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Global Circular Economy

Reflections for a Just Transition

By Luisa Denter

GERMANWATCH

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Edited by the Heinrich Böll Foundation
In cooperation with Germanwatch

About the author

Luisa Denter is a policy advisor for resource policy and circular economy at the environment and development organisation Germanwatch e. V. in Bonn. She studied Global Political Economy and Development at the University of Kassel, with a focus on global production networks. For her master thesis, she conducted research on how new circular economy legislation of the European Union on electronic and electric equipment might impact industry and workers in Ghana. Parts of the results are included in this publication.

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Heinrich-Böll-Stiftung, Schumannstr. 8, 10117 Berlin
T +49 30 28534-0 **F** +49 30 28534-109 **E** buchversand@boell.de **W** www.boell.de

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PREFACE

«Circular Economy» is a concept that can provide an answer for and be part of a solution to many problems, it is believed. A Circular Economy could help prevent the severe impacts of our resource consumption by reusing raw materials and keeping them in use as long as possible. A Circular Economy can also be a solution for the massive levels of dependence on raw materials from others countries such as China, and it can help to increase resilience towards other economies.

The EU has put forward several Circular Economy policies since the launch of its Circular Economy Action Plan in 2015 and its Circular Economy Package in 2022, including a Sustainable Product Initiative that tackles the design of products and a «Right to Repair». Policies such as the EU Critical Raw Materials Act focus especially on one aspect of a Circular Economy: recycling being used as a major tool to secure access to raw materials so that 25 per cent of all raw materials used in Europe come from recycling. At the same time, the EU also presented a proposal for a Global Circular Economy at the 6th United National Environmental Assembly, and the UN Panel on Critical Energy Transition Minerals take up Circular Economy as one important tool to decrease the impact of raw materials consumption.

Already when listing different policy approaches, it becomes clear that a Circular Economy can have many ends and that – depending on the approach the policy takes – the outcome and its benefits can differ. This already starts when looking more deeply into the concept, which includes reduce, reuse and recycle, with a mayor focus often on the latter. With this study, we want to look deeper into the different facets of a Circular Economy and on the impacts it can and could have in countries outside the EU, for example on their informal sectors, and highlight especially those countries where a lot of e-waste or old electronics from Europe is landing at the moment. With this contribution, we would like to raise awareness about possible pitfalls in terms of equity and increasing inequalities or counter-effects, highlight diverse solutions and kick-off a debate on how to jointly create a just and effective global Circular Economy.

Berlin, January 2025

Johanna Sydow
Head of International Environmental Policy Division,
Heinrich Böll Foundation

ABBREVIATIONS

ESPR	Ecodesign for Sustainable Product Regulation of the European Union
EU	European Union
E-WASTE	Electronic waste (old electronic and electric products that are no longer reused but instead directly recycled or sent to landfill)
L(M)ICS	Low-income and lower-middle-income countries
SSMES	Smallest, small and medium-sized enterprises
UEEE	Used electronic and electric equipment (that can still be used, possibly after repair or refurbishment)

1. Introduction

The European Union (EU) has clearly shown its desire to push a Circular Economy. After two Circular Economy Action Plans (2015 and 2020), the European Commission announced a Circular Economy Act in summer 2024, which shall inter alia strengthen demand for secondary raw materials. In 2023, the recycling of so-called strategic raw materials within the EU was chosen as one strategy in the Critical Raw Materials Act to counter the risks of raw material supply shortages for the EU. Moreover, numerous, more specific legislations have been passed to strengthen the European Circular Economy, such as an Ecodesign for Sustainable Products Regulation (ESPR) and a directive for common rules for repair. This political push for Circular Economy can be seen as being rooted in more awareness about possible interruptions in raw material supply chains and about the projected gap between global supply and demand for critical raw materials. Disruptions such as the Russian war of aggression against Ukraine and subsequent sanctions lead to this increased awareness, as risks related to a high level of dependency on singular, potentially autocratic states became apparent. Subsequently, there are significant political ambitions to process waste containing economically valuable raw materials within the EU instead of exporting it. However, circular strategies besides recycling that aim at reducing raw materials demand or at strengthening re-use are not in the political focus as much as recycling (Langsdorf and Duins, 2022: 10; Noyan, 2022; Tost et al., 2023: 2; Wijk, 2023: 83–84). To date, the momentum for the Circular Economy has not been used to set up a *holistic* Circular Economy. Following Potting et al. (2017), a holistic Circular Economy prioritises reducing raw materials consumption, for example by making products redundant, rethinking the usage of products or producing in a more resource-efficient manner (Refuse, Rethink, Reduce). In addition, products or their components shall be kept in use longer. Apart from reusing and repairing products, they can therefore also be improved upon or updated (Refurbish), functional parts of discarded products can be re-used for repair or the production of a new product (Remanufacture), or products or its parts can be used for a different purpose. Only if all of these options are exploited shall the materials of a product be recycled and waste be used to produce energy (Potting et al., 2017: 5).[1] These strategies should be implemented in a globally and socially inclusive way. Instead, currently, Circular Economy policies focus mainly on recycling and waste management and are aimed at strengthening selected, financially well-equipped states and regions such as the EU by securing respective access

1 The hierarchy of first preventing waste generation and exploiting possibilities of re-use before options such as recycling or recovery are implemented is also reflected in EU regulations and strategies such as the Waste Framework Directive.

to raw materials. So far, the transition to a Circular Economy is therefore a nationalised/regionalised endeavour and not designed to be enabled globally to also allow low-income and lower-middle-income countries [L(M)ICs] to be part of this transition.

A Just Transition to a Circular Economy is not a sure-fire guarantee

A holistic and effective Circular Economy contributes to saving resources, protecting biodiversity, decreasing emissions, preventing waste from being landfilled and reducing the need to extract raw materials from the ground, and consequently the devastating consequences and side-effects of extractivism. Therefore, the recent political pushes for a Circular Economy in the EU are in principle highly welcome. The above-described aims of a holistic Circular Economy would not only benefit the EU. For instance, preventing waste from being landfilled would counter the environmental problems that arise due to waste exports to third countries. Reduced raw materials consumption might not only reduce the pressure on communities in mining regions, but also enable more equitable access to resources across the globe. So, is the EU's transition to a Circular Economy a globally just project by default? Unfortunately not. On the one hand, this can be reasoned by the lack of awareness for, and focus on, the global effects of Circular Economy policies in the EU. On the other hand, this can be reasoned by the fact that Circular Economy policies in the EU are predominantly aligned with the aims of strategic independence, economic resilience and a strong *European* industry, especially with regards to raw materials that are considered critical or strategic for the EU.

But how does the transition to a Circular Economy in Europe impact actors in global linear and circular value chains? This not only depends on corporate decisions, but also on the political and regulatory frameworks that are set for a Circular Economy across the globe (Lucas et al., 2022: 38) and might be different, depending on the material streams and sectors. One possible outcome is a regionalisation of circular economic activities and trade in which products and infrastructure are re-used and recycled in the region where they were first used. In addition to the positive sides of this scenario, such as lower transport emissions or reduced harmful waste exports ending up in landfills, it includes the risk of L(M)ICs being left behind and no longer partaking in circular value creation and trade – especially those who are currently importing and processing used goods from upper-middle and high-income countries (Cotta, 2020: 256–257; Sheeran, 2021: 190–195). Alternatively, a Circular Economy could function globally like its linear counterpart. Used products might be shipped abroad to be repaired or refurbished, re-used in third countries, and remanufactured products or recycled materials might be re-exported (Lucas et al., 2022: 38). In this scenario, L(M)ICs have a chance to profit from circular value creation while there is a high risk that poor and hazardous working conditions and environmental harm would continue to be the basis for a global division of labour.

In any of these cases, the circular transition will impact countries, regions, corporations, workers and further actors in these supply chains. The possibilities for these

actors to shape this transformation depends on their positions of power in current value chains. Due to the existing lack of either market power or geopolitical power of L(M)ICs, the impact that actors in these countries have to shape the transition is often lower than for actors within, for example, the EU, thereby possibly rigidifying global wealth inequalities (Barrie and Schröder, 2022: 460). So far, it is a politically neglected and under-researched question as to how the transition to a Circular Economy within the EU and additional states and regions with substantial global market power impacts actors in L(M)ICs (Xavier et al., 2021). These effects are neither all positive, nor all negative, but ambiguous. Throughout this paper, we seek to give an overview of the following possible effects:

- **The future of global circular value creation and capture:** The central question is how the global production networks will evolve within the transition to a Circular Economy. Will the Circular Economy lead to more regionalised production networks? Or will value creation and capture be centralised in regions that have enough market power and capital to design the Circular Economy to their advantage while other regions are cut off from circular value creation? More concretely, which role will, for example, refurbishers in L(M)ICs currently preparing used products from the EU for the local second-hand market play in a circular future?
- **Effects on the global division of labour:** Closely related to the question of what circular production networks will look like is the question of how the global division of labour will evolve in a Circular Economy. In which regions will jobs be created, and in which ones are jobs endangered? And which role can informal workers currently involved in the Circular Economy take?
- **Environmental effects:** Which Circular Economy policies of the EU and its member states have the potential to unfold positive environmental effects beyond the EU? Which global rebound and displacement effects are looming that might, for instance, create more demand for primary resources outside of the EU?
- **The role of procedural justice:** Besides considering the global effects for a global Just Transition, it is key to ensure procedural justice. Which barriers impede all stakeholders of a transition to a Circular Economy from becoming part of policy design and planning? Which unequal power dimensions with regards to shaping the Circular Economy need to be considered, and which marginalised groups should be included in decision-making processes?

If policy-makers in Europe consider and address the global effects, the positive effects of the transition to a Circular Economy on global justice could prevail. Unfortunately, however, this is not the direction that is currently being taken. As interests such as access to raw materials often determine the design of Circular Economy policies, some researchers are even warning of protectionist tendencies, for example in case exports of secondary raw materials are restricted to retain them for their own industry (Barrie and Schröder, 2022: 449; Kettunen et al., 2019: 28) without taking a global Just Transition into consideration. Therefore, we conclude this paper with initial suggestions on how to address the global effects and procedural justice in Circular Economy

policy-making. These approaches mainly address the EU and its member states and not Global South governments or other high-income or industrialised countries, as the publishing organisations are based in Germany. However, the debate on a global Just Transition to a Circular Economy only started recently. Therefore, political approaches still need to be developed and discussed – jointly with all stakeholders that are affected positively or negatively by the transition. Moreover, for a global and Just Transition to a Circular Economy, other powerful states and regions must also work towards this goal.

