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Business

Business-led collaboration & disruptive innovation are key to building a circular economy

CE100

Learning

The transition to a circular economy requires us to transform the way we create products, services, and systems, and is dependent on how we learn

dif

Systemic Initiatives

Transforming key material flows to scale the circular economy globally

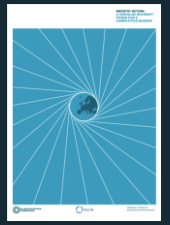
NEW PLASTICS ECONOMY

MAKE FASHION CIRCULAR

CITIES AND CIRCULAR ECONOMY FOR FOOD

Institutions, Governments & Cities

Create the enabling conditions for a circular economy, set direction, and drive innovation and investment.

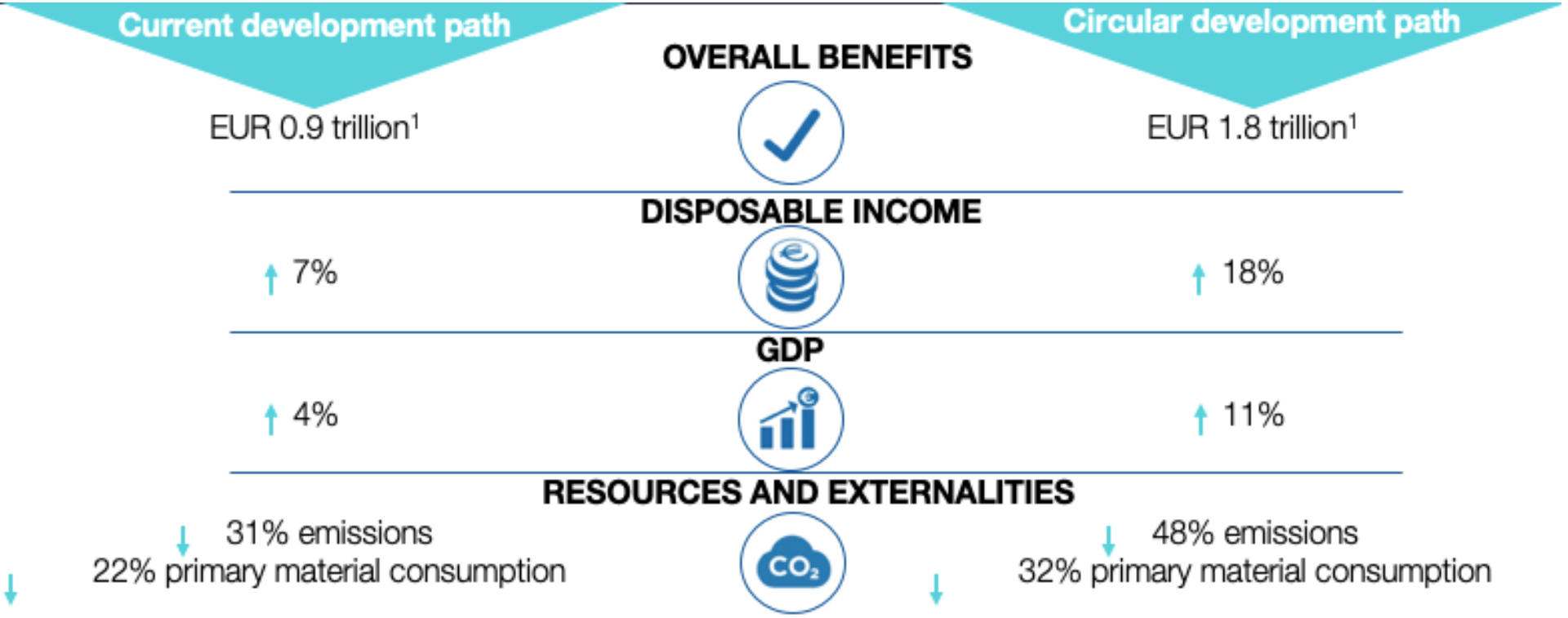


Insight & Analysis

We provide robust evidence on the benefits of a circular economy, showcasing the implementation of circular economy principles

