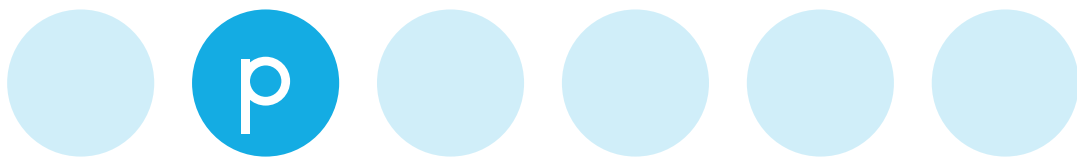
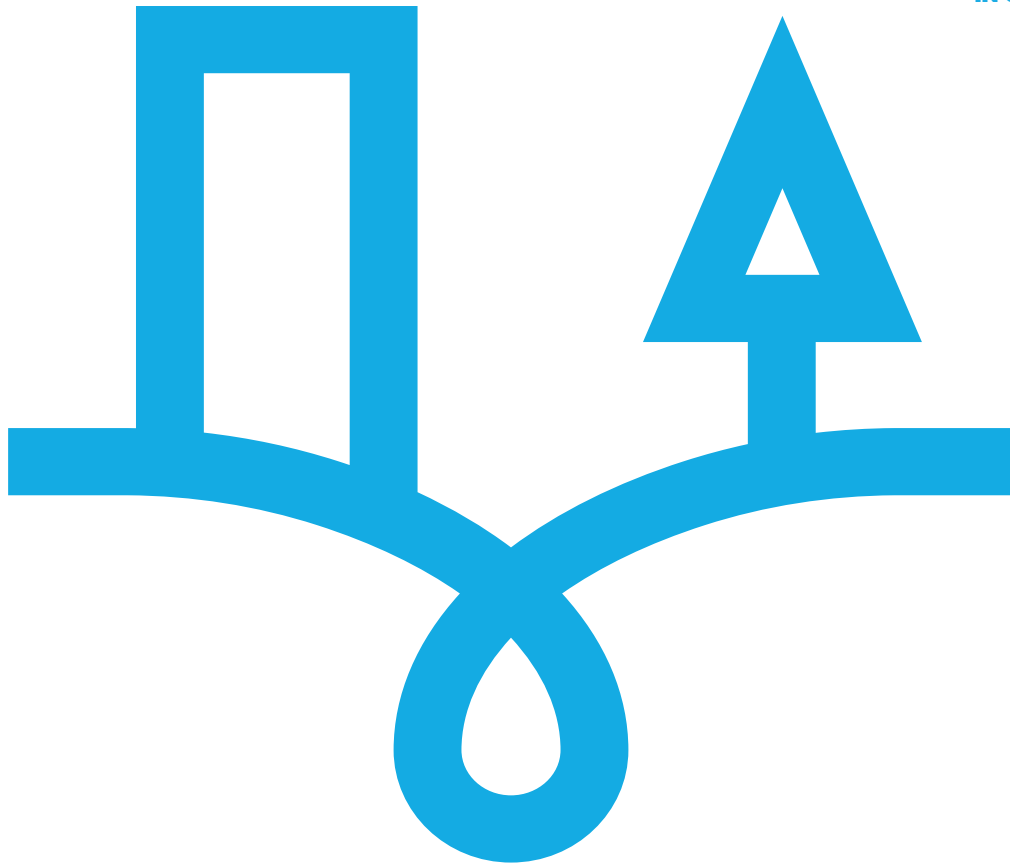


**CIRCULAR
ECONOMY
IN CITIES**



**PLANNING FOR COMPACT,
CONNECTED CITIES**



**ELLEN
MACARTHUR
FOUNDATION**

ARUP



How a city’s buildings are planned and developed has a significant impact on urban living conditions and on resource consumption. The physical structure of a city is fundamental to how a city functions. Urban planning in a city includes making decisions on the placement of buildings, their use, and urban density. Planning for compact, connected cities can ensure that land is used effectively and support the looping of local material flows while at the same time increasing urban quality of life.

