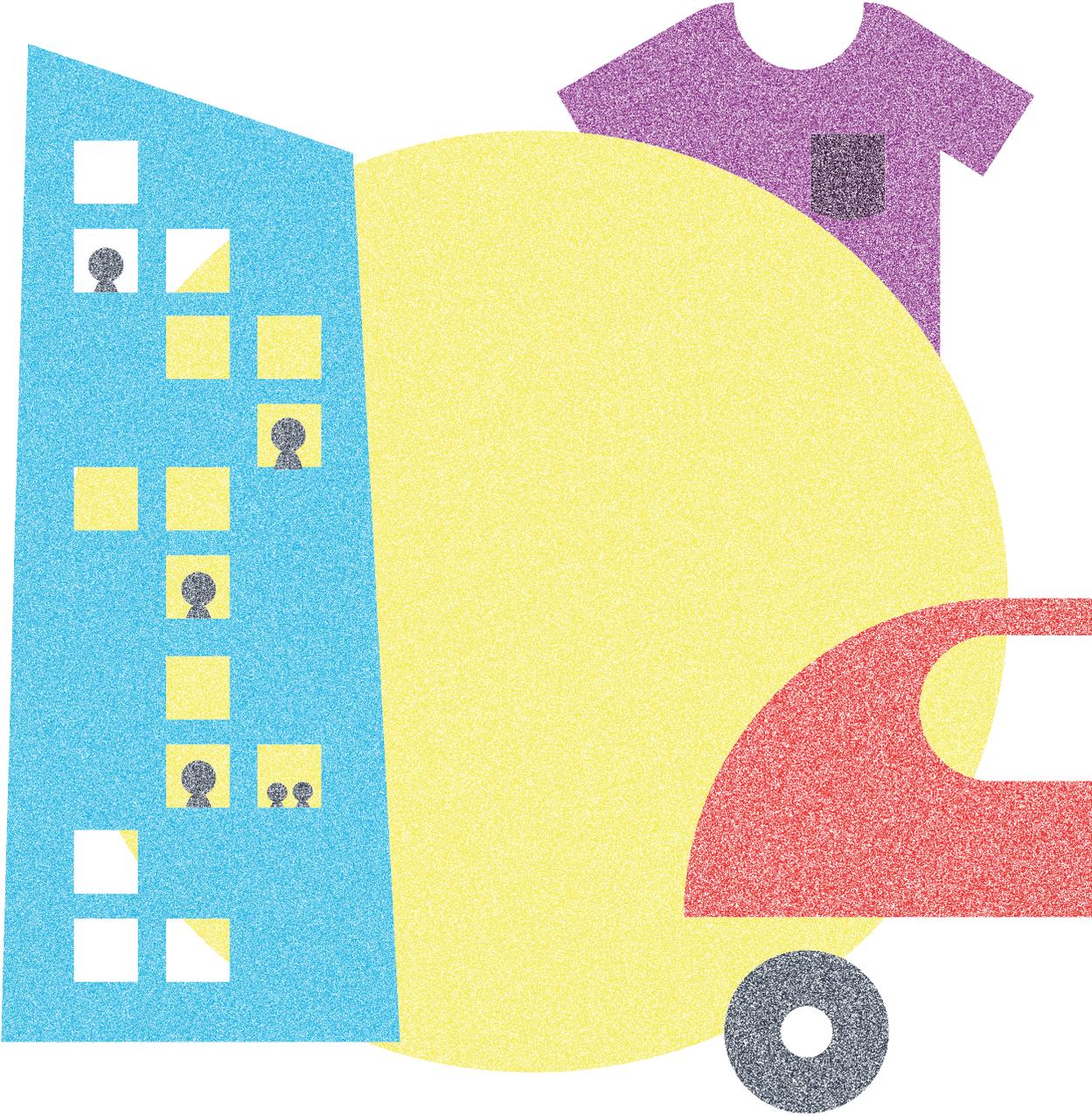
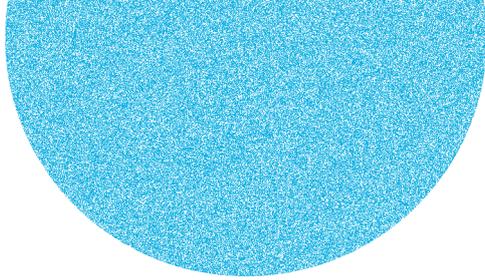


