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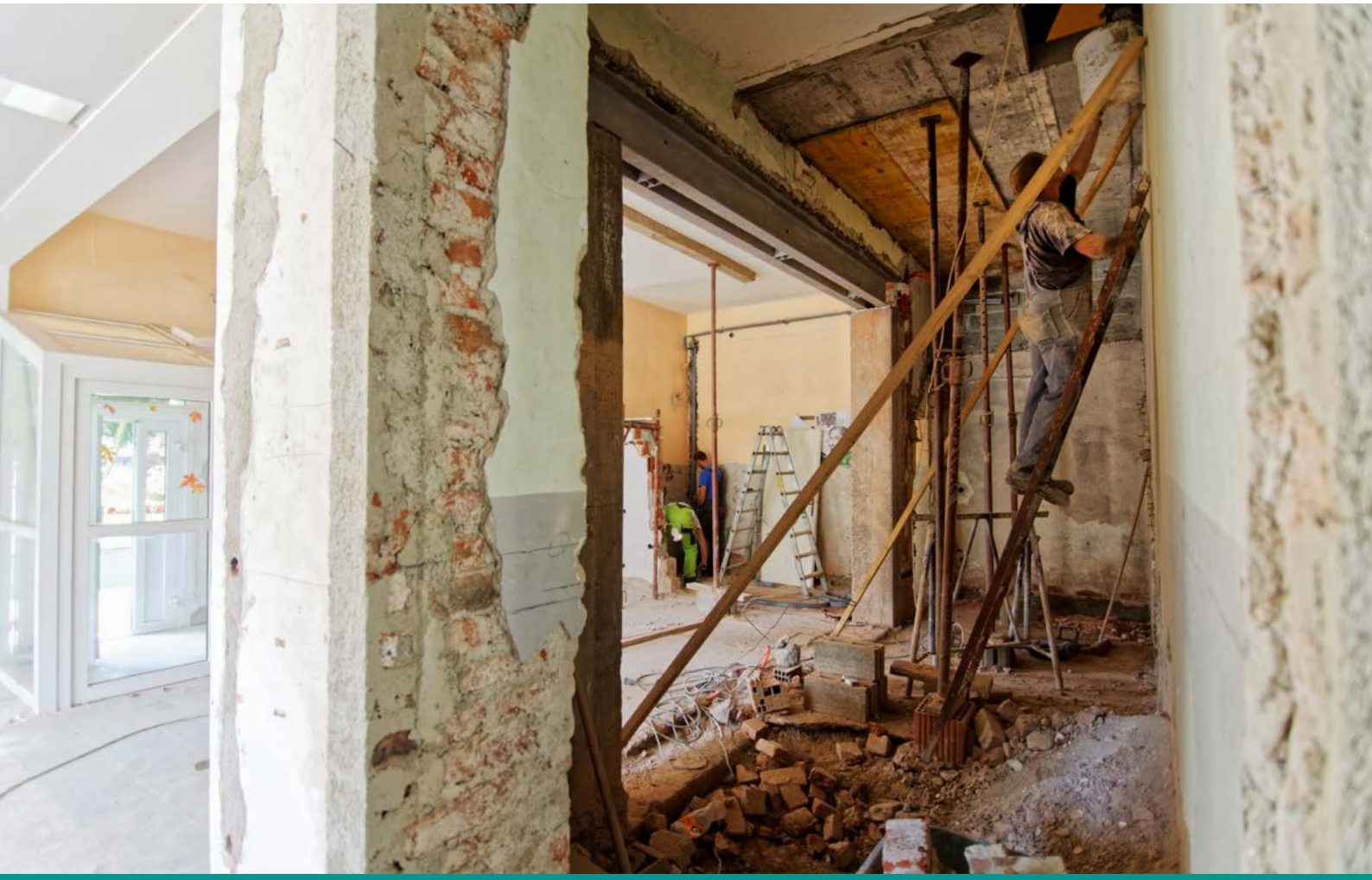

CIRCULAR RESOURCE MANAGEMENT FOR LOW EMISSION DEVELOPMENT IN CITIES

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KEY MESSAGES

Resource efficient cities could see cuts of 36-54 percent in greenhouse gas (GHG) emissions (International Resource Panel, 2018). Therefore, extending mitigation opportunities beyond geographic borders and across value chains are necessary to address GHG emissions systemically.

Circular development offers a framework and tools to leverage low emission development through multiple avenues, from **reducing energy needs, protecting carbon sinks and addressing non-energy emissions** (e.g. by minimizing waste generation or greening the value chain).

Circular resource management is also an opportunity to reconnect people with resources at the local level by changing how resources are allocated and accessed, creating green jobs and supporting community-based initiatives.

A politics of experimentation and "learning by doing" can generate innovative collaboration across all city stakeholders, from policymakers, academia, community organizations, urban experts, and the business community, to effectively rethink the relationship between urban systems and natural resources and how this drives climate change.

