. In general, coordination tends to occur for specific purposes, with inadequate monitoring and follow-up. There continue to be weak links in the chain from environmental policies down to the level of skills and training. Ministries dealing with education and training and employment are weakly represented in policy-making on climate change and environment. Often, existing decision-making structures and processes do not deal effectively with cross-ministerial topics. Better coordination and cooperation between governing bodies would result in addressing the above issues.
Ensure appropriate level of partnership	Policy coordination requires involvement of stakeholders outside government. The importance of involving private-sector stakeholders, both employers and workers, in policy decisions and in the design of skills development measures is essential.

49 https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_709121.pdf

11 Steps towards Development and Implementation of Circular Economy Policies

Based on the discussion and recommendations provided in the previous chapters, below diagram provides a summary of the key steps which national and local governments need to undertake in the process of development of policies conducive to the implementation of the circulatory measures.

Figure 3 Key Simplified Steps in the Development of Circular Economy Policies

Figure 4 provides key steps and timing for the development of a Road Map for policies targeting the change to more circular economies.

Figure 4 Example of Policy Implementation Roadmap

Short Term	***Medium Term***	***Long Term***
• Prepare implementation of policy packages to support 1-2 'quick win' sector opportunities: - Conduct further consultation with businesses and other stakeholders - Conduct detailed policy cost-benefit and feasibility analysis - Gather political support for policy intervention • Investigate which economywide policy options and potential sector packages could be implemented at a later stage	• Implement selected 'quick win' opportunities; track progress and adapt implementation as needed • Building on momentum of 'quick wins', prepare implementation of (and start implementing) 2-3 economy-wide policy options and potential sector packages	• Continue implementation, track progress and adapt implementation as needed • Assess overall program success and determine next steps

12 Circular Economy Reference Documents

General documents, studies and other information on the circular economy

1. ABN Amro et al Circular Economy Finance Guidelines 2018 https://www.abnamro.com/nl/images/Documents/040_Duurzaamheid/Publications/ABN_AMRO_Circular_Econo my_Finance_Guidelines_2018.pdf
2. Arup The Circular Economy in the Built Environment. 2016 http://publications.arup.com/publications/c/circular_economy_in_the_built_environment
3. CEPS The Circular Economy: Barriers and Opportunities for SMEs 2015 https://www.ceps.eu/system/files/WD412%20GreenEconet%20SMEs%20Circular%20Economy.pdf
4. Deloitte Circular Economy. From theory to practice. https://www2.deloitte.com/content/dam/Deloitte/fi/Documents/risk/Circular%20economy%20FINAL%20web.pdf
5. Ellen MacArthur Foundation Various CE publications 2012-2018 https://www.ellenmacarthurfoundation.org/publications
6. FinanCE Working Group Money makes the world go round (and will it help to make the economy circular as well?) (2016) http://sustainablefinancelab.nl/wpcontent/uploads/sites/232/2016/04/FinanCE-Digital.pdf
7. High-level expert group on Sustainable Financing a sustainable European Economy (2018) 2017 https://ec.europa.eu/info/sites/info/files/170713-sustainable-finance-report_en.pdf
8. JWT Intelligence The circular Economy 2014 http://adsoftheworld.com/sites/default/files/jwt_the_circular_economy.pdf
9. OECD Realising the Circular Bioeconomy. OECD Science, Technology and Industry Policy Papers, November 2018 No. 60 2018 https://www.oecd-ilibrary.org/docserver/31bb2345-en.f?expires=1546873942&id=id&accname=guest&checksum=FA5DE6EEBBC760-0C6D07870F6E8A7323
10. Various NGOs WALKING THE CIRCLE – the 4 guiding pillars for a Circular Economy 2015 http://www.rreuse.org/wp-content/uploads/WALKINGTHE-CIRCLE-–-the-4-guiding-pillars-for-a-Circular-Economy.pdf

11. World Economic Forum. Towards the Circular Economy: Accelerating the scale-up across global supply chains 2014 http://www3.weforum.org/docs/WEF_ENV_TowardsCircularEconomy_Report_2014.pdf

12. EllenMacArthurFoundation_PolicymakerToolkit https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_PolicymakerToolkit.pdf

13. Circle Economy. (2019). Circularity Gap Report 2019. Retrieved from: https://www.circularity-gap.world/global

14. Circle Economy (2020). Circularity Gap Report 2020 Retrieved from: https://www.circularity-gap.world/global

15. The Circularity Gap Report NL 2020 https://publish.circle-economy,com/circularity-gap-report-NL

16. Accelerating the transition to the circular economy Improving access to finance for circular economy projects https://op.europa.eu/en/publication-detail/-/publication/02590134-4548-11e9-a8ed-01aa75ed71a1