Electronic and electric equipment in focus

As Circular Economy is complex and different for every sector, a focus of this paper is electronic and electric equipment as well as the minerals and metals included in these products. The European Commission (2023: 20) identified waste from electronic and electric equipment to be among the most important waste streams for the recovery of so-called critical raw materials. This demonstrates the increased European interest in the recycling of used electronic and electric equipment (UEEE) for ensuring the supply of resources for the European industry. Currently, e-waste as well as re-usable electronic and electric equipment[2] are often exported from the EU to third countries, pre-dominantly to Southeast Asia and West Africa (Cotta, 2020: 264–265). While parts of these exported products are eligible to be repaired, refurbished and/or re-used in their country of destination, parts of these exports can only be landfilled. For the example of Ghana, depending on the estimations, 44–70 per cent of the UEEE arriving in Ghana is re-usable, and the rest is mostly directly landfilled (Ebenezer et al., 2019: 2, 13; Maes and Preston-Whyte, 2022). Due to the high share of illegal exports in this field (Cotta, 2020: 259), statistics on this waste stream are lacking. For instance, on the one hand it is estimated that 77 per cent of e-waste and reusable electronic and electric equipment arriving in Nigeria originated from the EU (Bates and Osibanjo, 2019: 141–143). The official numbers on legal trade, on the other hand, indicate that South-South trade of e-waste and used equipment has increased (Allan, 2021; Lepawsky, 2015: 147–149). However, as practices such as mislabelling goods to hide illegal exports or shipping these exports via third countries to circumvent existing export restrictions, North-South trade in these goods and waste is in reality more important than is indicated by these official numbers. Depending on the state of the used equipment items arriving in third countries, they are repaired and refurbished for the local market, directly re-used or dismantled to extract re-usable spare parts and valuable materials, often by informal workers. In the end, at least 20 per cent of the weight of UEEE is landfilled or burnt, as it cannot be recovered economically (Ebenezer et al., 2019: 29). Materials eligible for recycling are either used for the production of goods for the local market – such as cooking pots in the case of Ghana

2 Used electronic and electric equipment that can still be used (possibly after repair or refurbishment) is referred to as UEEE, while e-waste refers to old products that are no longer reused but instead are directly recycled or sent to landfill.

(Ebenezer et al., 2019: 28–30) – or re-enter the global metal trade. In the latter case, the final recycling processes with high potential for value generation mostly happen outside of the L(M)ICs. For example, in the case of copper, most of the processes that are labour-intensive and require rather low capital investments, such as dismantling and sorting, occur within Ghana, whereas refinery of the scrap enabling the material to re-enter the global metal trade market happens abroad (Ebenezer et al., 2019: 30; Grant, 2016: 27).

So far, policies of the EU seeking to regulate exports of e-waste and UEEE were weakly enforced and did not lead to fewer exports (Grant and Oteng-Ababio, 2019: 119; Olley, 2021: 27; Palmeira et al., 2018: 52). Despite this, it is likely that trade will change in the future due to the Circular Economy ambitions of the EU and the political and economic efforts to keep recyclable strategic raw materials within European borders. Besides political and economic interests, intentions and declarations, several Circular Economy policies that have already been adopted will impact trade in e-waste and UEEE and make its processing within the EU more viable. For example, based on the ESPR, new requirements for circular product design will be established so that the processing of e-waste and UEEE is likely to become less work-intensive, and thus economically more profitable. In addition, the EU set the aim of increasing recycling capacity within the EU for raw materials categorised as strategic for its economy to 15 per cent by 2030 in its Critical Raw Materials Act of 2024. The current recycling capacity for some of these materials is close to zero, for example for gallium and silicon metals. As electronic and electric equipment is a key product category for these materials (European Commission, 2023: 20), exports of used products will decrease if the EU sticks to its plans.

2. The future of global value creation and capture and the global division of labour

How could the EU's effort to establish a Circular Economy impact global value creation and workers in those L(M)ICs where UEEE and e-waste are often exported, for example Ghana? On the one hand, *opportunities* can arise, as some circular practices such as remanufacturing and repair are more developed and integrated into those society than within the EU. On the other hand, *risks* are looming, as the lack of consideration with regards to opportunities for L(M)ICs in policy design might cut workers and businesses off from circular trade or contribute to poor and hazardous working conditions.

Opportunity 1: The circular advantage

Many L(M)ICs have a circular advantage, as circular practices such as repair, refurbishment and remanufacturing are an integral part of their economies and local production and consumption patterns (Schröder et al., 2018). The global effort to establish a Circular Economy offers an opportunity to built on this and to expand and strengthen these business models and everyday circular activities.

To serve the local second-hand market, labour-intensive repairs and refurbishment are carried out in L(M)ICs. Second-hand, repaired or refurbished electronics have a market share of 80 per cent in Ghana. Even though the share of new products is rising (Obeng, 2022), circular consumption patterns are already or still in place in many L(M)ICs. In comparison to the numbers from Ghana, the market share of refurbished smartphones in Europe is only 10 per cent (Swappie, 2024: 2), even though smartphones comprise the most successful product category for refurbishment (Transparency Market Research, 2023). This showcases the circular advantage of production and consumption patterns of L(M)ICs such as Ghana. This circular advantage is also demonstrated by a database set up by Footprints Africa and Circle Economy that showcases the various circular business models across the African continent. Among them are numerous examples of how e-waste or UEEE is used, for example to produce power banks for the Nigerian market. Circular strategies such as refurbishment and remanufacturing can be attractive for L(M)IC markets and businesses, as the material costs for production can thereby be reduced (Yamaguchi, 2022: 31). Here, L(M)ICs are better suited, as sales markets in L(M)ICs are usually more price-sensitive. Therefore, there is a chance to set up refurbishment and remanufacturing

industries in L(M)ICs, because in addition to the sales market potential, the circular advantage and the available labour power in light of the amount of work needed for refurbishment and remanufacturing could pay off.

The United Nations Environment Programme therefore estimates that through a Circular Economy, up to 11 million new jobs might be created in Africa, and estimations for Asia assume job creation of 1.5 million (Asian Development Bank and Southeast Asia Development Solutions, 2023). However, these estimations can only materialise if circular activities in L(M)ICs are strengthened and considered in global policy-making. The main challenges that circular businesses in Africa are facing and need to be addressed in the sector are the lack of enabling policies, access to finance, skills and technical expertise as well as logistics and access to supplies. Moreover, they need support to obtain the certifications or accreditations necessary for participation in the formal and global circular market and for introducing state-of-the-art production processes (Footprints Africa, 2022: 6–7; Lembachar et al., 2022: 20). The latter need is likely to become even more important, given that global efforts to standardise a Circular Economy or set legal requirements for the importers of waste or used equipment are increasing. For example, the recently revised Waste Shipment Regulation of the EU determines that selected exports of used products and waste are only allowed if the importers and non-EU processors of these streams fulfil minimum environmental and reporting standards. Besides the investments, capacity-building and reforms that some circular businesses in Africa would need to implement to adhere to these requirements, the Regulatory Scrutiny Board of the EU estimates that the costs to comply with the requirements per facility and get audited will amount to €5,000–€35,000 for the first audit and subsequently €5,000–€15,000 annually (Kühlers, 2022: 1). Even if this rule does not yet directly apply to UEEE, it is likely that it will in the future: The regulation builds on the Basel Convention, which was recently reformed and included UEEE as a hazardous waste stream. In addition, the Basel Convention itself makes provisions for increasing the requirements for traders within the Circular Economy. To especially avoid having small and medium-sized companies from L(M)ICs, including small repair shops, be excluded from processing UEEE from the EU while bigger companies – often owned by foreign companies – are able to stay in the market, financial and capacity support is needed for such actors in order to help them comply with these requirements and prove their compliance (Lucas et al., 2022: 40–41; Schröder and Barrie, 2024: 12). Otherwise, actors in L(M)ICs might be cut off, as happened in India when the requirements for licences for trade with UEEE were introduced without containing adequate support for small and informal actors on the market (Gregson and Crang, 2015: 168). In addition, ideas such as resource recovery lanes at ports that facilitate quicker processing of goods which are destined for reuse, refurbishment, remanufacturing or recycling could be scrutinised (Schröder and Barrie, 2024: 41).

If there is success with designing the transition to a Circular Economy in a way that is inclusive for L(M)IC companies, Lucas et al. (2022: 37) suggest that West African companies could, for instance, refurbish UEEE for the European and local markets

or carry out high-quality recycling of e-waste to re-export secondary raw materials. However, any support should not only aim at supporting activities that contribute to the recovery of materials for European or other third markets, but also be geared towards addressing local demand and markets. This is challenging for countries such as Ghana, where the processing of UEEE for the local market is in many cases not yet profitable as such in the formal sector, and therefore either performed as a secondary activity or subsidised (Atiemo et al., 2016: 16; Grant and Oteng-Ababio, 2019: 124).

Examples of approaches to help turn this opportunity into reality

- Provide support to circular businesses in L(M)ICs to obtain the standardisation, accreditations and audits that are necessary to participate in the formal circular market and comply with any (EU) regulations for the import and export of circular goods and materials. In addition, they should be considered and included in standardisation processes and the respective policy processes.
- Ensure that EU policies establishing requirements for circular trade include provisions that are attainable for the smallest companies, such as repair shops, and programmes that aim to adequately integrate informal structures into the Circular Economy.
- Ensure long-term financing opportunities for high-quality recycling infrastructure such as e-waste levies through Extended Producer Responsibility schemes or business-to-business compensation schemes (World Economic Forum, African Circular Economy Alliance, 2021: 30–31) (see page 43).

Opportunity 2: The growing global market for secondary raw materials

A Circular Economy stimulates trade in secondary raw materials and their precursors, such as metal scrap (Lucas et al., 2022: 36). Secondary raw materials trade has become increasingly profitable over the past two decades (Grant and Oteng-Ababio, 2019: 127–128). Between 2003 and 2018, waste and scrap increased by 204 per cent in value (for metals even 210 per cent) and 23 per cent in weight (Yamaguchi, 2022: 20). Given the increased interest in secondary raw materials for critical and strategic raw materials due to ambitions to diversify supply and switch to more environmentally friendly production, this trend of the economic value of metal scrap increasing is likely to continue (Infinity Research Limited, 2022), despite current price drops. Policies such as minimum quotas for secondary raw materials input or subsidy programmes to make innovative recycling processes competitive can reinforce this tendency and create investment security (Yamaguchi, 2022: 27).