CIRCULAR ECONOMY IN CITIES: PROJECT GUIDE



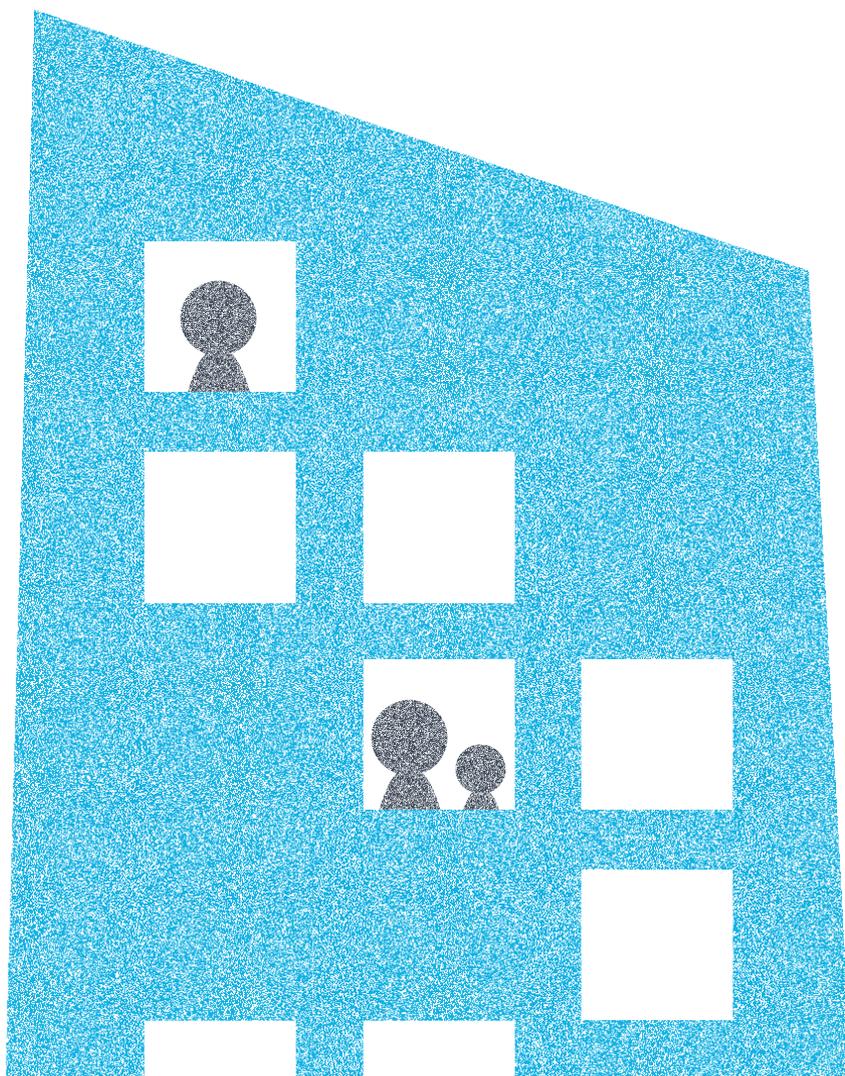


The Ellen MacArthur Foundation recognises cities as a focal point in the transition to a circular economy. This new framework has been rapidly gaining momentum as an opportunity to rethink our approach to using materials in cities. It leads to wholly new ways of creating value, as well as opportunities to support key mayoral priorities around housing, mobility, and economic development.

In March 2019, the Foundation launched ***Circular Economy in Cities***, a suite of easily accessible resources which provide a global reference on the topic. Its modules have been developed to respond to the growing interest in circular economy from city governments and mayors, and will offer insights to many other urban stakeholders.

This document offers an overview of the Circular Economy in Cities resources. This project builds on the city-related research and initiatives the Foundation has developed over the years. The project has been developed together with our Knowledge Partner, Arup.

We invite you to engage with us on this ongoing work to unlock the economic, social, and environmental benefits that a circular economy can bring to the 21st century city.



CONTENTS

5

**WHAT DOES
A CIRCULAR
ECONOMY BRING
TO CITIES?**

6

**A VISION FOR
CIRCULAR
ECONOMY IN
CITIES**

8

**ABOUT THE
PROJECT:
CIRCULAR
ECONOMY IN
CITIES**

9

**CITIES AT
THE ELLEN
MACARTHUR
FOUNDATION**

WHAT DOES A CIRCULAR ECONOMY BRING TO CITIES?