CE case studies

1. Circle Economy Various CE case studies
http://www.circle-economy.com/reports-insights/

2. Circular Flanders Various Belgian case studies
https://www.vlaanderen-circulair.be/nl/doeners-invlaanderen

3. Ellen MacArthur Foundation Various CE case studies
https://www.ellenmacarthurfoundation.org/case-studies

4. Encore Encore regions and circular economy. Best case studies 2016. 2016
https://www.irekia.euskadi.eus/uploads/attachments/8492/ENCORE_Regions_and_Circular_Economy_WEB_pdf?1474877920

5. London Waste & Recycling Board. London: the circular economy capital. Towards a circular economy – context and opportunities 2015
http://www.lwarb.gov.uk/wpcontent/uploads/2015/12/LWARB-circular-economyreport_web_09.12.15.pdf

6. Luxembourg Centre for Circular Economy Various CE case studies
http://www.lcce.lu/circular-economy-in-practice/

European Institutions: websites and documents

1. DG Environment Website dedicated to the Implementation of the Circular Economy Package and Action Plan
   http://ec.europa.eu/environment/circulareconomy/index_en.htm
2. DG REGIO Information on CE Funding from European Structural and Investment Funds (ESIF)
   http://ec.europa.eu/regional_policy/en/policy/themes/environment/circular_economy/
3. DG RTD - EASME Information on CE Funding from Horizon 2020 Programme
   https://ec.europa.eu/easme/en/horizon-2020-societalchallenge-climate-action-environment-resourceefficiency-raw-materials
4. European Commission European Circular Economy Stakeholder Platform
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Annexes SUCCESSFUL EXAMPLES OF CIRCULAR ECONOMY POLICY MEASURES

ANNEX 1 DENMARK AND THE CIRCULAR ECONOMY: DENMARK HAS STARTED ITS JOURNEY TOWARDS THE CIRCULAR ECONOMY

One of the first steps was a project initiated and performed by the Ellen MacArthur Foundation around creating a tool kit for policy makers, which was to describe a methodology for circular economy policymaking. The project looked at the circular economy opportunity from a country and policymaker perspective, and aimed to provide policymakers with an actionable toolkit to help accelerate the transition towards the circular economy. Part of the project was to perform a case study on Denmark which identified circular economy opportunities, barriers and policy options in the country. The results showed that introducing the circular economic principles to the Danish economy would:

- Increase GDP by 0.8 – 1.4 %
- Reduce consumption of selected resources by up to 50 %
- Reduce Danish carbon footprint by 3-7 %
- Create 7 000 – 13 000 jobs by 2035

The results were based on the following five sectors, which cover 25 % of the economy:

- Food and beverage
- Construction and real estate
- Machinery
- Plastic packaging
- Hospitals

Denmark has a long and rich tradition of innovating policies that stimulate the circular economy. It introduced the very first deposit-refund scheme for beverage containers in the 1980s. It has incrementally increased landfill taxes since they were introduced in 1987. In 2011, it set the target to be fully independent from fossil fuels by 2050. More recently, Denmark has laid out a comprehensive waste management strategy in 'Denmark Without Waste I/II', focused on moving from incineration to recycling and waste prevention, respectively. It has established the Task Force for Resource Efficiency, the National Bioeconomy Panel, the Green Industrial Symbiosis programme, and the Rethink Resources innovation centre. Denmark participates in international initiatives such as the Ellen MacArthur Foundation's CE100 programme. This country is internationally recognised as a front runner in the circular economy. A case in point is the Danish Business Authority winning the 2015 'Ecolab Award for Circular Economy Cities/ Regions' at the World Economic Forum in Davos.

Selected KPIs reveal that Denmark has indeed an advanced starting position compared to other European countries:

- Waste generated per unit GDP: 40 tonnes/EUR million vs. 69 for EU28.
- Waste diverted from landfill: 93% vs. 59% for EU28.
- Recycling rate113: 60% vs. 53% for EU28.
- GHG emission per unit of GDP: 225 tonnes CO_{2eq} per EUR million vs. 343 for EU28.
- Share of renewable energy: 26% of gross final energy consumption vs. 14% for EU28.