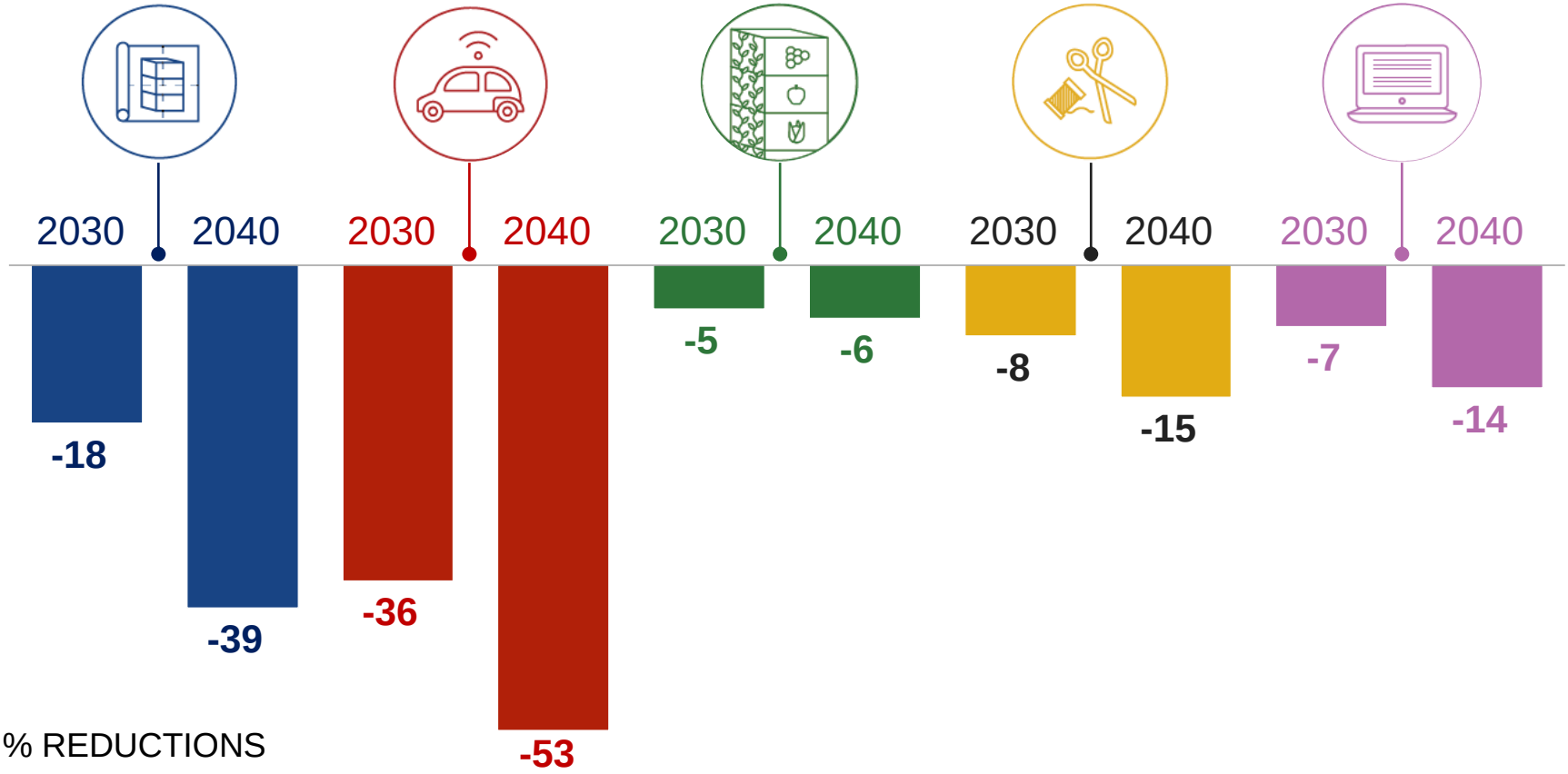
A CIRCULAR ECONOMY DEVELOPMENT PATH

€1.8tn total annual benefits expected by 2030 in mobility, food & built environment on a circular development path



A CIRCULAR ECONOMY DEVELOPMENT PATH

AGGREGATED COST REDUCTION FOR BUSINESSES AND HOUSEHOLDS IN 5 FOCUS AREAS:
32 TRILLION CNY BY 2030, AND 70 TRILLION CNY BY 2040