It is well documented that 75% of natural resource consumption occurs in cities. Cities produce 50% of global waste and 60-80% of greenhouse gas emissions. These are symptoms of the 'take, make, dispose' linear economic model.

The need for change is increasingly evident, with cities feeling the effects. The circular economy offers an opportunity to respond to these challenges by rethinking how we use materials, leading to wholly new ways of creating value.

Cities are where most materials are used and wasted, and where buildings, vehicles, and products are consistently under-used.

What if we:



Design out waste and pollution from cities?



Keep products and materials in use in cities and maintain their value?



Regenerate natural systems in and around cities?

The implementation of a circular economy vision in cities can bring tremendous economic, social, and environmental benefits. It can foster the emergence of a:

- **Thriving city** in which economic productivity increases through reduced congestion, eliminated waste, and reduced costs, and where new growth and business opportunities can support skills development and jobs;
- **Liveable city** with improved air quality and urban health, reduced carbon emissions and pollution, and with enhanced social interactions;
- **Resilient city**, keeping materials in use and reducing virgin material pressures, working with both local and distributed production capacity, and harnessing digital technology.

These benefits can be achieved by changing the way urban systems are planned, designed, and financed, and how they are made, used, and repurposed.

This vision can help address important and pressing mayoral priorities on housing, mobility, and economic development. It also aligns with the 2030 Sustainable Development Goals, including reducing greenhouse gas emissions and adapting to the effects of climate change.

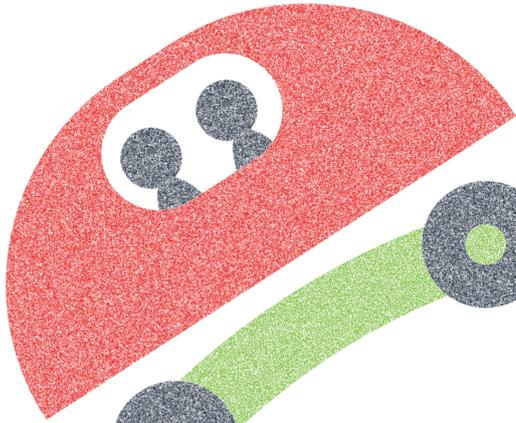
City governments are uniquely positioned in the transition to a circular economy – they can enable, lead, and involve other key stakeholders from across the public and private sectors, using the wide range of policy levers and measures at their disposal. Ultimately, this is a collaborative transition towards a future of thriving cities that are liveable and resilient, and that use materials according to circular economy principles.

A VISION FOR A CIRCULAR ECONOMY IN CITIES

OPPORTUNITIES IN BUILDINGS, MOBILITY, AND PRODUCTS

PLANNING

In cities that embed circular economy principles, there is greater proximity between where people live, work, and play. The air gets cleaner as vehicles switch to zero-emission engines and congestion reduces as shared transit increases. More people walk and cycle to work, boosting health and interactions with local businesses and communities. Valuable land previously dedicated to roads and car parks is freed up for green spaces, commerce, offices, houses, and recreation. The layout and design of cities also changes the way materials and products move around them. Instead of throwing materials 'away' to landfill or incineration, a new distributed system of resource management, nutrient flows, and reverse logistics makes the return, sorting, and reuse of products possible. Materials stay in use.



DESIGNING

In parallel to the urban plan, circular economy principles transform the design of elements within cities. Infrastructure, vehicles, buildings, and products are designed to be a combination of durable, adaptable, modular, and easy to maintain and repurpose. Nature inspires design. Materials are non-harmful, locally sourced and from renewable feedstocks where appropriate, and can be composted, recycled, and reused. Renewable energy powers cities.