Yet even Denmark has significant opportunities to further transition towards circularity. Across the economy, significant material value is left on the table as most waste streams and by-products are used for relatively low-value applications. Of 93% waste diverted from landfill, only two thirds are recycled – the rest is incinerated. In the construction sector, 87% of materials is recycled, but mainly for low-quality applications and there is only an estimated 95% of its most important material (steel) is recycled, yet there is less than 1% an estimated remanufacturing. Nearly 100% of industrial organic waste is being valorised, but mainly in low-value applications such as incineration, direct fertilisation, or animal feed, while only ~3% of waste is used in biogas production and there is less than 1 % of cascading bio-refining. In addition, the headline figures quoted above hide pockets of opportunities. Municipal waste per capita is the highest in the EU (~750 kg/capita vs. ~480 kg/capita EU28 average). There is an estimated 80-90 kg annual avoidable food waste per household. Only ~15% plastic packaging is collected for recycling from households, of which only half actually gets recycled in new resin.

The Danish food and beverage industry has developed a track record of minimising processing waste and finding productive use for its by-products and remaining waste streams – but mostly in relatively low-value applications. It therefore has a significant opportunity to increase the value extraction from its by-products and waste streams by using cascading bio-refineries. While anaerobic digestion and other basic bio-refining technologies exist today, the technology to derive – in cascaded applications – high-value compounds is still an estimated five years away. If technological development continues and plant capacity is built up, modelling suggest that these cascading bio-refineries could yield, by 2035, a potential net value of EUR 300–500 million annually. In parallel, reducing the levels of avoidable food waste from 80–90 kg/capita to 40–50 kg/capita, enabled through building awareness and capabilities among households and businesses and improving technologies across the value chain, could save Danish households and businesses an estimated EUR 150–200 million annually by 2035.

Bio-refining seems to have the highest circularity potential to achieve the Denmark's target to become 100% circular by 2035. For that reason, according to a study by the Ellen MacArtur Foundation, these are the key recommendations for policy makers to overcome this barrier:

- **As a starting point**, including bio-refineries in the government's long-term strategic plans. This could guide and reassure investors - even more so if accompanied by a policy package to deliver the strategy.
- **In the short term,** providing capital to deploy commercial-scale versions of mature bio-refinery technologies. Promising policies include providing low-cost loans or loan guarantees for the deployment of mature bio-refining technologies for example through existing Danish business support schemes, and financing at market rates that is better tailored to investors' needs (as provided for example by the UK Green Investment Bank in municipal energy efficiency). Public-private partnerships to finance the deployment of mature bio-refining technologies also hold promise. An interesting example is the Closed Looped Fund NY that provides zero- or low-interest loans to municipalities or companies, albeit more active in developing recycling infrastructure.
- **In addition, creating markets** for bio-refinery output. Pricing externalities, setting targets (e.g. a minimum target for second-generation fuels within the EU's biofuels target) could contribute to such market development.
- **In the longer term, stimulating development of advanced, high-value bio-refining technologies.** The government could set up or fund cross-institutional R&D clusters to accelerate the move into high-value chemicals, nutraceuticals, pharmaceuticals etc. These could take on various forms, like the UK Catapults, a powerful example of public private partnerships in R&D, or the German Fraunhofer Institute, which plays an important role in European innovation with its long-term perspective and clearly defined mission to support application-oriented research.
- **Complementing these measures with a business advice service.** The primary goal would be to help bio-refinery entrepreneurs navigate a relatively complex regulatory and policy environment, but it might also help the bio-refinery community shape this environment.
- **Identifying and communicating necessary changes to EU policy** (or its national implementation) to address the unintended consequences of some safety-focused regulations that unnecessarily restrict the trade in bio-refinery feedstock or products.
- **Informing and educating consumers** using information campaigns on the importance of avoiding food waste; a communication campaign to educate consumers about best-before and use-by labelling: augmenting the national school curriculum with knowledge about food, nutrition, preservation, judging

the freshness of food, seasonality, and appropriate ingredient and portion sizing.