% REDUCTIONS

CITIES

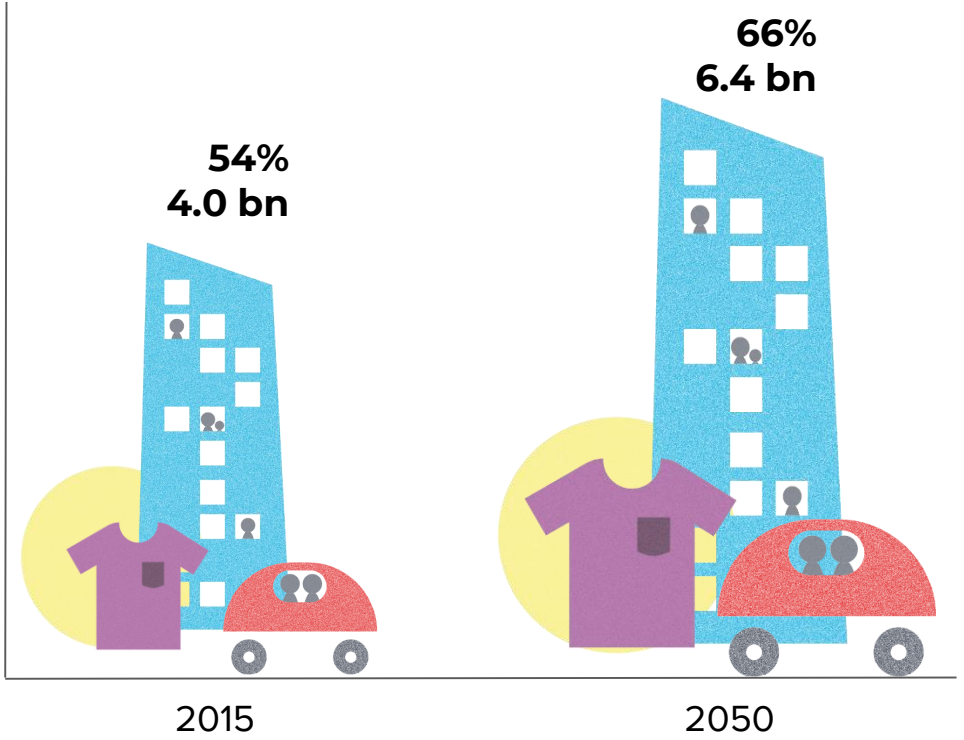
...account for

85% of global GDP generation

75% of global resource consumption

60-80% of global GHG emissions

50% of global solid waste production



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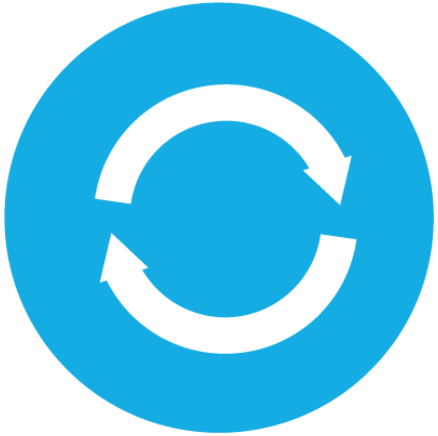
Module: Factsheets

https://www.urbanet.info/world-urban-population/

THREE PRINCIPLES

What if we **designed out waste and pollution** from cities?



What if we **keep products and materials in use and maintain value**?

What if we **regenerate natural systems** in and around cities ?

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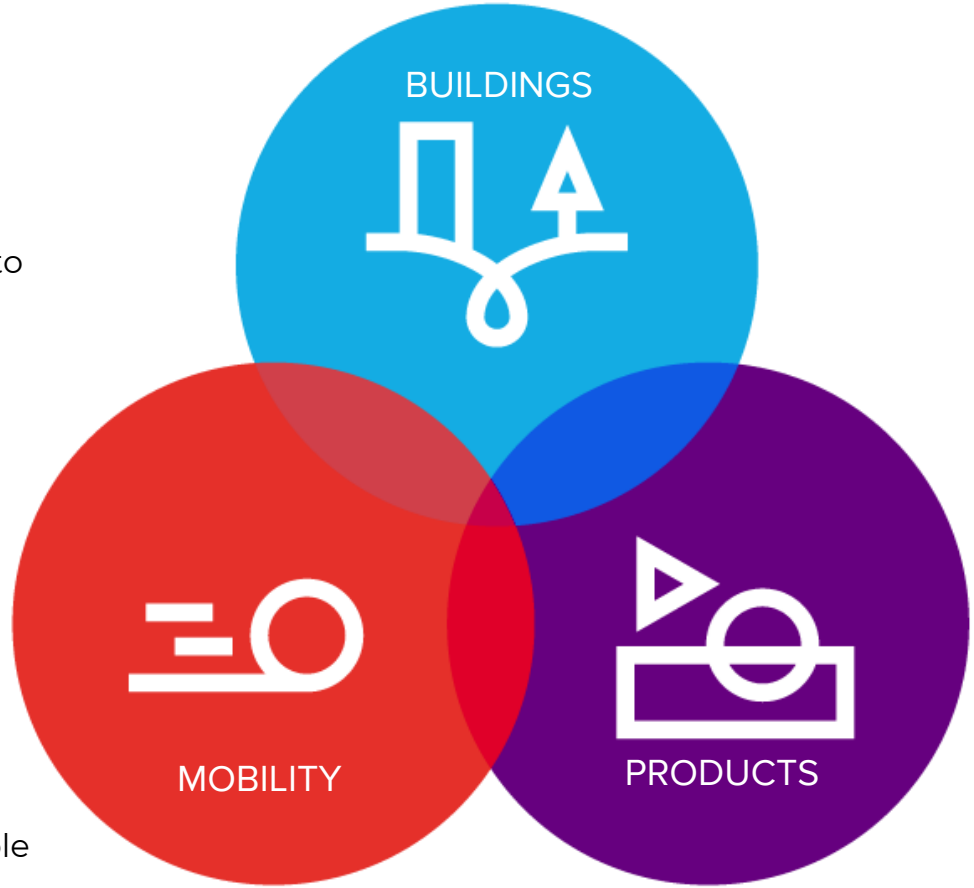
CASE FOR CHANGE IN THREE SYSTEMS

By 2025 1bn new homes are needed worldwide, costing $650bn pa and 1/3 struggle to find affordable housing and 60% of office space is not in use during working hours