In addition to good prospects for sales opportunities for secondary raw materials on the European and global market, some (former) middle-income countries such as India, China and Taiwan use(d) cheap secondary raw materials from recycled waste imports to build up their local manufacturing industries (Gregson and Crang, 2015: 168; Langsdorf and Duins, 2022: 18). Despite the circular advantage of these countries (see Opportunity 1), it is highly questionable whether additional L(M)ICs can profit from this trend on a large scale. In many production networks processing metal scrap, the main value capture happens in highly technologised facilities located in or owned by non-L(M)IC actors, while labour-intensive preparatory processes such as dismantling are performed by workforces in L(M)ICs. Thus, for instance, partly hazardous pre-treatment of UEEE such as dismantling and sorting happen in L(M)ICs such as Ghana, whereas the additional, higher value-adding production steps for turning metal scrap into secondary raw materials take place elsewhere (Fevrier, 2022: 1597; Grant, 2016: 21; Gregson et al., 2015: 221; Gregson and Crang, 2015: 157; Raghupathy and Chaturvedi, 2013: 830–831). Thus, the establishment of plants that are also able to perform these high value-adding recycling steps in L(M)ICs is a pre-condition for those L(M)ICs to profit from the increasing demand for secondary raw materials. For respective initiatives and programmes, learnings could, for example, be derived from the Sustainable Recycling Industries initiative, which is funded by the Swiss State Secretariat of Economic Affairs. For existing L(M)IC plants involved in processing metal scrap, it is essential that subsidy programmes in Europe do not chase them out of the market, but that they have similar access to those European programmes and are enabled to fulfil international standards and norms.

In addition, calls of European industrial actors to keep valuable metal scrap within EU borders as well as political ambitions to scale-up EU-*internal* capacity for processing metal scrap might render market access for L(M)ICs more difficult: The urban mine from which secondary raw materials can be extracted in L(M)ICs is typically significantly smaller than in Europe, the United States or China (Lucas et al., 2022: 36). Thus, if L(M)ICs are cut off from the supply of used products and scraps from Europe (and possibly also from countries such as the United States and China in the future), they would face major disadvantages for the sourcing and production of secondary raw materials. On the other hand, waste and scrap from Europe pose a significant environmental challenge for L(M)ICs and largely lead to mere waste dumping (also called waste colonialism). Trade with processable UEEE and metal scrap create loopholes for the export of banned products (Yamaguchi, 2022: 31). Political approaches that consider both sides of the coin have yet to be found (and enforced) and cannot be defined by Europe alone. For instance, the African Circular Economy Alliance, led by governments of African countries, does not seek a ban of all imports but a «balance between preventing the import of e-waste and near-end-of-life equipment and maintaining the socioeconomically valuable trade of good-quality used EEE» (World Economic Forum, African Circular Economy Alliance, 2021: 30–31). It thus requires bilateral and multilateral exchange and circular (trade) agreements and partnerships that focus on the needs of L(M)ICs. Moreover, it is crucial that efforts by L(M)ICs to build up environmentally friendly recycling capacity, including the most

profitable steps, are supported with sufficient capital (Lucas et al., 2022: 41). They and their industries must furthermore be included in standardisation and policy processes. Subsidy programmes set up by the EU and its member states should not only be directed towards their own recycling industry, but also be open to L(M)ICs.

Examples of approaches to help turn this opportunity into reality

- Support the set-up of high value-adding and environmentally friendly recycling processes in L(M)ICs in order to establish recycling processes – from the collection, sorting and dismantling of metals to melting and refining. This should be geared at enabling participation in the global market as well as at serving the local market. This could, for example, be done in the context of secondary raw materials partnerships.
- Adapt trade agreements to a Circular Economy while considering the loopholes for waste colonialism.
- Include L(M)IC industry and the smallest, small and medium-sized enterprises (SSMEs) in standardisation and policy processes.
- Open up EU recycling industry subsidy programmes for L(M)ICs.

Opportunity 3: Ecodesign

Mandatory rules on energy-efficient and circular products can influence global circular trade and production. Respective approaches have already been implemented in Japan, South Korea, Brazil and India, for example (Jensen, 2024). In 2024, the EU passed a new Ecodesign for Sustainble Products Regulation (ESPR), which is considered to be a pioneering piece of ecodesign legislation. With this regulation, a large range of products – among them electronic and electric equipment – need to comply with ecodesign requirements, thereby facilitating the circularity of the products in the future. Requirements inter alia shall make products placed on the EU market easier to repair, upgrade, refurbish, dismantle and recycle, as well as lead to more durability and create reductions in the usage of substances of concern. Before electronics are actually designed in compliance with the ESPR, the European Commission still needs to specify these requirements in product-specific delegated acts – a process that will take many years until all electronic and electric products are covered.

Once product design requirements become effective for electronic and electric products placed on the EU market, exported used equipment to L(M)ICs will likewise be easier to repair, refurbish, remanufacture and recycle. Thereby, the complexity of circular activities in L(M)ICs is reduced and the profitability of these activities increases (Cesaro et al., 2018: 747; Langsdorf and Duins, 2022: 28; van der Ven, 2020: 15). This is not only true for formal businesses, but also for the informal

sector. With the help of product design standards such as dismantability, workers will need less time to remove functional spare parts that can be used or re-sold for repair and remanufacturing as well as valuable materials that can be recycled. As a result, the livelihood options for informal workers processing UEEE can be strengthened. Especially in the formal sector, product design requirements and information requirements might furthermore facilitate more standardised processes to handle UEEE, making those processes more profitable. This inter alia requires that mandatory information on the composition of the product and its materials that will facilitate circularity be made available to actors in L(M)ICs, and it also requires that in the implementation process of the ESPR and the Digital Product Passport, manufacturers are obliged to reveal this information to them (see page 24 for more information).

However, to be able to fully profit from ecodesign requirements, especially informal workers and the SSMEs might need better access to adequate tools, equipment, technologies and trainings. Moreover, for the positive effects of the ESPR to render the processing of UEEE from the EU easier in L(M)ICs, first the usage phase within the EU takes place: The average usage phase within the EU for smartphones is about 3 years, for laptops 6 years and vacuum cleaners 6.5 years (European Environmental Bureau, 2019: 3). If the ESPR succeeds, these phases will be extended after the ESPR takes effect. Thus, the positive effects of ecodesign requirements of the EU on L(M)ICs are on the horizon, but they will only be realised in the distant future. Moreover, there is a need for good enforcement by European member states.

Besides the positive effects of the ESPR for processing UEEE, (small) companies from L(M)ICs with little access to capital might partly be unable to fulfil some of the product and material requirements set by the ESPR. Therefore, there is a risk that these companies cannot enter or stay in the market if no respective support is provided. Therefore, Schröder and Barrie suggest that «a country introducing its own ecodesign requirements could provide assistance in the form of technology transfer, training and financial support to help developing-country manufacturers meet circularity standards» (2024: 29). Some respective initiatives are already funded by the EU (Schröder and Barrie, 2024: 29) and should be continued and expanded.

Examples of approaches to help turn this opportunity into reality

- Provide training and the necessary equipment to the SSMEs and informal workers in L(M)ICs to unlock the potential of ecodesign.
- Utilise effective enforcement and cooperation with countries importing UEEE to ensure high-quality UEEE that is processable in the respective L(M)IC is still traded, whereas non-processable UEEE is not (see page 17).
- Give businesses, repairers, (informal) workers and consumers in L(M)ICs access to information that facilitates their circular activities, for example through a Digital Product Passport (see page 24).

Risk 1: Resource (in)justice

Since Europe began to industrialise, huge amounts of material were accumulated in infrastructure, the industry, products and buildings. This constitutes an «urban mine», where valuable materials can be exploited in a Circular Economy; this «urban mine» is significantly bigger in, for example, Europe, the United States and China compared to that of L(M)ICs (Lucas et al., 2022: 36). In addition, currently, governments and industry of high-income countries – including the ones of the EU – are strengthening their efforts to maintain or gain privileged access to important scarce resources for digitalisation, defence and the fight against climate change (Schröder and Barrie, 2024: 13). For the so-called green and digital transformation to function within planetary boundaries in the medium term, announcements that these materials are to be made usable and recyclable for as long as possible must be translated into regulatory laws and practices as quickly as possible. However, this is not sufficient to put an end to the unequal access to resources across the globe: L(M)ICs cannot rely on the same stock of materials in their urban mine to circulate resources in the future to satisfy the needs of their populations (and industry). Industrialised countries plan to keep and circulate past and current materials that originated from L(M)ICs to satisfy their own (future) material demands. The significant global differences in stock levels of materials are currently not being addressed (Bleher and Schüler, 2016: 255). Looking at the example of copper and the known remaining copper deposits, Exner et al. (2016) come to the conclusion that industrialised countries would need to decrease their absolute consumption of primary and secondary resources and transfer secondary resources out of used products and infrastructure to L(M)ICs to equalise the availability of copper in high-income compared to low-income countries. Schröder and Barrie therefore warn that an «increasingly siloed approach to circularity would risk encouraging ‹circular resource nationalism›» (2024: 13). This means that, if the transition to a Circular Economy is shaped by this nationalised approach focused on resource access for the respective national industry, it would perpetuate the unequal access to resources across the globe. If the existing inequalities in resource access are not addressed, the transition to a Circular Economy cannot be fair on a global scale (Meira et al., 2023: 37). Therefore, the high raw material use within the EU and other industrialised countries needs to be addressed beyond circularity (Pansera et al., 2024: 8), and the transformation should be negotiated in global and multilateral forums, with the involvement of civil society and scientific expertise. National efforts for a transition to a Circular Economy should be aligned with international and multilateral coordination efforts, trade policies and long-term finance mechanisms that support L(M)ICs with their own transition.