- **Creating the right framing conditions to avoid food waste in retail.** This could include adjusting regulations so as not to discourage the donation of food due to liability concerns; encouraging such donations, as was recently voted into law in France or by setting up brokering platforms to facilitate matching donors and beneficiaries, and clarifying the information on best before dates for food and beverages to further facilitate such donations.
- **Stimulating the capability building through training programmes** to ensure that procurement, retail and kitchen staff possesses the necessary skills and tools to minimize food waste.
- **Introducing fiscal incentives** such as variable charging schemes for household waste. A small number of small- and mid-size Danish municipalities have implemented weight-based charging. Experiences in other countries show that fee-differentiated collection schemes are also feasible in larger cities with more multi-family buildings, and Switzerland has made such schemes mandatory in all municipalities.
- **Setting national or EU-level quantitative food waste targets.** This would provide overarching guidance to consumers and businesses on the government's objectives, and would likely be a very useful complement to some of the other policies.
- **Motivating supermarkets to reduce waste** (e.g. shifting more fresh produce sales to weight-based models). League tables at local authority level have proven their value in shifting practices regarding other environmental/social challenges and could work here as long as it does not require sharing confidential data.

Construction & Real Estate has been identified as one of the sectors with the highest potential for circular economy. There are three main opportunities for the construction and real estate sector to become more circular. Industrialised production processes, modularisation and 3D printing could reduce both building times and structural waste if technology development continues and traditional industry habits are overcome. Reuse and high-quality recycling of building components and materials could reduce the need for new materials and decrease construction and demolition waste, if the split incentives created by a fragmented market are addressed. Sharing, multi-purposing and repurposing of buildings furthermore could reduce the demand for new buildings through better utilisation of existing floor space. Modelling suggests that the annual potential value unlocked by 2035 if these three opportunities are realised could amount to EUR 450–600 million, 100–150 million, and 300–450 million, respectively.

The following policy options could be considered to further progress the circularity in Denmark:

- **Complementing building codes with circularity ratings and targets:**
  - Ratings indicating the circularity potential of materials and construction techniques.
  - Circular economy targets that set minimum requirements using a scoring mechanism. Denmark and the UK have already introduced energy efficiency and carbon ratings. This could be deployed to stimulate circularity, for example with energy standards that incorporate carbon/kWh scores for both the energy embedded in the materials and that used during operations—with recycled materials scoring considerably better than virgin ones.
  - If targets are set, it is important that technology neutrality is maintained and the government is not prescribing the technologies, materials, or techniques to be used. In general, interventions along these lines would be expected to be most effective if introduced gradually, for example with gradually increasing standards as has been the case for energy efficiency within the Danish building regulations. In addition, these interventions would likely have impact across the three circular economy opportunities in the sector.
- **Supporting module production facilities.** The government might choose to play a role in motivating the financial industry to move into this area as such production facilities can yield good returns. If this is not an option or does not yield results at the desired scale or speed, low-cost government loans could also start addressing the access to capital barrier. If concessionary financing is undesirable, government agencies might provide loans at market rates that have been designed to meet the complex financing needs of nascent industries. For example, the UK Green Investment Bank has recently developed innovative loan products that are tailored to the specific needs of companies and local authorities wishing to make investment in energy efficiency improvements, which is a similarly immature market.
- **Creating legal framework for 3D printing materials.** Regulating input materials for 3D printing is necessary to realise the full potential of the technology. The timing is right to work on this, as the 3D printing industry is still young and supply chains are not yet mature and locked in. Given its complexity, developing this internationally—at the EU level or beyond—would make most sense. Along with material policies there is also a need for safety, quality, and environmental standards for the processes and technologies themselves.
- **Bringing together all stakeholders** in the construction value chain to work on systemic solutions to address the lack of skills and established norms that stand

in the way of industrialising production. This could take the form of an industry-wide partnership focused on knowledge sharing and collaboration, a project with specific short-term objectives, or a private public partnership.

- **Supporting R&D.** Funding programmes to develop and bring to commercial scale new techniques in the 3D printing of building components and explore technological synergies between component printing and the on-going digitisation of construction. A technology challenge prize (as for example promoted by Nesta in the UK) could also be considered.
- **Launching public procurement pilots.** Such pilots could serve a triple purpose: demonstrate the viability and benefits of existing circular materials and construction techniques, stimulate the development of new materials and techniques (design competitions offer an alternative), and develop the necessary guidance and procedures for procurement teams to be able to accommodate such new or unfamiliar elements (e.g. adjustments to the typical pre-construction dialogues).
- **Adjusting public procurement practices.** This would allow for more public construction projects with higher resource efficiency by encouraging technological standards that facilitate later repair, remanufacturing, or reuse (e.g. in lighting or heating, ventilation and air conditioning); use of recycled or reused materials and components; procurement of decommissioning services that focus on value preservation; or mandating the inclusion of performance models or Total Cost of Ownership (TCO) metrics. As a first step, an advisory mechanism on circular public procurement practices could be set up. This could be complemented with training programmes for public procurement teams. At a later stage the actual procurement rules themselves might be adjusted.
- **Funding for industry training programmes** tailored to the various actors along the construction value chain (architects, engineers, entrepreneurs, construction workers, etc.) covering off-site production and on-site assembly of components as well as 3D printing techniques.
- **Supporting the creation of material inventory software** to keep track of the materials used in construction, maintenance, and renovation projects from start to finish and provide information on their lifetime impacts and opportunities for looping. Such support could come in the form of a publicly funded design competition.
- **Creating a 'positive materials list'.** A comprehensive database of construction materials that are favourable for circular design could help inform, educate, and inspire developers, architects, and clients alike. The initiative could define the criteria a material has to meet to get on the list and create an initial set of materials. It could also be expanded with commercially available branded products – it would require the initiative to define a simple application process through which companies can submit their products, and set up a review board.