Congestion costs 2-5% of global GDP annually in lost time, wasted fuel, and increased cost of doing business. Yet only 1 in 5 car seats are in use on average and parking takes up valuable land



Up to 20% of municipal budgets are spent on waste management

75% of municipal solid waste can be discarded consumer goods, of which 80% is burned, landfilled or dumped due to poor design or lack of options

Factsheet module

LINKING BENEFITS TO URBAN PRIORITIES

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Key city priorities

Themes across all plans:

- Affordable housing
- Efficient and accessible transport
- Economic growth, increased prosperity
- Jobs, good jobs, skills
- Good, healthy living conditions
- Strong community

Operationally:

- Sound city budgets

Many plans also highlighted:

- Resilience to shock (weather, economic)
- Climate adaptation and reduced emissions
- Food security
- Increase density / counter urban-sprawl
- Green space, walkability
- Regional collaboration
- Being an international hub for a given area
- Education
- Equity
- Public safety

Other insights

Growth:

- Growth discussions are nuancing
- Traditional economic growth
- Good growth
- Better growth
- Positive growth
- ...
- Regenerative growth

BROAD RANGE OF BENEFITS

Health & Environment

Economic productivity

Jobs, skills & innovation

Community & social prosperity

Resource use

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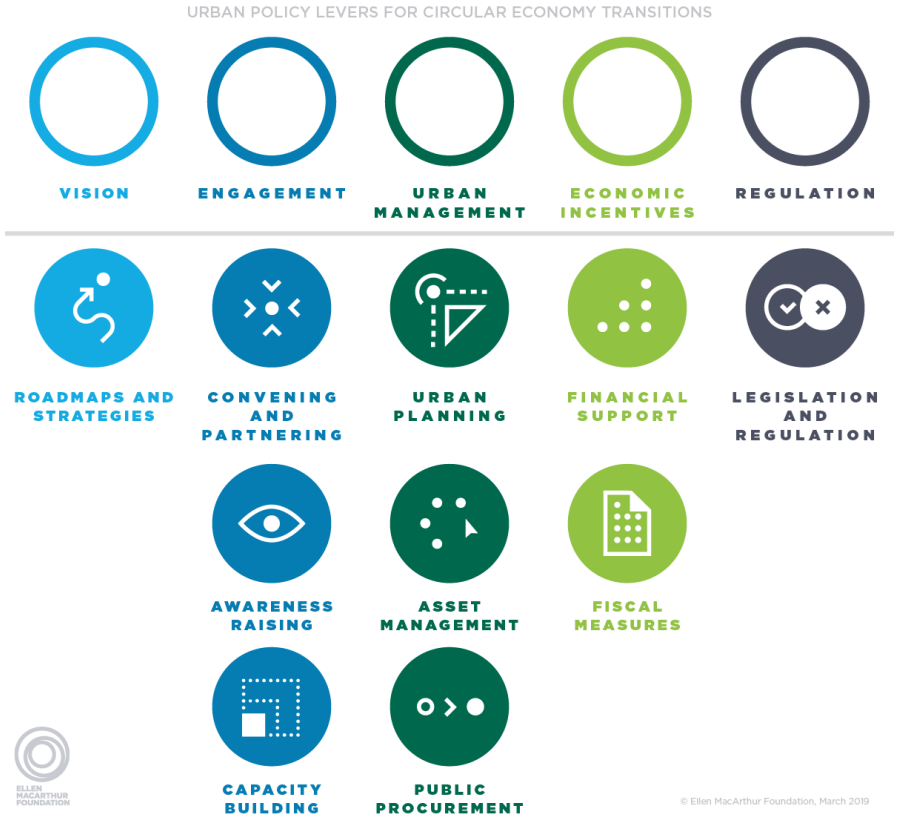
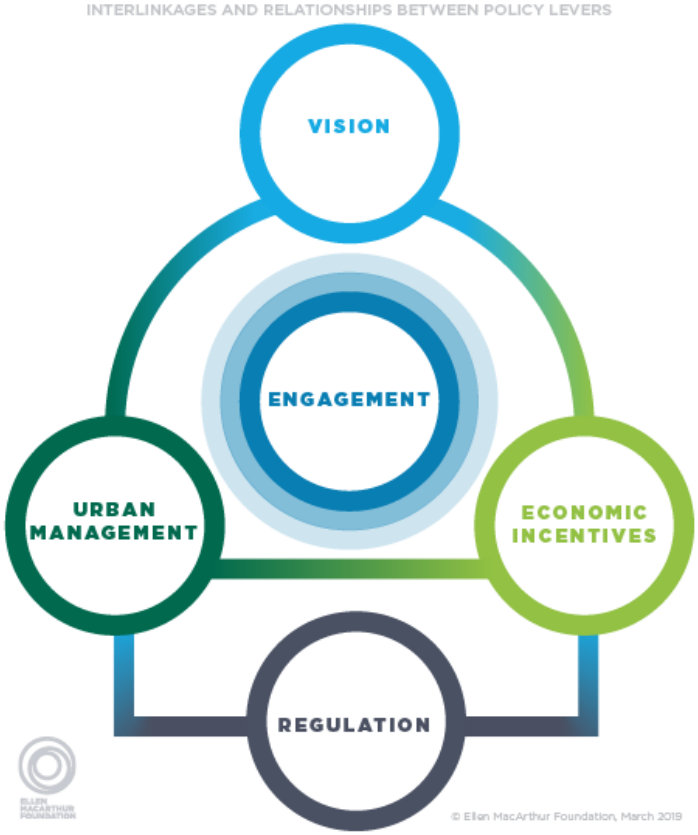
Module: Factsheets