The risk of resource injustice would materialise for UEEE and e-waste if those parts that can still be used or prepared for re-use or recycling in an economical way stay in the EU, meaning that materials (and value) cannot be reclaimed in L(M)ICs anymore as sources for affordable products and materials. The consequences are manifold, as many actors in the L(M)ICs to which UEEE and e-waste are exported use these valuable fragments for their livelihoods and economic activities (while at the same time

struggling with the environmental and health consequences due to the large amounts of UEEE and e-waste imports that cannot be processed economically and are therefore landfilled). For instance, the digital divide – thus the unequal access to information and communication technology and associated disadvantages across the globe – might intensify (Bates and Osibanjo, 2019: 138; Kettunen et al., 2019: 28; Langsdorf and Duins, 2022: 24), and the availability of secondary raw materials retrieved from UEEE and metal scraps that are currently used for products for the local market, such as cooking pots, would decrease (Ebenezer et al., 2019: 28–30). Moreover, the cheap secondary raw materials gained from the valuable fragments of UEEE and e-waste used to create an own manufacturing industry would no longer be available. This path was – and is being – taken by (former) middle-income countries such as India, China and Taiwan (Gregson and Crang, 2015: 168; Langsdorf and Duins, 2022: 18). Using the example of steel, India intends to use secondary steel out of scrap imports for its manufacturing industry, while at the same time European steel producers seek to retain this scrap within the EU (Langsdorf and Duins, 2022: 18). Therefore, it is key to ensure coherence between national and regional Circular Economy strategies and policies. It is also important that the intentions of L(M)ICs – such as that of the African Circular Economy Alliance to «find the balance between preventing the import of e-waste and near-end-of-life equipment and maintaining the socioeconomically valuable trade of good-quality used EEE» (World Economic Forum, African Circular Economy Alliance, 2021: 30–31) – are actively supported by the EU.

Examples of approaches to help prevent this risk

- Fund research on international material flows and modelling of its changes in a Circular Economy to gain a knowledge basis for political decision-making.
- Pursue sector-specific strategies to reduce critical raw materials consumption in the EU in the medium term. An example of this is a holistic transition of the mobility sector to reduce the importance of resource-intensive means of transport, such as cars and motorbikes, for mobility (for further information, see e.g. Wilke and Reckord, 2024: 16–18).
- Ensure coherence of Circular Economy strategies and policies globally, whereby the differences in material stock should be considered and addressed in international negotiations and agreements.

Risk 2: Primacy of European industry and consumers

How circular production and consumption networks will develop cannot yet be entirely predicted and depends on political and economic decisions. If they become global like their linear counterparts, it is essential to enable actors from L(M)ICs to

stay in the loop and participate in the global circular market, also with processes and products that enable high-value creation within L(M)ICs. If the Circular Economy instead contributes to a regionalisation of production and consumption, the expansion and establishment of circular value creation within L(M)IC regions must be strengthened similarly to those in Europe.

Governments and institutions of countries and regions with substantial market power and/or financial means have more powerful to shape the transition to a Circular Economy through legislations and industrial policy compared to L(M)ICs. This is why it is to be expected that the transformation will be shaped in the interests of these countries' industries and consumers, whereas L(M)IC companies and consumers might not be able to benefit in the same manner and, in the worst case, even suffer. For example, if EU policies and industry aim to keep valuable UEEE and e-waste in the EU for further value-creation within the EU (while low-value UEEE and e-waste is likely to be continued to be exported), this would mean a loss in revenue for actors currently involved in the repair, refurbishment, remanufacturing or recycling activities of these products in L(M)ICs (Langsdorf and Duins, 2022: 1). Thus, there is a risk that the value creation currently happening in L(M)ICs – for example with regards to repair, refurbishment and preparation for recycling – is shifted to the EU, supported by a shift of the recycling sector from being heavily reliant on manual labour to becoming a more technologised sector. This possible shift of value creation is also hinted at in the impact assessment for the revision of the Waste Shipment Regulation: The European Commission expects an economic gain of €200–€500 million a year within the EU, while industrial actors abroad might face disadvantages (European Commission, 2021: 13). Thus, a Europe-only focussed Circular Economy might deprive L(M)ICs «the opportunity to capture value by creating markets in recovered materials, which offer cheap supplies and thus cheap products that would not otherwise exist» (Crang et al., 2013: 22).

If transition policies towards a Circular Economy go hand in hand with resource nationalism, this thus perpetuates unequal institutional power of countries with substantial market power and/or financial means to support the regional economy compared to institutions in L(M)ICs. These institutional power inequalities, for example, materialise if subvention policies for circular technologies and business models are geared only towards domestic industry, and if governments or regional institutions such as the European Commission facilitate access to private capital for the transition only for its own industry. As endeavours to support the transition to a Circular Economy are also rooted in reasonable efforts to gain more independence from authoritarian states in raw materials supply, establishing governmental programmes that are open to all businesses and industries would not be expedient. However, these programmes should offer possibilities for L(M)IC actors, or parallel programmes should be set up with L(M)ICs to avoid a circular divide.

European governments and the EU tend to envision a Circular Economy that builds upon (new) technologies, thereby ensuring the Circular Economy will require less manual labour (Xavier et al., 2021: 6–7). Governmental institutions as well as

corporations invest in research for and the implementation of circular technologies. As L(M)IC governments do not have the same financial means to support the research and deployment of circular technologies, it is likely that technologies are being developed for the European context. Moreover, the acquisition of (new) technologies is often capital-intensive, meaning that actors in L(M)ICs have difficulties keeping up with the latest technologies, creating a significant competitive disadvantage vis-à-vis their European counterparts (Lembachar et al., 2022: 11). This analysis also holds true vis-à-vis the position of L(M)ICs compared to other countries with substantial market power and financial means, such as the United States and China. Barrie et al. (2022: 3) therefore warn of a innovation divide between industrialised countries and L(M)ICs. For example, this would materialise if intellectual property rights for circular technologies are developed in Europe and other high-income regions, whereas L(M)ICs would be dependent on them or even excluded from innovations if they cannot afford to pay the required licence fees. Thus, the research and deployment of circular technologies and the respective capacity-building should at least also be financed in L(M)ICs. In addition, public research funding for a Circular Economy in the EU could focus on open source technologies so that L(M)ICs can make use of them and adapt them to their specific contexts.

Besides these complex questions about the role of technology in the global transition to a Circular Economy, important legislations for ecodesign and better repairability are easier for the EU to implement and enforce due to its significant market power than for L(M)IC governments. As outlined in the section on ecodesign (see pp. 18–19), the ESPR and the common rules of the EU for promoting repair include advantages that will not only benefit European consumers and businesses, but also those in L(M)ICs. However, these advantages only materialise in cases where it can be avoided that products with high ecodesign requirements which can be processed economically in the context of a Circular Economy are retained within the EU, whereas only waste with low-value potential continues to be exported. This scenario seems likely since, in the past, efforts to address the illegal export of e-waste and UEEE that is very close to the end of life could not prevent its continuation. Still, e-waste and UEEE that can be processed and recycled economically within the EU – for example due to high ecodesign standards, possible subvention and leading market policies – are likely to be retained within the EU for the recovery of strategic raw materials, and thus value. Lower-quality e-waste and UEEE that cannot be processed within the EU will continue to be (illegally) exported if enforcement is not substantially improved within the EU as well as at the ports of countries where the goods are arriving (Barrie and Schröder, 2022: 466). This lowers hopes that L(M)ICs can use waste inflows effectively to create value (see e.g. van der Ven, 2020: 11). In addition, other aspects of the ESPR and repair rules mainly benefit businesses and consumers within the EU and might even lead to competitive disadvantages for L(M)IC businesses and consumers if no further action is taken. For example, this holds true for access to information to facilitate circular strategies such as repair, refurbishment, remanufacturing and recycling; access to spare parts; or the provisions for software updates.

- **Access to information:** The EU seeks to introduce mandatory Digital Product Passports for a wide range of products that are put on the European market. These passports shall include the information needed to facilitate circular strategies such as repair, refurbishment, remanufacturing and recycling. For example, the exact assembly drawings for a product, repair instructions or material compositions shall be included. This shall support the upscaling of these circular strategies, as it contributes towards making them more profitable and feasible. However, current European legislation does not make all of this information available to economic actors outside of the EU – it is instead likely that actors outside of the EU will at most have access to information that is available to the broader public, not to specific information on repair, refurbishment, remanufacturing and recycling. Thus, even if UEEE and e-waste are still exported to L(M)ICs on a large scale, repairers or recycling actors working with UEEE from the EU might not be able to use this information in order to keep products and resources in circulation. Besides accessibility and usability of the information for formal actors, requirements on what information is to be disclosed by manufacturers and how it should be displayed in the Digital Product Passport are currently unlikely to be adapted, for example, to the realities of and possibilities for informal workers processing UEEE and e-waste from the EU.
- **Access to spare parts:** A key barrier for repair of UEEE in L(M)ICs is access to spare parts (Amankwaa, 2013: 10–14; Bates and Osibanjo, 2019: 139). In Ghana, repairers rely on functional parts from e-waste for repairs. Especially for relatively new products, the availability of these parts is scarce. Thus, to fully profit from ecodesign requirements, repairers in L(M)ICs would need better access to spare parts, as foreseen for their European colleagues.
- **The role of software:** The role of software for the long-term usability and circularity of electronic and electric products is not fully addressed by EU legislations (Germanwatch, 2024). However, it is possible that, based on the ESPR, the European Commission will, for example, prescribe minimum periods for which software updates must be provided (Art. 5 2, Ecodesign for Sustainable Products Regulation). Based on the ESPR, this would only be valid within the EU. It would be crucial to also apply these prescriptions to L(M)ICs so that the rule not only benefits consumers and repair and refurbishment businesses within the EU, but also in L(M)ICs. This would also contribute to resource protection, as consumers in L(M)ICs often use European UEEE until it reaches its end of life.

Therefore, an attempt to establish globally or multilaterally harmonised rules to facilitate repair – including access rights to spare parts and the information needed for repair – would render a Circular Economy more beneficial for consumers and businesses in L(M)ICs, whose governments partly lack the market power to implement such rules (Schröder and Barrie, 2024: 31).

Examples of approaches to help prevent the above-mentioned risks

- Work towards harmonised rules to also facilitate repair in L(M)ICs, including access to spare parts, information for craftsmen and software updates in L(M)ICs.
- Ensure that European subsidy programmes are not only accessible to European companies, but also companies in L(M)ICs, or simultaneously establish programmes for L(M)ICs.
- Address the unequal starting conditions for developing circular innovations and technologies in the EU compared to L(M)ICs.
- Focus on open source technologies in public research funding schemes.