CASE FOR CHANGE



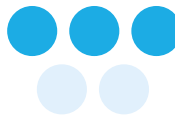
By 2025, **1 billion** new homes are needed worldwide, costing an estimated **USD 650 billion** per year, or **USD 9-11 trillion** overall¹



In 2010, as many as **980 million** urban households lacked decent housing²



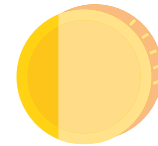
Carbon emissions and energy consumption are closely connected to urban density and structure³



In 2018, **60%** of urban space was sparsely populated⁴



15% of urban land in the US is vacant⁵



Decisions about where buildings are placed will have implications for **one third** of a typical US municipality’s budget⁶

“Spatial development has very strong ‘lock-in’ effects. As carbon emissions and energy consumption are closely connected to urban form, actions that influence land use and spatial development are among the most critical to achieving a low-carbon society.”

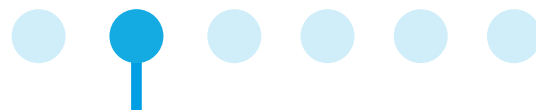
European Environment Agency, Urban sustainability issues — what is a resource-efficient city? (2015)

EXAMPLES OF CIRCULAR ECONOMY OPPORTUNITIES

Planning compact cities - dense, mixed-use, and transit-oriented

Compact cities can avoid sprawling by allowing for higher densification around mass-transit lines. This increases urban connectivity and saves on resources and costs in several ways, including through reduced energy use due to shorter transport distances, more energy-efficient heating of buildings, and increased cost-efficiency of public infrastructure and services. Planning for

mixed-use development (the co-location of commercial, residential, and recreational space) further reduces travel distances, distributes and evens out traffic flows, supports the shared use of buildings and parking space, and helps regenerate neighbourhoods.⁷ Compact planning can apply as much to new urban developments as to regeneration or infill projects where disused, abandoned or vacant lots are reintegrated into the city.



Planning for local, circular material flows

The spatial planning of residential and/or industrial sites provides a key moment to lay the foundations for future circular material flows and resource self-sufficiency. By integrating circular economy principles early in the urban development process,

planners can ensure that the physical structure of the city and its infrastructure are conducive to the effective reuse, collection, and redistribution of resources such as water, organics, industrial by-products, building elements, and household recyclables. See *Policy levers*.

RELEVANT CASE EXAMPLES

Compact city development in Curitiba

More than 30 years ago, the city of Curitiba started to grow using a compact city development strategy, which entailed mixed-use development and densification along five transport corridors served by a bus rapid transit (BRT) system. The development strategy has helped to improve the use of urban land, increase public transport use, and reduce the demand for private transport fuel. Today, Curitiba is one of Brazil's wealthiest cities, and the city has managed to maintain some of the lowest congestion and transport costs in Brazil (around 10% of income).⁸

Crowdsource-mapping of vacant space for community use in New York City

New York City has a large number of publicly owned vacant lots. These empty spaces fill with rubbish and blight communities they could otherwise enliven. A citizen-driven pilot project, 596 Acres, created an interactive crowdsourced map of vacant space, and assisted neighbourhood-led campaigns to turn inner-city land into community space, such as gardens, farms, and playgrounds that support social cohesion and

effective land use. As of October 2016, over 7 acres of new community spaces have been created.⁹

Site-specific urban planning for material flows and resources re-capture

In London, circular economy principles were integrated into the preliminary draft local plan for the regeneration of the Old Oak and Park Royal districts.¹⁰ The plan aims to create more than 25,500 new homes and 65,000 jobs in 640 hectares of residential and industrial area, while at the same time ensuring optimal local materials circulation to develop an "exemplary world class neighbourhood underpinned by new business models, as well as new cultures of collaboration, innovation and community engagement".¹¹ Key opportunities identified in the current planning phase are for buildings, fitouts, infrastructure, and spaces to be designed for reuse and disassembly from the outset, as well as resource-efficiency, sharing, and adaptability. By capturing local resources such as water, heat, organics, and solid waste for reuse and using underused space for farming, the draft plan aims to ensure the area's environmental and economic resilience.¹²

EXAMPLES OF WHAT URBAN POLICYMAKERS CAN DO

Setting out a clear **roadmap and strategy** for the urban building stock is key to informing and directing other policy levers. For example, setting a strategy for the **asset management** of urban land will have long-term consequences. **Urban planning**, such as spatial and land-use planning, is also frequently within the remit of city governments. Other policy instruments, such as **legislation and regulation** around land and property, can also influence urban spatial development.