ROLE OF URBAN POLICYMAKERS





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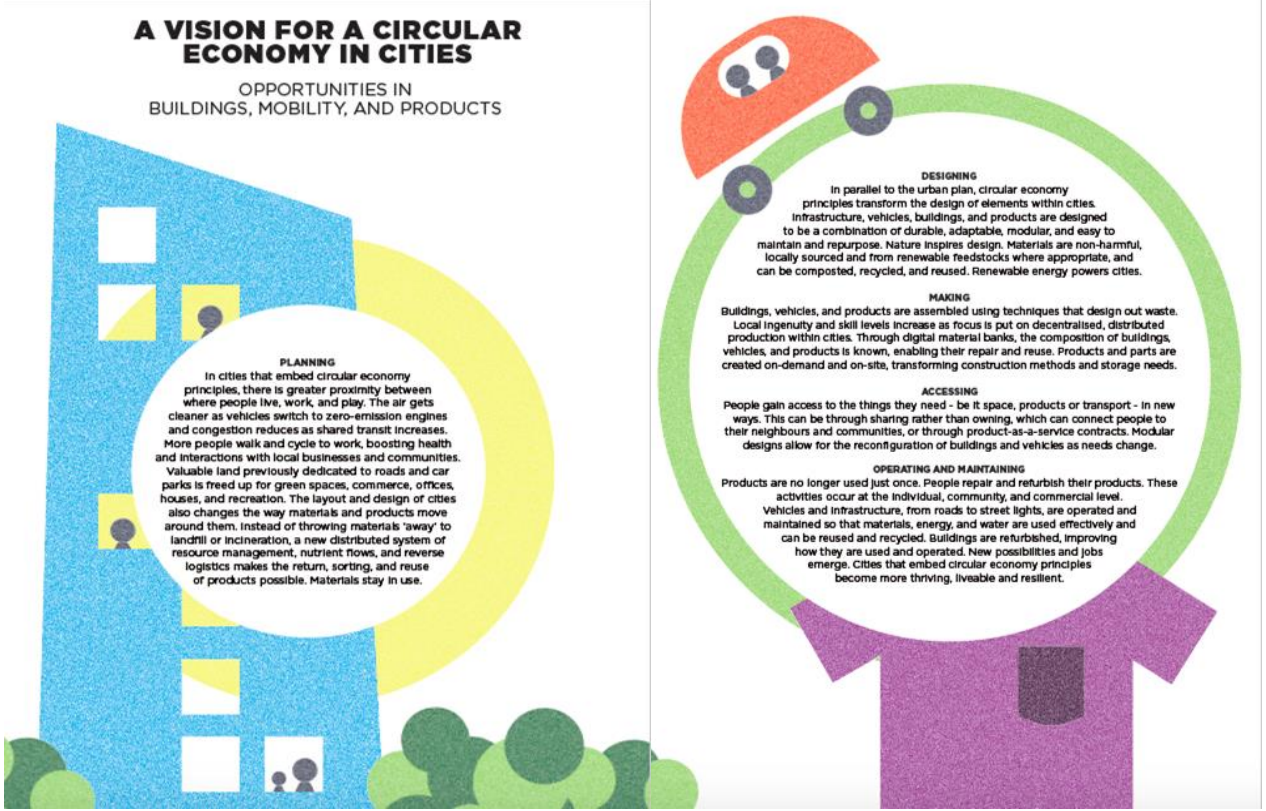
[Module: Policy levers]



CITIES

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Planning

designing

Making

accessing

Operating & maintaining

11 CASE STUDIES

CITIES

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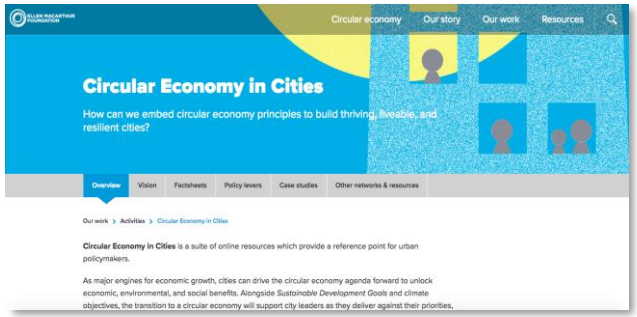
A SUITE OF ONLINE RESOURCES