Such a list could then be taken over at the EU level, so as to inform other member states and create more consistency for companies in the industry.

- **Clarifying the legislation** governing (participants in) sub-letting residential and office space, and sharing business platforms (like Airbnb and Liquidspace) by defining unambiguously who is entitled to practice it (private tenants, commercial players) and which regulation they need to follow. Doing so could lower the risks perceived by individuals and companies wanting to engage in such transactions.
- **Creating financial incentives or financial support** to local, regional and national public-sector entities such as schools and other public infrastructure could help overcome hesitance towards renting out their properties when not in use (without distorting competition), and possibly remove some practical barriers such as locks that need to be added or changed. This could also have demonstration effects for private owners, facility managers in industrial and commercial real estate, and landlords.

Plastic packaging is a central challenge to the circular economy. Although some of the potential solutions require multi-stakeholder alignment at international level, two opportunities stand out in Denmark at the national level: increased recycling and introduction of bio-based materials. By addressing the need for improved collection systems and working together with stakeholders on ways to increase standardization, Denmark could increase the recycling of packaging to 75% by 2035, saving both embedded energy and carbon. In addition, Danish companies could develop a competitive advantage in bio-based materials, if the need for accelerated technological development and creating functional end-of-use pathways is addressed.

Mobilized in 2014, as part of the MainStream Project, the Global Plastic Packaging Roadmap (GPPR) initiative leverages the convening power of the World Economic Forum, the analytical capabilities of McKinsey & Company, and the circular economy innovation capabilities of the Ellen MacArthur Foundation. The vision of the Global Plastic Packaging Roadmap (GPPR) is of an economy where plastic packaging never becomes waste but re-enters the economy as defined, valuable, biological or technical nutrients – a 'new plastics economy'. The GPPR provides an action plan towards this new plastics economy as an economically and environmentally attractive alternative to the linear model. The project is driven by a steering committee composed of nine global leading company CEOs and more than 30 participant organizations across the entire plastics value chain ranging from plastics manufacturers to brand owners and retailers in FMCG to municipal waste collection and after-use treatment systems. This integrative project setup allows for accelerating systemic change through innovation and collaboration. The GPPR works collaboratively with a number of existing initiatives focused on ocean plastics waste including the Global Oceans Commission, Ocean Conservancy, the Prince's Trust International Sustainability Unit, governmental institutions and policymakers. The

project's unique focus on systemic change will complement and inform these other initiatives. Besides fostering innovation and collaboration across the value chain, the GPPR project will also inform and influence policy on a corporate and governmental level, by highlighting interventions that either hinder or accelerate the transition towards the new plastics economy. First results from the GPPR will be published in January 2016 at the World Economic Forum in Davos.

- Setting up municipal access portals that provide information on public building availability and matches users with providers. This could start out with public buildings; private spaces could be added later, for instance in case a territory is too small or not sufficiently densely populated to warrant a commercial intermediary.

The following policy options could be considered to accelerate the circularity in the plastic packaging sector. These options are the result of an initial assessment of how cost-effectively different policy options.