Risk 3: Job inequality

Across the globe, it is expected that the Circular Economy will create jobs. However, most of the risks described in this publication imply the risk that jobs in L(M)ICs will be lost and that global job inequality will persist. For example, if circular value creation is shifted from L(M)ICs to the EU (see Risk 2), this would not only affect revenues within L(M)ICs, but also workers currently working within or for the Circular Economy sector. Region-specific estimations for job potential mostly lack a global perspective, in which the shifting of jobs to other regions is considered. For example in the apparel sector, the potential for employment in the reuse and recycling sector within the EU could lead to a sharp decline in employment opportunities in L(M)ICs that are active in textile production (Kirchherr, 2021; Repp et al., 2021: 12). Similar estimations for UEEE and e-waste are not yet available. Several scholars such as Amorim de Oliveira (2021) and Schröder (2020: 14) point to the importance of addressing the questions of where jobs are created and where jobs are lost to ensure a globally Just Transition towards a Circular Economy. Thus, it should be closely monitored and considered as to what extent jobs might not only be created, but also be shifted from L(M)ICs to the EU and other high-income regions.

The EU's advantages in terms of the technologisation of the Circular Economy are accompanied by other advantages in terms of creating new and attractive jobs in this field. Jobs related to these technologies – from engineering to operation – can be created within the EU with respective industrial policy (Barrie et al., 2022: 3). However, this could instead endanger manual work processes in the Circular Economy in L(M)ICs – for example, if the dismantling and sorting of UEEE is in the future carried out using robot assistance in the EU instead of being done manually in L(M)ICs. Since these jobs in L(M)ICs are often (sometimes but not always legitimately) associated with poor and even dangerous working conditions and precarious remuneration, this transfer of value creation and jobs is often framed as a win-win situation. However,

not all jobs in the Circular Economy in L(M)ICs are precarious and, independently of the working conditions, this still would mean a loss of jobs in regions with mostly high unemployment rates. Therefore, for a Circular Economy transition to be globally just, formal as well as informal workers in this field should not be cut off from their work. Instead, their jobs should be transformed so as to be safe, decent and well-paid, or alternatively, adequate livelihood opportunities need to be created. To enable the respective policies, more research is needed to be able to estimate global job developments in different sectors (Kirchherr, 2021).

Informal workers in (circular) supply chains are in this context the most vulnerable. Informal workers currently contribute substantially to the circularity of electronic and electric products (Amankwaa, 2013; Anantharaman, 2021; Grant and Oteng-Ababio, 2012, 2019) under highly deficient working conditions. For example, they engage in collecting the UEEE, in recycling and dismantling it, or engage in other preparatory work for recycling as well as in refurbishment and repair. Others are «middlemen» trading the metal scrap that is created through informal recovery activities on scrap dealer markets. In addition, mostly women indirectly participate in the handling of UEEE by supplying drinks and food to the other workers as well as by collecting UEEE from local households (Amankwaa, 2013: 10–14). Their livelihoods are at risk if UEEE and e-waste from which value can be extracted is in the future retained in the EU (Lembachar et al., 2022: 6). Fevrier points to the racial implications of the likely change of job opportunities under Circular Economy policies, as mainly «the very basic needs of the urban poor» (2022: 1587), such as waste-pickers who depend on their informal circular practices, would be affected negatively without appropriate alternatives to sustain their livelihoods. The example of a strict ban on UEEE imports in Guiyu (China) has shown the potential for impoverishing people due to such reductions in UEEE imports if informal workers have no alternative livelihood options (Brand and Wissen, 2021: 96–97). In this scenario, adequate approaches to address the precarious and dangerous working conditions of informal workers are highly context-specific. Formalisation of work is not always a suitable solution, given the fact that, for example in Ghana, informal workers working with UEEE can attain an income that is about seven times higher than the Ghanaian minimum wage (Grant and Oteng-Ababio, 2019): 120–121). Therefore, cooperation with bottom-up organisations for informal workers is crucial, and their perspectives should be included in policy design.

Besides the often precarious jobs that are at risk in L(M)ICs, jobs that create more value for the workers themselves are also in danger if high-value UEEE and e-waste were in the future to be retained within the EU, especially those jobs in the re-use sector. Circular activities related to the preparation for re-use are significantly more profitable than disassembly and recycling in L(M)ICs (Grant and Oteng-Ababio, 2019: 119), and they are therefore important for livelihoods and the economy. Independent repair, refurbishment and remanufacturing businesses preparing UEEE for re-use for the local market would suffer if *usable* UEEE imports to their countries were to ceased or decrease significantly (Bates and Osibanjo, 2019: 139). For example in Ghana, the share of *new* electronic and electric products is already increasing on the

local market. However, repairers and refurbishers report that the possibilities to create value out of these new products is highly limited, as they are mostly not capable of being dismantled or repaired like high-quality UEEE pieces from the EU. Another significant risk to repairers, refurbishers and remanufacturers in L(M)ICs would be political framework conditions that allow Original Equipment Manufacturers to establish a monopoly on the circularity of their products. This means that Original Equipment Manufacturers would not only produce and sell the products, but also offer services for the repair, refurbishment and recycling of their products while impeding third-party repairs, for example through software-based barriers to repair (Wilson et al., 2017: 5).

Thus, EU policies should aim for circular strategies to be implementable by independent providers – regardless of their locations – and abstain, for example, from Extended Producer Responsibility schemes that allow Original Equipment Manufacturers to claim the entire circular value-addition for themselves, and instead implement systems in which manufacturers mainly fund – instead of implement – after-sale circular processes (Talbott, 2022).

In addition to these risks of job shifting, a continuation of the downsides of the global division of labour in the linear economy throughout the transition to a Circular Economy is likely if it is not actively addressed. The lack of occupational safety, health risks due to working with hazardous substances, and low and insecure renumeration are realities with, for example, activities preparing UEEE and e-waste for recycling in L(M)ICs. It is likely that high-income countries such as those in the EU will be able to create high-value jobs, for example in the repair or recycling sector, whereas jobs in L(M)ICs will instead be in the low-income sector, for example waste and scrap management (Lucas et al., 2022: 10, 45).

Therefore, it is crucial to not only look at the potential numbers of jobs, but also at the framework conditions that are needed to ensure decent jobs are created in L(M)ICs. Aside from workers' rights in L(M)ICs and due diligence legislation in the EU, adequate infrastructure to process waste, proper collection systems and sufficient capacity to adequately process the waste generated (and imported) in L(M)ICs is crucial in this context. Moreover, programmes for providing the right qualifications for workers in L(M)ICs for high-value jobs in the Circular Economy, including for working in a more technologised Circular Economy, are needed. Those measures need to be highly context-specific and address the different needs of, for example, marginalised groups or informal workers (Lucas et al., 2022: 42–45).

Examples of approaches to help prevent this risk

- Ensure that due diligence legislations such as the Corporate Sustainability Due Diligence Directive also apply for circular trade (thus, e.g., also for the respective downstream value chains).
- Support the building of circular infrastructure (including e.g. collection systems) and processing capacity. Only in such a context can safe working conditions be established.
- Establish context-specific job trainings and qualification programmes for circular jobs.
- Cooperate with bottom-up organisation for informal workers for programme design and policy design.

3. Global environmental and health effects of European Circular Economy policies

Reducing the negative environmental impacts of production and consumption patterns is a key potential of a Circular Economy. In a Circular Economy, fewer primary resources need to be extracted, meaning that the negative impacts of resource extraction, such as on biodiversity and water quality, are reduced. In addition, less waste is produced, resulting in fewer environmental problems due to landfilling. How do environmental effects play out differently around the world? And what kind of global interlinkages of environmental effects need to be considered?

Opportunity 4: Circular legislations reduce environmental damage and health risks

Ecodesign regulations such as the ESPR in the EU have the potential to reduce the environmental impacts of all phases of a product, from production and use to disposal. If such a phase occurs in L(M)ICs, the reduction in environmental impacts resulting from EU regulations also benefits the L(M)ICs, for example if less waste or hazardous substances are incurred during production processes (Lembachar et al., 2022: 18). They can furthermore extend lifetimes and re-use phases of UEEE, and therefore reduce waste generation in general. However, especially for digital end-user devices, this environmental advantage will only materialise if advertising strategies and consumption patterns also change so that fewer products are produced and consumed in the EU. The reduction in levels of hazardous substances in products makes waste disposals in L(M)ICs at least a bit less harmful to the environment, and subsequently to the health of neighbouring residents (rates of cancer and respiratory diseases are disproportionally high in neighbourhoods with e-waste landfills [Murthy and Ramakrishna, 2022: 9]), and less dangerous for workers working with UEEE from the EU (Wilson et al., 2017).

In addition, better dismantability and recyclability of products can reduce the residual waste of products that cannot be processed economically and is therefore landfilled. For example, dismantling activities to prepare UEEE for recycling in the informal sector could be done in a safer and more environmentally friendly way: Gollakota et al. (2020: 10–11) differentiate between selective and simultaneous dismantling. Whereas in the first instance, a product is dismantled and components and materials are manually sorted out, simultaneous dismantling uses the practice of

open burning so that only valuable metals remain. With the ecodesign requirements, the selective dismantling might be profitable in more cases, and therefore be applied more often also in informal structures. Therefore, ecodesign requirements not only contribute to the higher profitability of circular activities in L(M)ICs, but also reduce health risks for the people working with UEEE and the environmental impacts due to the dismantling process. These advantages can only materialise if (informal) workers are informed of the advantages of a new product design and about how they can make use of it and have access to the requisite tools.

Besides ecodesign requirements, environmental regulations impacting post-consumer supply chains might not only benefit the environment in the EU, but also in L(M)ICs. For example, the requirements for environmental standards of the importers of used products and waste – as provided for in the revised Waste Shipment Regulation of the EU – can contribute to enhanced environmental standards in processing facilities. However, this only holds true if the respective facilities have the financial means and knowledge necessary to not only adhere to these standards, but to also prove they are in line with the requirements of the EU legislation and potential EU business customers. In addition, frontrunner legislations can encourage and facilitate the adoption of similar legislation elsewhere: For example, learnings from the EU regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals were used in India to establish similar rules and adapt them to the Indian context.

Examples of approaches to help turn this opportunity into reality

- Provide training and the necessary equipment to the SSMEs and informal workers in L(M)ICs to effectively unlock the environmental potential of ecodesign legislations also beyond the EU.
- Address the systemic drivers of increased e-waste generation in the EU. Such systemic drivers are, for example, business models such as personalised online advertisements or phone contracts that continually offer new phone models, and the impacts of the increased energy demand from data centres and hardware through AI implementation.
- Support actors in L(M)ICs to upscale and apply high environmental standards.
- Ensure that ecodesign standards not only outlaw hazardous substances that might do harm in usage phases or repair processes, but also in the production and recycling phases, considering how UEEE is de facto handled in the informal sector.