MAKING

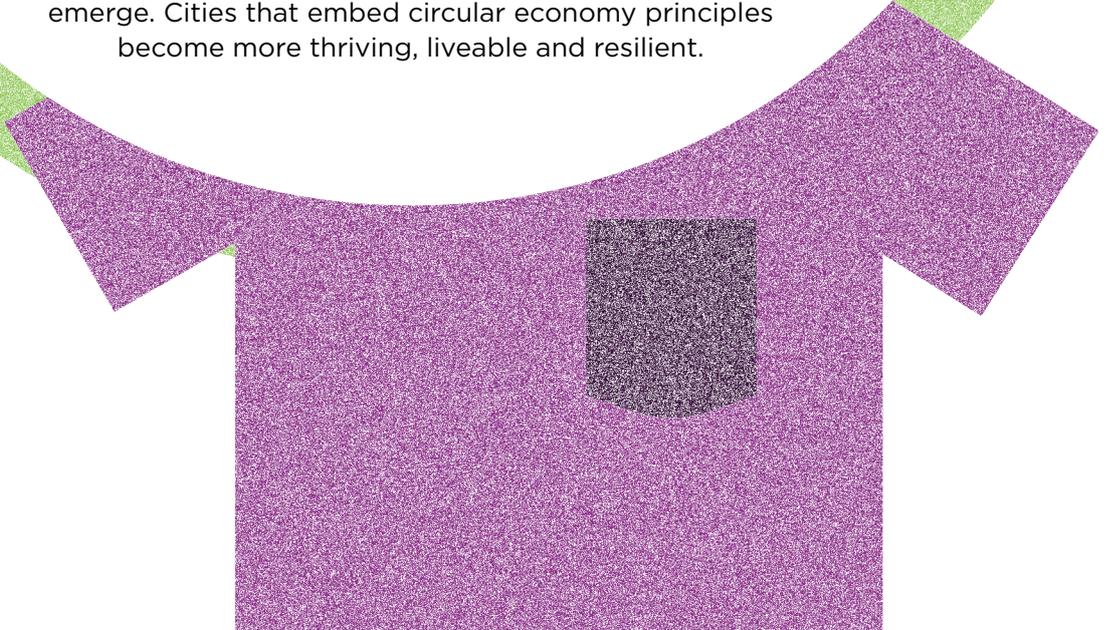
Buildings, vehicles, and products are assembled using techniques that design out waste. Local ingenuity and skill levels increase as focus is put on decentralised, distributed production within cities. Through digital material banks, the composition of buildings, vehicles, and products is known, enabling their repair and reuse. Products and parts are created on-demand and on-site, transforming construction methods and storage needs.

ACCESSING

People gain access to the things they need - be it space, products or transport - in new ways. This can be through sharing rather than owning, which can connect people to their neighbours and communities, or through product-as-a-service contracts. Modular designs allow for the reconfiguration of buildings and vehicles as needs change.

OPERATING AND MAINTAINING

Products are no longer used just once. People repair and refurbish their products. These activities occur at the individual, community, and commercial level. Vehicles and infrastructure, from roads to street lights, are operated and maintained so that materials, energy, and water are used effectively and can be reused and recycled. Buildings are refurbished, improving how they are used and operated. New possibilities and jobs emerge. Cities that embed circular economy principles become more thriving, liveable and resilient.



ABOUT THE PROJECT: CIRCULAR ECONOMY IN CITIES

In March 2019, the Ellen MacArthur Foundation launched **Circular Economy in Cities**, a suite of easily accessible resources which provide a global reference on the topic. Its modules have been developed to respond to the growing interest in circular economy from city governments and mayors, and will offer insights to many other urban stakeholders, including the people who live in cities.

The project contains the following modules:

VISION

Circular economy opportunities within three key urban systems – buildings, mobility, and products – are brought together in this project to illustrate what they can unlock in cities.

FACTSHEETS

A series of easy-to-reference factsheets focused on circular economy opportunities in buildings, mobility, and products. The factsheets provide examples of circular economy opportunities, and a range of qualitative and quantitative benefits, including benefits in economic and resource productivity, health and environmental outcomes, and social prosperity.

POLICY LEVERS

This module identifies ten policy levers that city governments can leverage to embed circular economy principles and enable the transition in cities.

CITY-LED CASE STUDIES

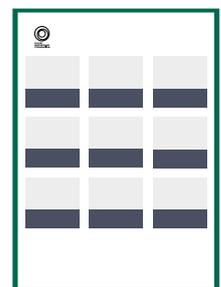
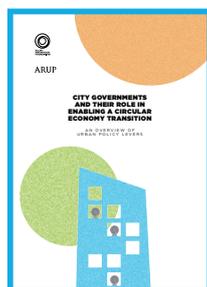
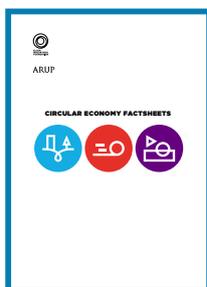
Each case study focuses on a specific initiative championed by a city government. The cases cover a range of circular economy opportunities, urban systems, and policy levers mentioned in the previous modules.