- **Mandating the improvement of the collection infrastructure** for household plastic waste in municipalities. Nordic country experience suggests that kerbside collection generates less contamination than the 'bring' approach.
- **Increasing the national target for the plastics recycling** rate from 22.5% to up to 60%. This would move Denmark from the minimum level under current EU law to the levels envisaged in the 2014 EC review of waste policy and legislation presented as part of the EC's circular economy proposals. This could also help insure targets and objectives are well defined.
- **Standardising collection and separation systems** across municipalities to pave the way for economies of scale and stronger sorting and treatment capabilities at the national level. This could lead to a higher profitability of domestic recycling operations.
- **Reviewing fiscal** incentives around incineration of plastics. This could both tackle the externality barrier and accelerate the shift towards the complete recycling of plastic waste. In Denmark the taxation rate is already high in comparison with other European countries, so policymakers might consider differentiating the tax rate based on whether or not plastics are separated out before incineration. Catalonia has such a differentiated incineration tax rate for organics collection programmes.
- **Bringing together all stakeholders** in the plastics supply chain to work on systemic solutions to address split incentives that affect plastic recycling. This could take the form of a project with specific short-term objectives, or a network, or a private public partnership.

- **Working towards EU-wide rules and standards**
  - on the plastics used in retail packaging solutions to better ensure recyclability. Ultimately this could result in a EU-wide positive list of material/format combinations for which recycling performance is superior.
  - for waste recovery and management procedures so as to create more standardized outputs and allow better trade opportunities for the waste processors.
  - on minimum shares of recycled material in plastic products (as in California) in order to increase and stabilise market revenues for plastic recycling.
- **Setting up league tables ranking** neighbourhoods based on their recycling performance. In the UK for example the Department for Environment, Food and Rural Affairs maintains such a league table and provides information to households on how their communities' recycling rates compare to others. A study made by the University of Guildford concluded that this type of feedback encouraged households to recycle more.
- **Fund collaboration in the R&D and design phases.** With sufficient budget available this could take the form of funding R&D platforms—the further development of bio-based materials in collaboration with large CPG companies could follow international best-practice models for public-private innovation (for example the Fraunhofer Institute in Germany and UK's Catapults). More modest collaboration support could bring together designers and engineers in formats that draw inspiration from the packaging eco-design advisory services that Eco-Emballages offers in France.
- **Investing in improving end-of-use** pathways for bio-based and biodegradable materials (including plastics and food waste) in the collection/separation systems.
- **Working to clarify the EU regulatory framework** for approving new materials for food packaging so as to minimise unintended consequences that could hamper innovation and growth in the bioplastics industry.

ANNEX 2 SLOVENIA AS A CASE STUDY FOR THE PUBLIC SECTOR INVOLVEMENT[50]

Circular Change – Public Sector as the Core – the policies for the circular transition are coordinated through an interdepartmental collaboration when determining all policies. In Slovenia, a Circular Economy is already specified as a goal in the Government's strategic and vision documents, but also require more comprehensive policies which include: • Upgrading national statistics and accounts, • Introducing sustainability accounting • Changing taxation policies, • Measures in the field of the use of space, • Changing subsidy policies, • Adjusting investment policies, • Restructuring the banking sector, • Transitioning to green public procurement, • Directing science and research, supporting innovations, • Building a suitable infrastructure, • Educating and raising awareness among stakeholders.

The majority of activities are linked to the Ministry of the Environment and Spatial Planning with strong cooperation with other ministries, notably the Ministry of Economic Development and Technology, the Ministry of Finance and the Ministry of Education, Science and Sport. Selected activities in the Slovenia's road to the Circular Economy include the following:

- There is an on-going reform of the fiscal policy to be more flexible in adapting to promote the transition to circular business operations.
- Harmonization of subsidy policies – certain policies between individual sectors are being harmonized to promote circular management.
- At the level of Strategic Research and Innovation Partnerships (SRIP), action plans and metrics for monitoring performance (and circularity) are being synchronized.
- Green public procurement is being developed and gradually implemented.
- Emphasis on learning and consolidating good practices – a dialogue between stakeholders and the strengthening of recognizability of good circular practices that set an example and promote a circular transition are encouraged through inter-sectoral cooperation that is already underway on the level of the Partnership for the transition to the green economy.
- Representatives of the Government Office for Development and European Cohesion Policy are routinely being involved in the preparation of an emerging framework for the monitoring of the circular economy at EU level in order to harmonize national and European circulation indicators.
- There is a continuous work on promoting investments in circular business

50 Road Map Towards the Circular Economy in Slovenia https://circulareconomy.europa.eu/platform/sites/default/files/roadmap_towards_the_circular_economy_in_slovenia.pdf

models – concrete measures that direct domestic and foreign investors towards the circular economy, reward and promote long-term oriented investments in circular practices, include the existing ones and develop new financial instruments for efficient circular management have become guidance for the Ministry of Finance and the Ministry of Economic Development and Technology.