Knowledge Partner

ARUP

Philanthropic Partner

MAVA
FONDATION POUR LA NATURE

Networks and resources

ACR+ | C40 Cities | Circle Economy | Circular Economy Club (CEC) | Eurocities | European Investment Bank (EIB) | Fab City Global Initiative | ICLEI – Local Governments for Sustainability | International Resource Panel | Organisation for Economic Co-operation and Development | United Nations Environment Programme | EU Urban Agenda Partnership on Circular Economy

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www.ellenmacarthurfoundation.org/our-work/activities/circular-economy-in-cities

CITIES

PHASE	EXAMPLES OF BENEFITS	
PLANNING	**Strengthening local communities** Mixed-use neighbourhoods that encourage walking are most likely to be associated with positive social encounters and a strong sense of community. Surveys show that people in high-density, walkable communities are more likely to trust or socialise with their neighbours, volunteer or vote.[14]	ECONOMIC PRODUCTIVITY
DESIGNING	**Reducing air pollution** Green façades can lead to a reduction in concentrations of particulate matter by 10–20% in the immediate surroundings.[15]	COMMUNITY AND SOCIAL PROSPERITY
MAKING	**Lowering unemployment** Integration of circular economy principles in the construction supply chain of 70,000 new homes in Amsterdam before 2040 can generate 700 additional jobs. The approximately 1% gain would be a significant contribution, resulting in a 10% drop in unemployment in the construction sector.[16]	HEALTH AND ENVIRONMENT
ACCESSING	**Increasing utilisation** In London, peer-to-peer renting, better urban planning, office sharing, repurposed buildings, and multi-purposed buildings increases the value of new buildings and can double utilisation of 20% of London's buildings by 2036, saving over GBP 600 million annually.[17]	RESOURCE USE
OPERATING AND MAINTAINING	**Reducing energy consumption through refurbishment** Through simple refurbishment solutions, it is possible to reduce energy consumption by 20–30% in existing buildings.[18] Deep refurbishment can cut building-related energy consumption in Europe up to 80%, saving the EU over 30% of its total energy use (equivalent of 4 billion barrels annually).[19]	JOBS, SKILLS, AND INNOVATION

CITIES

PHASE	EXAMPLES OF BENEFITS	
PLANNING	**Reducing crime**: In Kansas City, crime in Kessler Park dropped by 74% the year that 2.6 miles around it were turned car-free on weekends.[9]	COMMUNITY AND SOCIAL PROSPERITY
DESIGNING	**Reducing the total urban car fleet:** A study suggests that the introduction of shared autonomous vehicles (AV) integrated with mass-transit could meet urban mobility needs while removing 9 out of 10 cars in European cities and freeing up a significant amount of parking space for alternative land use.[10]	RESOURCE USE
MAKING	**Increasing skilled labour requirements:** Remanufacturing of vehicle parts can increase skilled labour requirements by up to 120%.[11]	JOBS, SKILLS, AND INNOVATION
ACCESSING	**Gaining time and saving costs:** In the US, employers can save over USD 11,000 per half-time telecommuter per year while half-time telecommuters gain back 11 days a year – time they would have otherwise spent commuting.[12]	ECONOMIC PRODUCTIVITY
OPERATING AND MAINTAINING	**Reducing light energy CO^2 emissions:** Replacing outdoor lighting in the US with LED lighting can reduce the impact of carbon emissions by the equivalent to taking 8.5 million cars off the roads for a year.[13]	HEALTH AND ENVIRONMENT

CITIES

PHASE	EXAMPLES OF BENEFITS	
PLANNING	**Reducing material costs:** Circular opportunities for fast-moving consumer goods could be as much as USD 700 billion per annum in material savings.	ECONOMIC PRODUCTIVITY
DESIGNING	**Saving households money:** In Europe, ecodesign and energy labelling is estimated to result in important economic savings for end-users. For example, around EUR 100 billion per year in 2020 through lower utility bills, which is equivalent to annual household savings of up to EUR 500.[9]	COMMUNITY AND SOCIAL PROSPERITY
MAKING	**Reducing CO2 emissions in the textiles industry:** For the Chinese textiles industry, automation and 3D printing, water and energy-efficiency practices and textile recycling would reduce CO2 emissions in Chinese cities by 200 million tonnes by 2040 compared with the current development path.[10]	HEALTH AND ENVIRONMENT
ACCESSING	**Reducing need for new products by renting clothing:** Per renter per year, online rental of clothes can result in 14 fewer garments being produced and disposed of, equivalent to net water savings of 37 m3 and net material savings of USD 38 per person.[11]	RESOURCE USE
OPERATING AND MAINTAINING	**Creating jobs in electronics refurbishment:** Refurbishing 1,000 tonnes of electronics creates 13 times more jobs than recycling the same amount.[12]	JOBS, SKILLS AND INNOVATION

BUILDINGS, MOBILITY, PRODUCTS

PRODUCTS

PLANNING

Household goods tend to end up in municipal waste streams, where their value is lost and where they create a strain on public budgets. To address this at city level, both upstream and downstream policy measures are needed. To ensure effective resource consumption and the elimination of waste in cities, local material loops and flows must be created through two interrelated city-scale measures that address the entire product life cycle:

1. **Upstream:** Enabling and incentivising better production through business support and advisory services that focus on design and business development.
2. **Downstream:** Providing resource management infrastructure that facilitates services such as collection, sorting, reuse, and recycling.