Opportunity 5: Environmental externalisation of waste problem decreases

A major advantage of European efforts to establish a Circular Economy around UEEE and e-waste is certainly that the externalisation of the waste problem to third countries – mostly L(M)ICs – is partly addressed and likely to become less common. With this reduction, environmental and health problems associated with this externalisation might also be mitigated. Because the landfilling of e-waste and invasive methods of dismantling and recycling on landfills lead, for example, to the contamination of air, soil and (ground-)water with chemicals or heavy metals and by pollution, the levels of toxins in fish, plants, drinking water, and thus food, increase (Bates and Osibanjo, 2019: 146–150; Maes and Preston-Whyte, 2022; Murthy and Ramakrishna, 2022: 9). The consequences are borne by neighbouring communities, and the health of workers at the landfills and UEEE handling sites is affected. This inter alia is reflected in high rates of cancer and respiratory diseases (Adanu et al., 2020; Bates and Osibanjo, 2019: 151; Murthy and Ramakrishna, 2022: 9).

However, whether this will only lessen the EU's responsibility for the fatal consequences of e-waste generation or whether the situation in L(M)ICs facing these problems will actually improve, depends on the degree to which e-waste and UEEE imports from the EU are replaced. In Ghana, for example, some repairers and non-governmental organisations (NGOs) assume that less UEEE from the EU would reinforce the tendency of Ghanaian consumers to buy new products predominantly from China instead of second-hand products. The repairers and NGOs working with informal workers consider these new products to have short lifespans, to be significantly less suitable for repair and recycling, and to contain more hazardous substances. Thus, this scenario would risk the jobs of, for example, repairers or refurbishers. In any case, even if exports of hazardous waste from the EU were to abruptly stop, its responsibility for decades of externalisation of its waste problem would not end at the same time, given the huge amounts of landfilled e-waste that persists in L(M)ICs. Moreover, in light of the still drastic increase of e-waste generation within the EU (Eurostat, 2023) and the striking gap between e-waste generation and global recycling capacity (Murthy and Ramakrishna, 2022: 13), it is likely that (illegal) exports of *low-quality* UEEE and e-waste to L(M)ICs will continue (see p. 23), as will the environmental and health consequences.

Examples of approaches to help turn this opportunity into reality

- Support enforcement authorities in L(M)ICs and strengthen enforcement in the EU with regards to exports of UEEE and e-waste.

Risk 4: Undermining of the waste hierarchy due to purely national approaches

As long as there are significant global differences in living standards and income levels, the phenomenon that used products are no longer resalable in, for example, the EU but in L(M)ICs instead will persist (Amankwah-Amoah, 2016: 21). This must be taken into account when designing Circular Economy policies to ensure that the aims of resource protection and reduction of emissions are reached. Otherwise, the implementation of the waste hierarchy might even be impaired: The waste hierarchy stipulates that the prevention of waste is the most preferred option, followed by exploiting re-use options. Only if these options have already been exploited shall a product be recycled, recovered and disposed of. Potting et al. (2017) translated this waste hierarchy into circular strategies, ordered from the most preferred to the least preferred. The most preferred circular strategies are to reduce raw materials consumption, for example, by making products redundant, rethinking the usage of products or producing in a more resource-efficient manner (Refuse, Rethink, Reduce). This is followed by circular strategies to keep products or their components in use longer. Apart from reusing and repairing products, they can therefore also be improved upon or updated (Refurbish), functional parts of discarded products can be re-used for repair or the production of a new product (Remanufacture), or products or its parts can be used for a different purpose. Only if all of these options are exploited shall the materials of a product be recycled and waste be used to produce energy (Potting et al., 2017: 5).

As outlined above with «Opportunity 1: The circular advantage», circular strategies such as refurbishment, remanufacturing and repurposing are much more established in the production and consumption patterns of many L(M)ICs than in European countries. Besides economic circular strategies, circular practices that do not take place within a strictly economic context, such as repairs in the private context, should also be considered, as they effectively contribute to waste reduction and circularity (Meira et al., 2023: 37; Pansera et al., 2024: 10–11). Therefore, if the EU is successful in retaining more and more UEEE within the EU for the recycling of the valuable raw materials, these circular strategies are likely to be skipped. Consequently, it should not be neglected that the implementation of the waste hierarchy of electronic and electric products put on the European market is currently implemented within the EU and also in third countries. Otherwise,, this risks undermining the waste hierarchy, despite good intentions. The EU should consider building up refurbishment and remanufacturing practices within the EU, and at the same time acknowledge that the export of UEEE is likely to continue for quite some time. Therefore, the establishment of adequate infrastructure and facilities in L(M)ICs to properly handle this UEEE after the usage phases is crucial to ensure that valuable materials contained in exported UEEE is not lost for circularity at their end of life. Only then can the waste hierarchy be implemented effectively.

Examples of approaches to help prevent this risk

- Fund research on (prospects for) the trade of used products to be able to assess the geographically differing potentials to implement the waste hierarchy and consider this in political decision-making. In this context, it is crucial to take the differing global working conditions into account to prevent the global implementation of the waste hierarchy from being based on the exploitation of low working conditions in L(M)ICs.
- Support the collection and recycling of UEEE in L(M)ICs to ensure that materials are not lost after the usage phases in L(M)ICs if UEEE is exported.
- Ensure long-term support of circular activities in L(M)ICs, for example by stipulating compensation schemes from manufacturers or retailers (see Footprints Africa and CTL Foundation, 2024) or by setting up international Extended Producer Responsibility schemes, in which manufacturers are obliged to contribute to a respective fund (see Apoorva and Arpit, 2023).

Risk 5: Material demand leakages

Closely connected to the pitfalls of an impairment of the waste hierarchy is the risk of material demand leakage. If the availability of high-quality second-hand products on an L(M)IC market decreases because high-quality UEEE is increasingly being kept in the EU for recycling, this will not only worsen the digital divide with regards to those consumers who cannot afford a new product, but it will also increase the overall demand for new products with regards to those consumers in L(M)ICs who can afford to buy new products instead of UEEE. In the textile sector, data for Eastern and Southern Africa has already showcased that reduced inflows of high-quality second-hand textiles led to an increased demand for new products (Lucas et al., 2022: 44). If such an increase in «primary demand» in L(M)ICs were to be overcompensated for with less consumption of primary products in high-income countries, this development might be an indicator of equalising living conditions, and thus it would be in line with a Just Transition to a Circular Economy. However, as the market power of L(M)ICs to ensure qualitative products is limited compared to the EU, for example, repairers and NGOs working with informal workers fear that new devices put on African L(M)IC markets have significantly fewer opportunities for value addition in the context of repair and recycling, meaning that repairers as well as some consumers prefer UEEE from, for example, Europe (Obeng, 2022). In addition, it is also questionable that primary demand will proportionally decline within the EU if no further measures are taken: Drivers of short (first) usage phases of electric and electronic equipment within the EU – such as planned obsolescence, technological innovations and marketing

strategies that make consumers buy new products even if the old ones are still functional (Hoeltl et al., 2017: 1052) – have not yet been effectively addressed.

Material demand leakage might not only occur with regards to products, but also secondary raw materials. As materials recovered from waste streams are partly used for the local market, for example aluminium and iron for cooking pots in Ghana (Ebenezer et al., 2019: 28–29), a loss of these materials due to reduced incomes from used products might lead to an increased demand in primary resources (in case people can afford them). Although the environmental effect might be moderate for the product group of electric and electronic products, it is significant for other product groups and material flows, for example with regards to secondary steel.

Examples of approaches to help prevent this risk

- Fund research on international material flows and modelling of its changes in a Circular Economy to gain a knowledge basis for political decision-making.
- Ensure that subsidy programmes set up by the EU and its member states are not only directed towards their own recycling industry, but that they are also open to L(M)ICs. They should furthermore not only support recycling capacity in the interest of European industry, but explicitly also support the alignment towards the local market. This can help preventing large material demand leakages due to the increased interest of European industry in secondary raw materials.
- Address all drivers of short usage phases and the increasing consumption of electric and electronic equipment within the EU, including marketing strategies such as personalised advertisements and planned obsolescence.

4. Considerations for distributive and procedural justice

The transition to a Circular Economy is ongoing. However, the global adoption of legislations, trade rules, and agreements and international agreements for a Circular Economy is still in its early stages. So far, these efforts are mainly being pursued nationally and regionally – sometimes without consideration of the global impacts – and some efforts are being driven by the will to diminish the environmental and social impacts of our consumption. International interest in pushing the adoption further is, for example, demonstrated by the proposal for a resolution to promote the Circular Economy at the sixth UN Environmental Assembly in 2024, and the importance that the UN Panel on Critical Energy Transition Minerals attaches to the Circular Economy in its recommendations. Currently, the power dynamics in Circular Economy decision-making are often dominated by the specific interests of certain powerful countries – interests that are often shaped by corporations seeking profitability and resource access at the expense of the interests of L(M)ICs and social issues. For success, it is crucial that the framework conditions for the global transition to a Circular Economy include all stakeholders and address the interests of the most vulnerable in linear and circular supply chains, as well as questions of the distribution of resources and opportunities for value creation. Moreover, planetary boundaries and how needs can be met globally within these limits should guide political decisions and framework conditions. This is key to avoid the transition to a Circular Economy replicating inequalities of its linear counterpart (Pansera et al., 2024: 1; Weslynne et al., 2022: 1175–1176). Furthermore, more dialogue and coherence of national and regional Circular Economy strategies and policies need to be ensured. The African Development Bank recently called for more collaboration «to leverage the benefits of circularity». It pointed to the Paris Agreement's provision that wealthier countries should support L(M)ICs in mitigating and adapting to climate change – including the transition to a Circular Economy. In addition, countries that are dependent on linear practices, such as countries earning high revenues from the mining of primary raw materials, should be supported on their paths to becoming less dependent on the linear economic model (Schröder, 2020: 15).