BACKGROUND INFORMATION

About half of the total GHG emissions are caused by resource extraction and processing (IRP, 2019). Further down the value chains, current consumption and production models trigger additional emissions through manufacturing, distribution, usage, and disposal. **Every product and infrastructure has instigated significant GHG emissions over its lifecycle, from the extraction of raw materials to disposal as waste**. Despite the significant carbon impacts triggered by their management, only 9% of the 92.8 billion tons of minerals, fossil fuels, metals, and biomass that enter the economy are re-used annually (Circle Economy, 2019).

The linear economic model of "Extract. Refine. Sell. Consume. Discard" is exacerbating climate change in systemic ways; yet **these emissions remain often unaddressed and the mitigation impact of a circular economy is only marginally considered**. This is because much of the current mitigation efforts focus on energy emissions or energy efficiency measures.

Circular development is an effective approach to operationalize mitigation because it **takes into account the full life cycle of materials and products as well as of infrastructures**. Thereby, it offers an opportunity to rethink how resources are managed to avoid the generation of waste and reduce demand for new resources. Where applicable, circular development is operationalized through the following hierarchy: **Reduce, Reuse, Recycle and Recover**.

Cities are key drivers of circular development. They are responsible for 75 percent of resource consumption worldwide and influence supply chains directly through their role as procurers and planners of how resource flows interact at the local level. Therefore, **cities play a key role in driving the transition towards more circular models to reduce emissions throughout supply chains**. It is estimated that resource efficient cities could see cuts of 36-54 percent in GHG emissions (IRP, 2018), making circularity a pivotal tool for low-emission development at the local level.

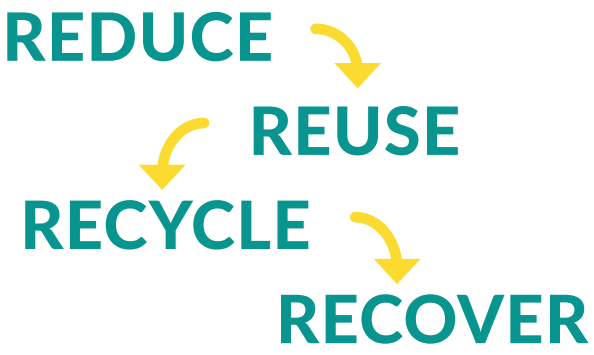
PROBLEM DEFINITION

Despite its high potential to address climate challenges, **circular development is often narrowed down to end-of-life solutions** such as conventional waste management and waste-to-resources initiatives. While these approaches are needed to address the direct effects of waste production and related sanitation challenges, they fail to address the overall lifecycle carbon impacts of current consumption and production patterns. **When materials are wasted, all the energy and resources that went into producing them and getting them to the end-consumer are also wasted**.

A **focus on a circular design of products** and infrastructure projects is therefore needed to ensure that waste can be phased out as early in the supply chain as possible and synergies can be found across different usages. This requires local governments to move away from siloed planning and management. **The integration of circular development across different disciplines and levels of governments is key to ambitious climate action**.

KEY FINDINGS

Circular management of resources implies looking at urban systems both in terms of stocks (e.g. buildings and infrastructures, green space) and flows that service the city (e.g. food, water, waste). The local governments interventions outlined below aim at increasing the productivity of resources (e.g. by extending an infrastructure's lifespan) and finding synergies between systems that were previously separated (e.g. wastewater as a source of energy).



CARBON SINK: By allowing nutrients to be cycled back to the soils and helping regenerate ecosystems that have been deteriorated by waste and pollution, circular development protects the ability of certain ecosystems, like oceans, forests and soils, to act as carbon sinks.

AVOIDED EMISSIONS: When secondary production (based on recycled materials) replaces primary production (based on raw materials), production and extraction needs decrease, thereby avoiding GHG emissions. This is also the case when strategies in the design phase expand a product or infrastructure's lifespan.

NEW LOW-CARBON ENERGY SOURCES: Energy recovery from wastewater and biomass is a low-carbon way to produce energy at the local level.

Circular Development Tools

Waste

- Pre-consumer waste prevention programs
- Sharing schemes, repair and reuse centres, leasing platforms
- Material recovery facilities

Wastewater

- Decoupling sewage from rainwater
- Green infrastructures to filter grey waters for local use
- Sludge-to-energy systems

Chemicals

- Agroecological production methods to minimize inputs of chemical fertilizers
- Recovery of chemical compounds from wastewater (e.g. phosphate)
- Chemical leasing schemes

Construction materials

- Alternative use of existing abandoned buildings
- Design for disassembly deconstruction and material mining
- Exchange platform for reused or recycled building materials

Food

- Engage food producers to reduce losses along supply chains
- Food sharing platforms
- Community composting facility

E-waste

- Support repair and refurbishment initiatives
- A take-back obligation for producers
- Material recovery facility for metal mining

Although the mitigation impacts of circular development are not widely known and considered, the circular and low-carbon agendas are complementary, cost-beneficial, and should be mutually supportive.