CASE FOR CHANGE

20%

75% of municipal solid waste is incinerated or landfilled, of which **22%** is burned, landfilled or dumped due to poor sorting or lack of end-of-life collection options[1]

Solid waste management alone leads to **5%** of global CO_2 emissions[2]

Up to **20%** of municipal budgets are spent on waste management[3]

32% of plastic packaging litter leaks into natural systems because waste collection systems.[4]

One garbage truck of textiles is landfilled or incinerated every second,[5] representing a lost opportunity of more than **USD 100 billion** annually.[6]

E-waste, worth **USD 107 billion**, is generated each year, of which only **22%** is collected and recycled under appropriate conditions[7]

"The aspiration to replace one-way products with circular ones is driven by the desire to create logistics networks and other systems to support the circular economy. It is a powerful spur to new ideas. The benefits of a more innovative economy include higher rates of technological development, improved materials, labour, and energy efficiency and more profit opportunities for companies."

Ellen MacArthur Foundation, 'Towards the circular economy: opportunities for the consumer goods sector' (2013)

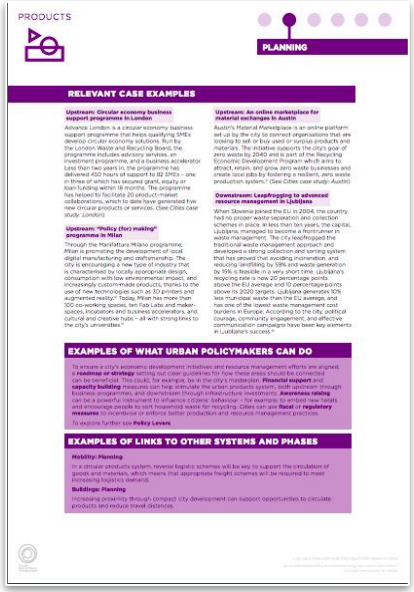
EXAMPLES OF CIRCULAR ECONOMY OPPORTUNITIES

Supporting and incentivising better production (upstream)

Product design decisions and new business models are key to eliminating waste and the unsleeve of products. For example, the way a product is designed might make it easier to repair – keeping it in use and out of landfill. A city's policies and activities related to business support and economic development can be used to incentivise these methods. Support for skills and training can also help ensure that digital manufacturing, remanufacturing, and repair expertise exists.[8]

Providing resource management infrastructure (downstream)

While appropriate product design is key to enabling local material loops, there is also a need for the right resource management infrastructure to be put in place. This includes standardised collection and sorting schemes, reverse logistics services, as well as local sorting and processing facilities that can recover and redistribute materials and products for further use. Sorting infrastructure can be supported by innovations in robotics and artificial intelligence that can increase rates of recovery and purity of secondary materials.[9]



PRODUCTS

PLANNING

RELEVANT CASE EXAMPLES

Upstream: Circular economy business support programme in London

Advance London is a circular economy business support programme that helps qualifying SMEs develop circular economy solutions. Run by the London Waste and Recycling Board, the programme includes a grant, equity or loan investment programme, and a business accelerator. Less than two years in, the programme has delivered 450 hours of support to 82 SMEs – one in three of which has secured grant, equity or loan funding within 18 months. The programme has helped to facilitate 20 product-market collaborations, which to date have generated five new circular products or services. (See Cities case study: London)

Upstream: "Policy (for) making" programme in Milan

Through the Manifattura Milano programme, Milan is promoting the development of local digital manufacturing and platformanship. The city is encouraging a new type of industry that is characterised by locally appropriate design, consumption with low environmental impact, and increasingly custom-made products, thanks to the use of new technologies such as 3D printers and augmented reality.[10] Today, Milan has more than 100 co-working spaces, ten Fab Labs and maker-spaces, incubators and business accelerators, and cultural and creative hubs – all with strong links to the city's universities.[11]

Upstream: An online marketplace for material exchanges in Austin

Austin's Material Marketplace is an online platform set up by the city to connect organisations that are looking to sell or buy used or surplus products and materials. The initiative supports the city's goal of diverting 90% of waste from landfill by 2040 and its Economic Development Program which aims to attract, retain, and grow zero waste businesses and create local jobs by fostering a resilient, zero waste production system.[12] (See Cities case study: Austin)