- Circular Agricultural Policy – the Ministry of Agriculture, Forestry and Food is currently developing guidelines and conditions for the development of agriculture in the direction of circular models, taking into account the opportunities brought about by bio-economics and promote innovative approaches both in food production and in management of forest value chains.
- The Ministry of Education, Science and Sport is upgrading existing programs and establishing new ones that would speed up the circular transition.
- Economic diplomacy – the consular corps is being acquainted with the established international links in the field of the circular economy within the framework of the Ministry of Foreign Affairs and, on this basis, strengthening the business links and international competitiveness of Slovenian circular pioneers.

ANNEX 3 EXAMPLES OF SUCCESSFUL POLICY ACTIONS FROM VARIOUS COUNTRIES

Case Study: Information and awareness

Since the concept of the circular economy is still not widely known among the public or in the business community, policy interventions aimed at increasing information and awareness play an important role. These policies aim to change ingrained patterns of behaviour and ways of thinking that companies and individuals have developed over long periods of time. They also seek to plug gaps in information that prevent or restrict circular economy opportunities. A related barrier is that of imperfect information. Since the circular economy requires business to cooperate across traditional sectoral and functional silos, an understanding of the economic potential and the practicalities is important, and often lacking. An example of targeted information delivery by the public sector is Denmark's Esbjerg municipality where officials inform farmers about agricultural plastics waste during farm inspections as part of the municipal waste management plan. Information and awareness campaigns can be broadcast to the general public, for example the food waste prevention campaign in Catalonia, or provided to consumers through product labelling: South Korea's Eco-label indicates not only the emissions of pollutants associated with the product, but also the conservation of resources through the product's life cycle relative to other products of the same category.

Case Study: Collaboration platforms

When pursuing circular economy opportunities, businesses incur transaction costs finding, and interacting with, suitable collaboration partners along and across value chains. Similarly, circular economy opportunities can be held back by a lack of commercially viable technology. In both cases there is a case for policy support to facilitate partnerships either between businesses or across business and academia. Collaboration platforms can take various forms, including industrial symbiosis, public-private agreements, R&D clusters and voluntary industry initiatives. Companies that look for collaboration partners for circular business ventures, but are challenged by a lack of information or find the transaction costs involved high, can benefit from industry collaboration platforms. These include industrial symbiosis programmes, examples of which include the Green Industrial Symbiosis programme in Denmark, the UK's National Industrial Symbiosis Programme, the Western Cape Industrial Symbiosis Programme (WISP) in South Africa and eco-industrial parks in China. Similar platforms include the Textiles Recycling Valley initiative in Northern France, where the local government is directly fostering collaboration around textiles flows in four clusters to develop innovation in recycled textiles. Cooperation can be centred on an association or an institution with government involvement, for example the Chinese Circular Economy Association (CCEA) and the Circular Economy Institute in France.

Voluntary industry initiatives can work where a circular economy opportunity requires change along the value chain: the Australian Packaging Covenant (APC) is an agreement between government, industry and community groups to improve packaging sustainability; and EcoProFabrics is a joint project, part-funded by the EU Eco-Innovation Initiative, of six companies in the Netherlands that closes a clothing production loop. When the barrier to the viability of a circular economy opportunity is a lack of cost-effective technology, R&D collaboration can be effective. Rethink Resources is an innovation centre in Denmark for resource-efficient production and product design. It is a partnership between universities, technology centres, manufacturing companies and the Danish Ministry of Environment and aims to support resource efficiency in companies. It provides new knowledge about product design, manufacturing processes, closed-loop, life-extension and new business models. The German government has provided funding to foster a leading-edge cluster for lignocellulose bio-refining, and the UK government is funding research clubs on integrated bio-refineries and bio-based processing. In Scotland there is a public-private partnership arrangement funding the Institute for Remanufacture at Strathclyde University.