To explore further see **Policy Levers**

EXAMPLES OF LINKS TO OTHER SYSTEMS AND PHASES

Mobility: Planning and Products: Planning The physical structure of a city's built space has a significant impact on the effectiveness of urban mobility and how well people can move around the city, and how well products, materials, and by-products can be moved around the city for reuse and recycling, highlighting the importance of thinking across systemic thinking.



EXAMPLES OF BENEFITS:

ECONOMIC
PRODUCTIVITY

Reducing infrastructure costs

Compact urban development can save 38–50% on upfront costs for new construction of roads, sewers, water lines, and other infrastructure.¹³

Reducing development and operational costs

London, Ontario, estimates sprawling development patterns will cost an extra CAD 2.7 billion in capital expenditures plus CAD 1.7 billion in operating expenses compared to compact growth annually.¹⁴

Reducing the cost of urban services

Sprawl puts pressure on local public finances as it is more expensive to provide urban infrastructure in sprawling low-density areas.¹⁵ By contrast, compact cities can save municipalities an average of 10% on police, ambulance, and fire service costs by reducing the distances service vehicles must drive.¹⁶

Reducing motorised travel needs

Mixed-use redevelopment of the Southern Industrial Area (SIA) in Sydney is estimated to generate commuter-related savings of USD122 million a year (which includes the time saved by commuters and the value of avoided externalities, such as vehicle emissions and road wear).¹⁷

JOBS, SKILLS, AND
INNOVATION

Increasing access to work

Compact, transit-oriented development is important as people living near public transport services can work more days annually than those without such access. Public transport commuters report that they would earn less, or not be able to continue in current jobs, if public transport services were not available.¹⁸

HEALTH AND
ENVIRONMENT

Decreasing emissions from compact growth

Barcelona and Atlanta have similar income levels and populations, however due to high urban density Barcelona's urban transport area is 26 times smaller and its CO₂ emissions are 10 times lower.¹⁹

COMMUNITY AND
SOCIAL PROSPERITY

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.²⁰



RESOURCE USE

Putting vacant buildings into use

Up to 600 empty apartments in high-demand areas in Barcelona could be put into use to ease housing shortages following the city's new policy to demand repossessed bank-owned properties be put back into use if they have been vacant for more than two years.²¹

Reducing total land use in compact cities

Changes such as shifting land use patterns, taking advantage of inner-city vacant land and promoting compact urban growth, can reduce land use by as much as 75% compared with a sprawl scenario.²²

Reducing energy use in compact cities

Energy consumption can be reduced by a factor of two or more by planning and designing liveable, functional, and socially mixed neighbourhoods that have a dense structure made up of small-scale urban blocks and compact street patterns.²³



ENDNOTES

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- 8 Ibid., p. 98; C40 Cities, *Good practice guide: Bus Rapid Transit* (2016) p. 15; J. Goodman et al., *Curitiba's bus system is model for rapid transit*, *Race Poverty and the Environment* (2005) pp. 75–76
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- 11 ARUP, OPDC, and LWARB, *Circular and sharing economy scoping study for Old Oak and Park Royal* (2017)
- 12 Old Oak and Park Royal Development Corporation, *Local plan second revised draft for regulation 19 (2) Consultation* (2018) p. 20, 31, 124, 154
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- 17 Deloitte, *The benefits of mixed use in the Southern Industrial Area* (2015) p. ii
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- 21 F. O'Sullivan, *Barcelona forces banks to turn repossessed homes into affordable housing*, *CityLab* (17 April 2018)
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- 23 International Resource Panel, *The weight of cities* (2018) p. 79

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