Climate benefits are greater when circular strategies minimize the additional material inputs needed to put discarded materials back into productive use. Reducing and reusing, therefore, have greater climate benefits than recycling and energy recovery.

Waste-to-energy (WtE) technologies should only be implemented after a systemic application of the waste management hierarchy. Effective controls of WtE pollution levels should be conducted as harmful pollutants (dioxins, furans, mercury lead and cadmium) may be emitted into the air, land, and water which may influence human health and the environment.

The scale at which materials are cycled back into the system is also important. If the emissions linked to the transport of materials are greater than the emissions avoided through the recycling or recovery of these materials, circular development projects won't yield climate benefits.

Local governments need to pursue possible synergies between sectors, jurisdictions, and technical domains so as to increase institutional performance, optimize resource management, and services quality. The Urban Nexus approach offers a methodology for local governments to put cross-silo governance into practice (ESCAP, GIZ, ICLEI. 2019).

POLICY RECOMMENDATIONS

Local governments can effectively redesign the relationship between urban systems, natural resources, and low emission urban development through policy mixes combining regulatory, economic, governance and communication elements, such as the ones outlined below. These interventions can be included in a city's targets and local climate actions plans and reflected into the national climate targets.

1. Improved monitoring of resource utilization

A monitoring systems accounting for material flows and related GHG emissions is a key step to rethink the resource balance sheet in cities and its climate mitigation potential. Tools such as urban metabolism assessments can be used to inform planning, investments, and policies and design effective Material Flow Management systems. Consumption-based carbon accounting is also a useful tool for tracking mitigation progress from a lifecycle perspective. Where granular data isn't available, bottom-up data collection workshop with key stakeholders may be organized to get a better understanding of the materials consumed and discarded locally.

Policy example: Brussels Urban metabolism studies for circular construction (Europe)

2. Regulatory instruments for circularity

Municipal-level specific targets, for instance on renewable resource use, material efficiency, secondary material use, land-based marine pollution, source separation and composting of organic waste or high-value recycling, are necessary to guide and inform policy development and corporate strategies with regards to circular development.

Policy example: Mumbai Plastic Ban (Asia)

3. City-business collaboration for innovation

Implementing circularity requires businesses to fundamentally change their product design, production processes and marketing activities. Early-market engagement activities, creating exchange platforms for materials or designing incentives for the market uptake of low emission products and infrastructures are some of the many ways local governments can support businesses in delivering innovative circular solutions that address GHG emissions from a lifecycle perspective.

Policy example: Baltimore Deconstruction program (North America)

4. Circular public procurement

Demand pull is a success factor in the uptake of circular initiatives. Through their procurement power, cities can influence this shift. Circular principles can be embedded in public procurement through initiatives such as local sourcing, encouraging low energy footprints and using life cycle costing as a guiding principle in tenders. These incentives would allow circular companies to compete more fairly in markets dominated by a linear management of resources.

Policy example: Seoul's Resource Recirculating & Recycling Project (Asia)

Policy example: Pasig "patronize" of waste-to-resources products by the women of KILUS foundation (Asia)

5. Community engagement

Circular projects must be designed so that they create tangible benefits for the local population, especially vulnerable groups. In developing economies, the well-being and empowerment of informal workers is vital for the sustainability of local circular projects. Supporting the creation of social enterprises that link materials reuse with societal benefits such as employment are also critical components of equitable circular projects.

Policy example: Belo Horizonte's inclusion of waste pickers (South America)

CONCLUSIONS

Circular development has the potential to close approximately half of the emission gap between current policies and the global 1.5 degree climate target (Ecofys, 2015). Circular development should become a central policy concern for cities as they are the global hubs of resource consumption and waste generation. This transition is all the more urgent given the projected 125% increase in cities' consumption of natural resources by 2050 under a business as usual scenario (IRP, 2018).

Translating circular development into actionable, ambitious climate policies and strategies requires collaboration across all levels of government. National and regional governments must support city-level innovation for circularity and give them the space to experiment with new approaches. Similarly, market-based mechanisms and taxes set at the national level can contribute significantly to providing incentives that support circular development and climate action.

As such, circular development offers a framework for local and national governments to meet their pledged climate targets while designing inclusive low emission urban economies.

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The purpose of the policy brief series under the IKI Ambitious City Promises project is to support more informed evidence-based decision-making on the priority areas within the project cities or their respective national governments. It is targeted at the policy-makers and the government officials who are involved in developing and/or executing the climate action plan.

The Ambitious City Promises project supports 9 city local governments in Indonesia, the Philippines, and Vietnam in developing and implementing low emission development strategies. Through the project, local governments in South-east Asia adapt this model of inclusive, ambitious climate action, mainstreaming low emission development strategies and creating new climate leaders. The project is implemented by ICLEI – Local Governments for Sustainability and funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) through the International Climate Initiative (IKI).