Downstream: Leapfrogging to advanced resource management in Ljubljana

When Slovenia joined the EU in 2004, the country had no proper waste separation and collection schemes in place. In less than ten years, the capital, Ljubljana, managed to become a frontrunner in waste management. The city leapfrogged the traditional waste management approach and developed a strong collection and sorting system that has proved that avoiding incineration, and reducing landfilling by 58% and waste generation by 15% is feasible in a very short time. Ljubljana's recycling rate is now 20 percentage points above the EU average and 10 percentage points above its 2020 targets. Ljubljana generates 10% less municipal waste than the EU average, and has one of the lowest waste management cost burdens in Europe. According to the city, political courage, community engagement, and effective communication campaigns have been key elements in Ljubljana's success.[13]

EXAMPLES OF WHAT URBAN POLICYMAKERS CAN DO

To ensure a city's economic development initiatives and resource management efforts are aligned, a **roadmap or strategy** setting out clear guidelines for how these areas should be connected can be beneficial. This could, for example, be in the city's masterplan. **Financial support** and **capacity building** measures can help stimulate the urban products system, both upstream through business programmes, and downstream through infrastructure investments. **Awareness raising** can be a powerful instrument to influence citizens' behaviour – for example to embed new habits of separating and sorting household waste for recycling. Cities can also **fiscal** or **regulatory measures** to incentivise or enforce better production and resource management practices.

To explore further see **Policy Levers**

EXAMPLES OF LINKS TO OTHER SYSTEMS AND PHASES

Mobility: Planning

In a circular products system, reverse logistic schemes will be key to support the circulation of goods and materials, which means that appropriate freight schemes will be required to meet increasing logistics demand.

Buildings: Planning

Increasing proximity through compact city development can support opportunities to circulate products and reduce travel distances.

PRODUCTS

PLANNING

EXAMPLES OF BENEFITS

ECONOMIC PRODUCTIVITY

Creating new profit potential

Collected and sorted clothing has a profit potential of around USD 1,300 per tonne.[14]

Reducing material costs

Circular opportunities for fast-moving consumer goods could be as much as USD 700 billion per annum in material savings.[15]

HEALTH AND ENVIRONMENT

Reducing the environmental impacts on cities of the electronics industry

Better recycling, higher-value end-of-use options (e.g. remanufacturing), and performance-based business models in urban China's electronics and electric appliances industries could help reduce emissions of greenhouse gases (GHG) and of particulate matter (PM2.5) by 11% in 2030.[16]

Reducing similar impacts of the textiles industry

In Chinese cities, implementing all circular economy opportunities in textiles could have a significant impact on reducing environmental impact costs, by USD 64 billion in 2030 and USD 112 billion in 2040.

RESOURCE USE

Reducing reliance on raw materials for electronics

Better recycling, higher-value end-of-use options (e.g. remanufacturing), and performance-based business models in urban China's electronics and electric appliances industries could reduce reliance on key virgin raw materials, such as precious metals, by 14% in 2040.[17]

Increasing e-waste recovery

Circular economy measures, management infrastructure, optimised using AI solutions, could enable the recovery of USD 24 billion of additional value from reused, repaired, remanufactured or recycled devices, components and materials. AI can help capture a significant part of the total e-waste market, which is estimated to be USD 107 billion.[18]

Reducing reliance on raw materials for textiles

Stimulating automation and 3D printing, water and energy efficiency, and textile recycling would decrease the need for virgin materials and other primary resources in Chinese cities, while generating USD 48 billion in savings by 2040.[19]

JOBS, SKILLS, AND INNOVATION

Creating jobs from utilisation of municipal waste

On a European scale, reuse can create significant local employment: on average, 80 jobs could be created for every 1,000 tonnes of collected municipal solid waste. Europe-wide, 200,000 jobs could be created if 1% of total EU municipal solid waste were to be collected and sorted.[20]

Creating jobs and training in the collection and sorting of electronics

15 jobs and 110 training opportunities could be created for every 1,000 tonnes of electronics collected and sorted for reuse. In Europe alone this could amount to between 55,000 and 93,500 jobs.[21]

Creating jobs and training in textiles collection and sorting

Around 20 jobs could be created for every 1,000 tonnes of textiles collected and sorted for reuse, adding up to 120,000 jobs in Europe.[22]

Creating jobs in packaging waste management

In France, the sorting, collection, and recycling of packaging could generate more than 12,000 jobs.[23]

Creating jobs in packaging deposit-return-schemes (DRS)

The introduction of a DRS for beverage containers in the UK could generate between 3,000 and 4,300 jobs in collection and processing as well as an additional increase in the number of higher-skilled jobs.[24] In Germany, expansion of the DRS to all drinks containers could create 27,000 jobs.[25]

Generating higher salaries

Recycling a tonne of solid waste will pay USD 101 more in salaries and wages than disposing of it in landfill.[26]

The main driver is increased water recycling and treatment, which contributes 60% of the 2040 cost reductions.[27]

COMMUNITY AND SOCIAL PROSPERITY

Increasing access by reducing cost

By 2040, China's urban electronics and electric appliances industries, upstream and downstream circular economy measures could reduce total cost of access by nearly 14% compared with the current development path. This could therefore increase access to these goods for lower-income groups.[28]

CITIES

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