Moreover, actors of current circular practices – such as informal workers or SSMEs as well as workers' organisations and trade unions from L(M)ICs – should be included and allowed to participate in policy processes related to the Circular Economy (Lembachar et al., 2022: 10; Weslynne et al., 2022: 1175). Apart from SSMEs of the Circular Economy and informal workers, Schröder and Barrie suggest to

«include small-shop owners, street vendors, local government bodies, informal sector workers, local communities, and Indigenous peoples whose knowledge and practices can significantly contribute to circular strategies» (2024: 29). In addition, besides economic circular activities, circular activities beyond the economic realm should be considered in policy-making, as they contribute to the reduction of waste and circularity. This concerns international negotiations for agreements, national and regional policies that have intended or unintended effects beyond their own region, as well as access to capital for L(M)ICs. To aim not only at job creation but for qualitative jobs, workers should decisively co-determine the transition to a Circular Economy, at the company level as well as on the political level, for example through social dialogues led by (international) trade unions (Pansera et al., 2024: 111).

Especially informal workers' interests and needs tend to be neglected in Circular Economy policy-making. Often, they are not considered as actors of the current circular system but as a phenomenon that needs to be avoided. Despite the hazardous and precarious conditions under which informal workers operate, their jobs should be considered and transformed into secure and safe ones instead of ignored. As outlined above under «Risk 3: Job inequality», approaches to informal work need to be highly context-specific, and the formalisation of work alone is not always the silver bullet. Policies and their enforcement that criminalise informal work is an approach that mostly eliminates peoples' livelihoods and even removes them from society, and therefore they are seldom adequate for a Just Transition. There are several examples of how the informal sector can be integrated into policies and programmes and how, thereby, the conditions of informal work can be improved: In Argentina, cooperatives of informal workers are officially recognised and included in public services. In South Africa, the informal sector is being included in national Extended Producer Responsibility schemes, and informal waste pickers integration guidelines are being established (Talbott et al., 2022: 27). Such context-specific approaches to informal work should be supported by European policy-makers rather than prevented by trade policies that do not provide for the potential inclusion of the informal sector (Weslynne et al., 2022: 1178–1179). To enable meaningful participation in (international) decision-making processes related to Circular Economy, bottom-up organisations, for example informal workers' organisations and repair associations in L(M)ICs, must be strengthened in their capacity to engage in policy-making.

For procedural justice, the knowledge on which fundamental decisions are taken needs to be critically reflected upon: In 2020, about 95 per cent of scholars doing research on Circular Economy were in so-called developed economies. Thus, the situation of L(M)ICs is underrepresented in existing research, meaning that political strategies cannot adequately address the potentials and risks of the transition for actors in L(M)ICs (Kirchherr, 2021).

Such considerations of procedural justice need to be taken into account in international, national as well as regional processes, but also with regards to access to finance.

- **International processes:** High-income and industrialised countries have far more possibilities to secure access to primary as well as secondary raw materials than L(M)ICs, for example through trade agreements and using their purchasing power. Combined with the material stock already present in their countries, they therefore have a far better starting position for the Circular Economy than L(M)ICs. When trade agreements are adapted to the Circular Economy, this power imbalance persists. This has the potential to foster global circular production networks that continue to externalise hazardous, environmentally unfriendly, low-wage processes to L(M)ICs (Barrie et al., 2022: 3). Besides bi- and multilateral cooperation and trade relations, more international agreements could emerge or be adopted with regards to the Circular Economy. For those processes, some learnings can be derived from the negotiation processes, such as the Global Plastics Treaty. The set-up and organisation of the negotiations were partly obstructive to the effective participation of civil society organisations and representatives of vulnerable groups such as informal workers. For example, shortly before a round of negotiations, the permitted size of delegate rounds was reduced to one person per organisation for NGOs, whereas large commercial enterprises were apparently not subject to any comparable restrictions. In general, there was a clear preponderance of lobbyists from the (fossil fuel) corporate lobby compared to the number of participants from academia and civil society (Caterbow, 2024: 21–22). Moreover, civil society actors and observers in general were excluded from parts of the negotiation meetings, which showcased a non-inclusive set-up of the process. Despite these hampering framework conditions, civil society organisations still managed to participate in a well-coordinated and impactful way, considering the circumstances. Thanks to this, the topic of Just Transition remained on the negotiation table. Among other things, the Global Alliance of Waste Pickers demonstrated how such participation in political decision-making processes can work (Talbott, 2022). Jointly with well-financed and renown institutions such as the Gesellschaft für Internationale Zusammenarbeit (GIZ), they organised effective side events and published straight-forward position papers on current points of negotiation. It remains to be seen to what extent the Just Transition will remain part of the treaty after the preliminary failure of the treaty in December 2024.
- **National and regional policies:** Including the perspectives of stakeholders from L(M)ICs in relevant national and regional policies of the EU, whose impacts go beyond Europe, is key for procedural justice. This is because the EU has significantly higher power to shape the transition to a Circular Economy, for example by setting ecodesign standards or export and import restrictions, due to its relatively high geopolitical and economic importance and significant financial means to support the transition, as compared to L(M)ICs. In addition, for procedural justice, it is crucial that Circular Economy policies are not merely used as an instrument to ensure privileged access to (secondary) raw materials. Then, the current disadvantages in global production networks of L(M)ICs would continue within a circular system (Barrie and Schröder, 2022: 449).

National and regional policies such as the ESPR, the Waste Shipment Regulation and the Directive on Waste from Electrical and Electronic Equipment of the EU have impacts on consumers, circular businesses and informal workers in L(M)ICs, as outlined throughout this paper. Expertise from these countries should be considered in policy-making to not only facilitate re-use and recycling processes within the EU, but also in the L(M)ICs to which UEEE from the EU is often exported (Schröder and Barrie, 2024: 29). Moreover, legislations setting rules for circular trade should be discussed with the various stakeholders from L(M)ICs, including representatives of informal actors, environmental organisations, SSMEs and enforcement bodies, and there should be room for manoeuvre for country- and context-specific approaches towards imports of UEEE and e-waste as well as informal work.

- Access to finance: The transition to a Circular Economy requires substantial investments, not only by governmental bodies, but also by private companies. L(M)ICs face a disadvantage compared to EU member states in this regard with respect to public-funding schemes as well as private capital. Thus far, most investments for the Circular Economy have been pursued in high-income and industrialised countries (Barrie et al., 2022: 3). A continuation of this trend would impede a Just Transition. Therefore, learnings from the global framework for investor action on the Just Transition from the climate change context should be derived and applied to the transition to a Circular Economy (Schröder, 2020: 24).

  Besides private and blended capital, Grant and Oteng-Ababio found that governmental funding schemes for the Circular Economy, including from European donors, tend to neglect the informal sector instead of integrating informal workers. In addition, they would rather focus on the processing of metal scrap, while circular activities in the realm of re-use or remanufacturing receive significantly less funding (2021: 70, 81, 84). Moreover, funding schemes from international donors are often conceptualised to fit global markets but they «fail to address local waste conditions and realities» (Oduro-Appiah et al., 2020: 118–119). Therefore, it is crucial to include inter alia informal workers' associations, local environmental organisations and, for example, associations for repair shops when designing funding schemes and programmes as well as creating decision-making bodies.

5. Outlook

The transition to a Circular Economy is an absolute necessity and a central building block to stay within planetary boundaries, for the fight against the climate crisis, for the preservation of biodiversity, and for the prevention of human rights violations and environmental harm through mining. If a globally Just Circular Economy could be sketched out on a blank sheet of paper, then regional cycles with few exports of used goods and a globally just distribution of resources could probably be outlined. However, the basis for the transition to a Circular Economy is not a blank sheet of paper, but must instead take place from within the current linear system and the few circular trade relations and production patterns that already exist. Therefore, for example, the following aspects must be taken into account for a global Just Transition:

- How the global division of labour will evolve and how workers whose jobs will significantly transform or even disappear can be included in the Circular Economy instead of being excluded by the transition.
- Which value-creating activities have been established on the current linear system and on the current deficient circular (trade) system in L(M)ICs, and how these activities can be improved, scaled up and integrated into the transition.
- How the current linear economic system has produced lock-ins of inequality and injustice that would be reproduced or even strengthened by the transition to a Circular Economy if not addressed, for example with regards to the current global distribution of resources, or decent working conditions in global production networks.
- Which environmental displacement effects are looming if the transition to a Circular Economy happens asymmetrical around the world, and how L(M)ICs can be supported to benefit from and design the transition to a Circular Economy.
- How also the most vulnerable stakeholders of the transition to a Circular Economy, including (informal) workers in circular supply chains, can be included in relevant political decision-making.

As stated throughout the paper, research and dialogue is needed to discuss political actions that are adequate for a global Just Transition to a Circular Economy. The following political recommendations could serve as the next steps to facilitate a Just Transition. Further measures need to be developed and discussed in an inclusive process.

Use inclusive international dialogue, conferences, agreements and resolutions to shape the transition

International initiatives towards a Circular Economy are necessary so that the global effects of and for local and regional transitions can be taken into account, ensuring a Just Transition of current global production networks. In this respect, the EU – jointly with partner countries, including L(M)ICs – strives to ensure that a Circular Economy and a respective Just Transition is put high on the agenda of UN Climate Change Conferences and of the UN Environmental Assembly. In this framework, inter alia the principles and recommendations of the UN Secretary-General's Panel on Critical Energy Transition Minerals should be translated into binding commitments.

For international negotiations on a Just Circular Economy, some learnings can be derived from the proposal for a resolution to promote the Circular Economy at the sixth UN Environmental Assembly in 2024, the Global Plastics Treaty process as well as the UN Climate Change Conferences:

- Distributional, Recognitional and Procedural Justice should be part of any international agreement or resolution. Thus, topics such as globally unequal access to raw materials (distributional justice), or the inclusion of informal workers in the transition (recognitional justice) need to be discussed. Moreover, the decision-making processes should be designed in a fair and transparent manner. To this end, it needs to be ensured that L(M)IC and civil society actors as well as representatives of affected stakeholders, such as informal workers and Indigenous peoples, have sufficient resources to 1) travel and participate, and 2) have sufficient capacities in order to effectively prepare and participate in the process. This needs to be considered inter alia in funding schemes for civil society actors – schemes that should also enable coordinative work to facilitate joint positions of NGOs as well as travel and international meetings to prepare for participation in international processes, especially for L(M)IC civil society actors. Besides funding from UN institutions, the EU and high-income countries should also contribute. Apart from this, NGOs shall have equal access to information on the processes (procedural justice).
- Initiatives for agreements or resolutions should not put the approach towards the Circular Economy of one region in focus, but instead consider the efforts of multiple countries and regions. Therefore, it is recommendable to start initiatives in partnership with several countries and/or regional bodies to develop the necessary persuasive power. In order to set the basis for agreements and resolutions that contribute to a Just Transition, partners from L(M)ICs should be part of the initiative.
- The negotiation processes should be designed inclusively. This means that civil society actors, representatives of affected stakeholders in L(M)ICs such as informal workers and organisations of Indigenous groups should explicitly be invited to the negotiations and be allowed to provide official submissions for the negotiations. The possibilities for participation need to be communicated well in

advance and should in no way be more restricted than those offered to companies. A balance of participants and observers from companies and civil society and academia should be aimed at, as well as a balance of organisations from the different world regions, as L(M)ICs are often underrepresented. Moreover, adequate speaking time should be given, and speakers should be an integral part of the inter-sessional work that takes place outside of the official negotiations. NGOs should furthermore be allowed to engage in public actions to raise awareness on the sidelines of the conference at the conference venue.