NETWORKS AND RESOURCES

Momentum is building around circular economy in cities. This reference page module provides an overview of the relevant resources, tools, and initiatives from our partners and other organisations in the field.



This project has been developed in partnership with our Knowledge Partner, Arup, and is supported by the MAVA Foundation.



CITIES AT THE ELLEN MACARTHUR FOUNDATION

The Ellen MacArthur Foundation recognises cities as a focal point for the transition to a circular economy, and this project builds on and expands the knowledge and initiatives that we have developed on cities over the years.

THOUGHT LEADERSHIP ON CITIES

The Foundation has influenced the cities and circular economy narrative through thought leadership pieces such as *Cities in the circular economy: An initial exploration* and *Cities in the circular economy: The role of digital technology* in 2017.

These efforts build on the evidence base and understanding of city, regional, and national governments developed through the research *Delivering the circular economy: A toolkit for policymakers* led by the Foundation in 2015.

In addition, regionally focused work such as *The circular economy opportunity for urban and industrial innovation in China*, *Circular economy in India: Rethinking growth for long-term prosperity* and *Growth Within: A circular economy vision for a competitive Europe* provide an evidence base for the benefits of applying circular economy principles to key urban systems such as mobility, the built environment, products, and food.

SYSTEMIC INITIATIVES ON KEY MATERIAL STREAMS

The Ellen MacArthur Foundation's Systemic Initiatives aim to accelerate the global transition towards a circular economy by applying circular economy principles to key material streams.

In 2016, the Ellen MacArthur Foundation launched the *New Plastics Economy* initiative building momentum to a plastics economy that works. In 2017, we launched *Make Fashion Circular* to create a new textiles economy including the development of demonstration projects in cities. At the World Economic Forum in Davos 2019, we launched a major report, *Cities and the Circular Economy for Food* setting out the significant contribution cities can make in shifting the global food system.

Working with businesses, governments and cities, philanthropists, innovators, and NGOs, Systemic Initiatives spark unprecedented levels of cross-sectoral and value-chain collaboration to unlock innovation and new system solutions.

CONVENING AND WORKING WITH CITIES

The Foundation works closely with cities such as Brussels, Charlotte, London, Milan, Phoenix, and Toronto through the *CE100 programme*, a pre-competitive innovation programme that supports the private and public sector in their transition to a circular economy. The Foundation also works with cities through our Systemic Initiatives including Austin, Brussels, Copenhagen, Guelph, New York, Porto, and São Paulo.

The *Circular Cities Network*, set up by the Foundation in 2016 as the first network of its kind to focus exclusively on cities and the circular economy, exchanged knowledge between a group of 12 pioneering cities. The network informed much of the early development of the Foundation's thinking on the topic. Cities in transition also feature in the annual *Disruptive Innovation Festival*, and are the focus of the 2018 film *System Reset* that amongst other topics, explores the opportunities of distributed production in cities.

In addition, the Foundation has developed partnerships with key influencers in the urban ecosystem, such as the *C40 Cities Climate Leadership Group* as a Platform Partner and *UN Environment Cities Unit*.



ACKNOWLEDGMENTS

This project drew on the collective expertise of members of the Ellen MacArthur Foundation's CE100 Network and a wider group of leading academic, industry, NGO, and city government representatives who provided invaluable perspectives. It was written and coordinated by a core project team from the Ellen MacArthur Foundation and Arup.