Case Study: Business support schemes

In seeking out circular economy opportunities, companies can face economic barriers such as lack of access to technology, capital and in some cases challenges to profitability, and market failures such as insufficient competition, split incentives and transaction costs. Policy interventions in this area can take the form of financial support, such as grants and subsidies, and capital injections and financial guarantees, but also importantly technical support, advice, training, demonstration of best practices and development of new business models. A particular focus of these support schemes will likely be SMEs, which can lack the internal capacity, capabilities and financial resources to take advantage of these new opportunities. Examples on the ground are often instruments that offer a mixture of both financial and non-financial support. Denmark's Fund for Green Business Development is an example that provides grants, advice, support for partnerships and pilot projects, and an acceleration programme for new green business models. In South Korea the 'Green Up' offers environmental management consultations with SMEs aimed at enhancing competitiveness, reducing resource costs and improving environmental performance; and the Eco-Design programme provides technical and financial assistance to SMEs commercialising eco-innovation initiatives for their products and services. REBus, an EU Life+ funded collaborative project in the UK and Netherlands, provides technical expertise to businesses to develop resource-efficient business models in textiles and electricals (in the UK the focus is on building the financial case for a transition to a circular business model; in the Netherlands it is through public procurement).77 Finally, an example of tailored, on-demand business support around circular economy opportunities is the Green Deal in The Netherlands.

Case Study: Public procurement and infrastructure

When businesses face the barrier of entrenched customs and habits or a lack of markets for a circular economy opportunity, the public sector can step in to provide purchasing power. A circular public procurement approach is achieved when public organisations meet their needs for goods and services in a way that achieves value for money throughout the life cycle, for the organisation and for wider society, while minimising materials losses and environmental impacts. To this end circular economy standards can be incorporated into procurement law or guidelines, lists of preferred suppliers or materials can be drawn up, and capabilities and skills in concepts such as total cost of ownership (TCO) and measures of material circularity can be built in procuring departments. Examples include Denmark's Government Strategy on Intelligent Public Procurement, which contains initiatives to support circular procurement practices and puts in place dissemination activities and partnerships on green public procurement. In Flanders the government has created a market for high-quality recycled aggregates through their own procurement. US has integrated circular economy thinking into several levels of its public procurement policy. If the barrier holding back circular business practices is insufficient public infrastructure – such as waste collection systems and treatment facilities – public sector budgets can provide investment that enables private sector circular economy activity and potentially investment. An example is the South Korean government's construction of secondary infrastructure in order to boost car sharing as part of the Seoul Sharing City programme. Governments can also help by opening up access to the sharing of their own assets such as buildings and vehicles on platforms to be used by individuals or organisations such as in Flanders where the government is considering expanding a programme to share with the public its cars when they are not in use, for example at weekends.

Case Study: Regulatory frameworks

Regulatory policy interventions can address barriers of several types, including profitability and split incentives, and are of course critical to address regulatory failures. In cases where circular economy activity is hampered by the unintended consequences of existing regulations, it can be helpful to form a taskforce on circular economy or resource efficiency. Examples include Denmark's Taskforce on Resource Efficiency, Finland's working group on National Material Efficiency Programme and the UK's Circular Economy Task Force. Where the barrier is that of inadequately defined legal frameworks, new or adapted product, waste, industry, consumer, competition and trade regulations may be needed. These could come in the form of restrictions on, or requirements relating to, existing activities. Examples include New York City's ban of Styrofoam cups; France's requirements for manufacturers to display on product labels for how long spare parts will be available and to offer free repair or replacement for the first two years after purchase; California's

amendments to its rigid plastic packaging container regulations to more effectively require plastic resin manufacturers to use at least 25% of recycled resins in their products; and France's proposal to ban large supermarkets from throwing away unsold food, instead either donating it to charity or sending it for composting or for use as animal feed. Such interventions can equally come in the form of lifting existing restrictions or setting a positive legal framework for circular economy activities. Examples include Japan's policy to give food waste to pigs under highly sanitary conditions; Nevada's legislation to permit the licensing and operation of autonomous vehicles; The US's Good Samaritan Law that limits the liability of food companies and retailers for products they donate to charities; and the Basel Convention's new guidelines that could also allow countries to classify products and parts as destined for reuse or extended use, or for repair and refurbishment, to exempt them from the convention's requirements on the export of hazardous wastes.

Case Study: Fiscal frameworks

The main barriers to circular economy opportunities that fiscal instruments could address are those of profitability for companies and unpriced externalities. Similar to regulations, fiscal instruments can be applied either to discourage non-circular activities on the one hand or explicitly support circular economy opportunities on the other. An example of a fiscal instrument applied to a product difficult to incorporate into a circular system is Ireland's levy on disposable plastic carrier bags. Examples of pricing more fully the negative externalities of waste (management) through fiscal interventions are Denmark's high and incrementally increasing taxes on landfilled or incinerated waste and Finland's levy and deposit system on disposable drink containers. Examples of tax breaks for circular economy products and processes include New York's tax credit in favour of remanufacturing firms and China's reduced or eliminated VAT on goods produced from recycled materials.