- Give major groups and other stakeholders (in which, among others, civil society and representatives of affected stakeholders can be organised) the possibility to speak in the negotiations in order to make their assessments heard for national negotiators. In addition, negotiators in negotiating groups should conduct bilaterals with observing NGOs and groups during the negotiations.
- Ministries of EU member states and the EU institutions should seek expertise from stakeholders from L(M)ICs, including the most vulnerable groups, such as from representatives of informal workers, when developing their positions for negotiations. Therefore, these perspectives also need to be integrated into (ad hoc) expert groups that accompany and support the building of positions.
- As many L(M)ICs often do not have large delegations at international negotiations due to financial constrains, there should not be too many different negotiations scheduled at the same time, thereby giving them the chance to participate in all streams of negotiations. Moreover, regarding accreditation to the conferences or dialogues, visas should automatically be issued, as problems with obtaining visas have repeatedly hindered L(M)IC actors from attending these processes.

Mainstream spill-over analysis of Circular Economy policies in the EU

Whenever the EU or its member states or any other country set up new Circular Economy policies, a spill-over analysis with regards to the positive and negative effects on L(M)ICs and for a Just Transition should be prepared in the process of policy-making. Based on the generated knowledge, the policies should be adapted to contribute towards a Just Transition. For the example of ecodesign, this means, among other aspects, that ecodesign requirements benefiting companies and informal workers in L(M)ICs where circular practices such as manual dismantling and remanufacturing is much more common than in the EU should be introduced. Moreover, the findings should be used to guide development cooperation and trade policies with L(M)ICs with regards to a Circular Economy. This means that conclusions should not only be drawn for Circular Economy-specific projects and sector programmes, but also for region- and country-specific programmes and cooperation projects. The respective programmes should be adapted and supplemented accordingly. This means, for instance, that support and subsidy programmes for the European industry should ideally be mirrored or opened up for development cooperation partner countries.

In addition, legal ways should be assessed in which L(M)ICs can effectively enforce standards and regulations, for example with respect to ecodesign, despite lacking market power.

Align development cooperation with a Just Transition to a Circular Economy

Development cooperation should be aligned to the aim of a Just Transition to a Circular Economy. Therefore, the Circular Economy-related portfolio in development cooperation should be expanded significantly and inter alia respond to the findings of a spill-over analysis of Circular Economy policies. In general, it should:

- strengthen circular potentials in L(M)ICs, if available on the basis of the circular strategies set by the L(M)ICs themselves. This may include supporting circular businesses that implement strategies such as repair, refurbishment, remanufacturing and repurposing. In addition, the establishment of high value-adding and environmentally friendly recycling processes in L(M)ICs should be strengthened in order to set up recycling processes – from the collection, sorting and dismantling of metals to melting and refining. This should be geared at enabling participation in the global market as well as at serving the local market. To this end, also circular infrastructure (e.g. collection systems of UEEE) should be supported. With such a support structure for collection and high-quality recycling in L(M)ICs, it can also be ensured that UEEE exported from the EU is not landfilled after the usage phases in L(M)ICs;
- ensure that development cooperation addresses the unequal starting conditions in developing circular innovations and technologies, and therefore, for example, supports capacity-building and research and development activities in L(M)ICs;
- support vulnerable stakeholders at risk of being sidelined or negatively affected by the policies and help them become part of the Circular Economy. This means, for example, strengthening bottom-up organisations for informal workers or repairers and refurbishers through capacity-building for effective participation in political decision-making; by integrating the informal sector into municipal collection systems or Extended Producer Responsibility schemes; and by partnering with these organisations when setting up development cooperation projects. In addition, programmes should be supported that improve working and living conditions and trainings to enable (formal) participation in the Circular Economy;
- support enforcement capacity of import restrictions in L(M)ICs as a basis to allow for selected trade for circularity, thereby preventing waste dumping in third countries but enabling circular value creation based on the importing of high-quality UEEE and processable scraps;
- establish context-specific job trainings and qualification programmes for circularity, especially addressing those (informal) workers who risk otherwise being thwarted instead of empowered in the circular transition.

Introduce compensation schemes to ensure long-term financing of circular infrastructure in the L(M)ICs to which UEEE and e-waste are exported

Governmental institutions with relatively substantial demand-side market power on the world market have significantly better prerequisites for imposing requirements on manufacturers. In addition, the first usage phase of electronic and electric equipment often happens in high-income countries before UEEE is re-used in L(M)ICs or directly recycled or landfilled. Some EU member states have established Extended Producer Responsibility schemes that oblige producers to co-finance, for example, repair incentives or the recycling infrastructure. However, these systems do not yet reflect the actual flows of products and materials, as they do not cross-finance the circular management of products after they are exported to L(M)ICs. Therefore, charges levied in the context of Extended Producer Responsibility schemes in the EU should also be directed to L(M)ICs so that circular practices can be established and maintained there. Thus, producers pay a fee for the electronic and electric products that they place on the EU market. These fees should be used to cross-finance the circularity of these products within the EU (e.g. through repair vouchers) but also in those L(M)ICs where lots of UEEE and e-waste is de facto exported. For example, these fees should support the set-up of high-quality recycling capacity or programmes to assist informal workers and repairers (Apoorva and Arpit, 2023). In order to pilot this approach, lessons can be derived from projects such as «Closing the Loop», and similar pilot projects can be set up as a basis to establish a global Extended Producer Responsibility scheme in the medium term (Footprints Africa and CTL Foundation, 2024).

Fund research to better understand the dimensions of a global Just Transition to a Circular Economy and include researchers in L(M)ICs

A Just Transition to a Circular Economy has so far not been well researched. However, extended knowledge from research is needed to enable adequate political decision-making and inform the programmes and processes that shall contribute to a Just Transition. Examples of questions for which more research is needed are:

- What synergies and contradictions arise from the different strategies and policies on the Circular Economy worldwide?
- How will international material flows shift in the context of the Circular Economy?
- In the context of the Circular Economy, where in the world and which kinds of jobs could be created or endangered, and in how far might job-creation in one region lead to a loss of jobs in other regions?
- Which economic, social and environmental risks arise in the transition to the Circular Economy and how can they be avoided? Which lock-ins does the linear economic model provide with respect to the working conditions, living standards, environmental pollution and global economic development aspects that need to be actively addressed in order to not be reproduced in a Circular Economy?

- How does the international legal framework (especially trade regulations) correspond to a Circular Economy, and which adaptations are needed? What leeway and potentials do states and regional bodies have to design trade agreements that align with the Circular Economy as well as common rules for the Circular Economy (such as ecodesign requirements)?
- How is the waste hierarchy currently being implemented globally in specific sectors?

In general, to build up a better knowledge basis for a Just Transition to a Circular Economy, research should not only be carried out on L(M)ICs but also be more localised – thus, researchers in L(M)ICs should be supported in this regard.

Adapt international raw materials diplomacy and trade policies to circularity

The raw materials diplomacy of the EU and its member states so far focusses on ensuring (privileged) access to primary raw materials, for example through raw materials strategic partnerships or respective provisions in trade agreements. Apart from important criticism of this approach – among other things due to the inadequate protection of human rights and the environment and questionable benefits for the mining countries (see e.g. Lobacheva and Sedovy, 2024; Peñuela and Bernal, 2024: 2) – it is striking in comparison that diplomatic and trade efforts in favour of the Circular Economy are still rare. Circularity partnerships could contribute to the implementation of the waste hierarchy on a global scale if they aim to ensure that non-processable waste is no longer exported, while UEEE and waste for which demand and capacity to process it is available in L(M)ICs can be traded. In the framework of circular partnerships, the development of the local Circular Economy and circular business models in L(M)ICs should be supported, and knowledge and technology transfer should be agreed on (Bits & Bäume, 2025, forthcoming). The benefits for L(M)ICs, the adherence to human rights and the protection of the environment should be binding and much more in focus of these circularity partnerships than practised before by the counterparts of the linear raw material strategic partnerships. In addition, trade agreements, if negotiated, should be adapted to enable circular trade and should expand the leeway for governments of L(M)ICs to develop a Circular Economy that benefits their people in their country. This inter alia means allowing governments of L(M)ICs to levy duties to allow for the development of a local circular industry (Bits & Bäume, 2025, forthcoming).

Work towards reducing raw materials demand to a consumption level within planetary boundaries

Distributive justice is an important pillar to enable a Just Transition to a Circular Economy. This refers, for example, to the current unequal global distribution of resources, which provides a significant advantage to industrialised countries possessing a large urban mine that can be used for circularity. Therefore, high-income countries should

implement effective measures to reduce their demand for raw materials to an extent that their raw materials consumption is reproducible on a global scale. To this end, they should introduce binding raw materials protection targets that should be fulfilled with the help of a holistic Circular Economy, the exploitation of substitution options of critical raw materials and sector-specific strategies for less resource consumption. Through a sector-specific approach, it can be ensured that key endeavours in the fight against climate change such as the energy transition are enabled.

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Reflections for a Just Transition

A circular economy could help prevent the severe impacts of our resource consumption and can be a solution to the massive dependence on raw materials from other countries. The EU has proposed several circular economy measures since the launch of its Circular Economy Action Plan in 2015, including a Sustainable Products Initiative, addressing the product design, and a «Right to Repair».

With this study, we would like to take a closer look at the various facets of a circular economy and to raise awareness of potential pitfalls in terms of equity and increasing inequalities, identify different solutions and initiate a debate on how we can collectively create a fair and effective global circular economy.

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Heinrich-Böll-Stiftung Schumannstraße 8, 10117 Berlin
The Green Political Foundation 030 285340 info@boell.de www.boell.de