ELLEN MACARTHUR FOUNDATION

CORE PROJECT TEAM

Andrew Morlet, Chief Executive
 Jocelyn Blériot, Executive Officer and Head, International Institutions & Governments
 Ashima Sukhdev, Government & Cities Programme Lead
 Miranda Schnitger, Cities Project Lead
 Maja Johannessen, Research Analyst
 Soukeyna Gueye, Research Analyst
 Henrietta Goddard, Research Analyst
 Victoria Almeida, Brazil Associate
 Vigil Yangjinqi Yu, China Research Analyst

PRODUCTION

Ian Banks, Editorial Lead
 Lena Gravis, Editor
 Joe Iles, Editor
 Lou Waldegrave, Editor

Sarah Churchill Slough, Design and Branding Manager
 Piers Young, Multimedia Designer
 Matthew Barber, Design Assistant

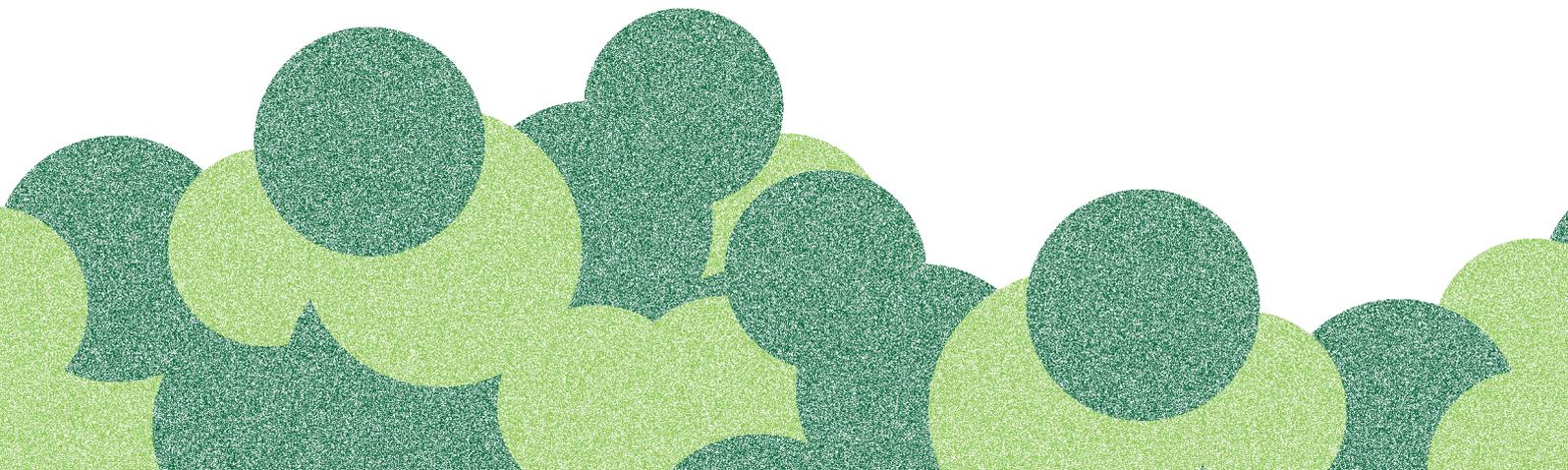
Lucy Hardy, Digital Team Lead
 George Millard, Technical Lead
 Victoria Deegan, Digital Project Manager
 Dan Baldwin, Digital Designer

Joanna de Vries, Editor, Conker House Publishing
 Samantha Guerrini, Editor, Freelancer

ARUP

CORE PROJECT TEAM

Carol Lemmens, Director, Global Advisory Services Leader
 Joanna Rowelle, Director, City Economics
 Zach Wilcox, Senior Consultant, City Economics
 Giacomo Magnani, Senior Consultant, City Economics
 Michael Muller, Consultant, City Economics
 Devni Acharya, Senior consultant, Resources and Waste
 Amrita Kataria, Senior Consultant, Energy, Cities and Climate Change Consulting
 Emma Gains, Senior Consultant, Sustainability Consulting





ABOUT THE ELLEN MACARTHUR FOUNDATION

The Ellen MacArthur Foundation was launched in 2010 with the aim of accelerating the transition to the circular economy. Since its creation, the charity has emerged as a global thought leader, putting the circular economy on the agenda of decision-makers around the world. The charity's work focuses on seven interlinking areas: insight and analysis; business; institutions, governments and cities; systemic initiatives; learning; circular design; and communications.

Further information: www.ellenmacarthurfoundation.org • @circulareconomy

ABOUT ARUP

Arup is the creative force at the heart of many of the world's most prominent projects in the built environment and across industry. With over 80 offices in 34 countries Arup has more than 14,000 planners, designers, engineers and consultants delivering innovative projects across the world with creativity and passion.

Further information: www.arup.com • @ArupGroup

