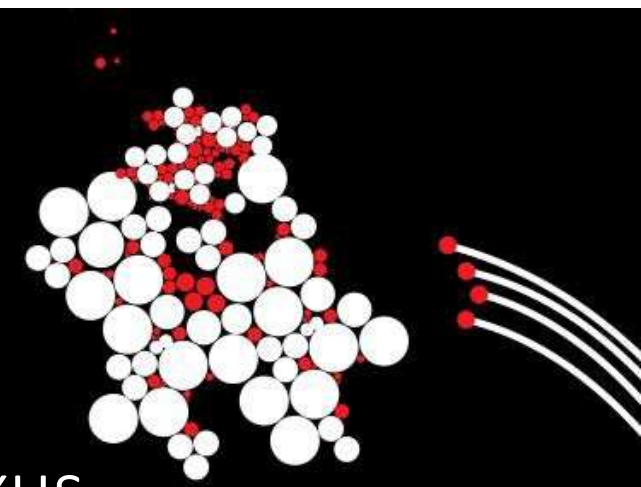


UNIVERSITY OF TWENTE.



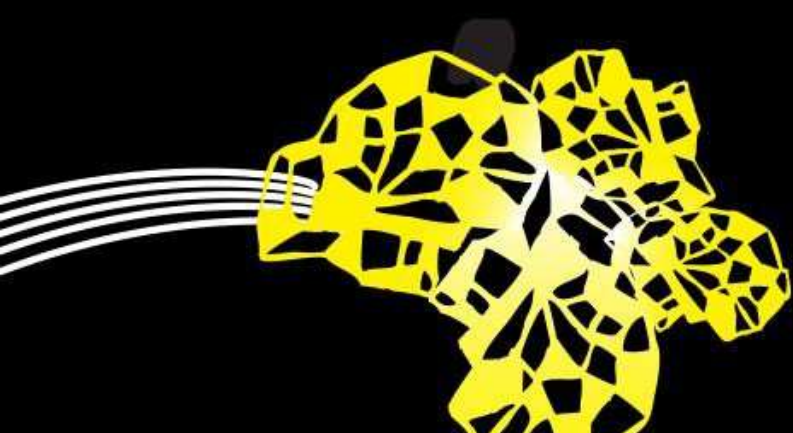
Circular cities and climate change mitigation nexus

Dutch and Indonesian cities

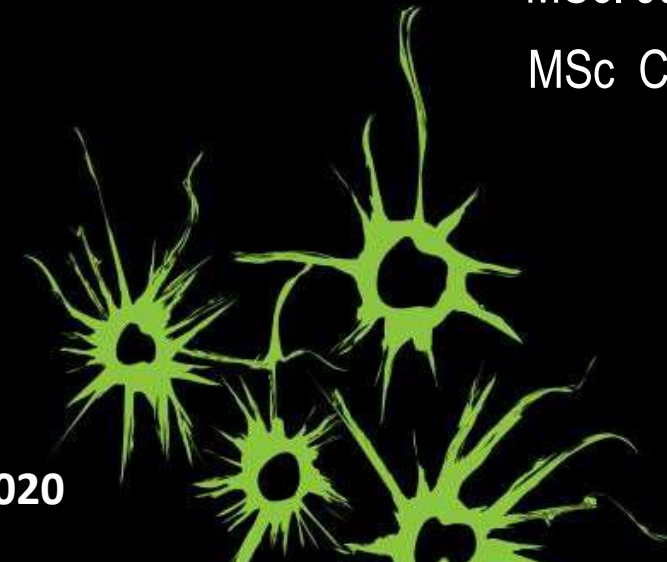
Dr. M. Laura Franco-García

MSc. Juli Nurdiana

MSc. Carol Mungo



August 31, 2020



Why Cities?

CITIES ARE BEING PUSHED TO THE LIMIT

of the world's
10 billion
people will live
in cities¹



of the world's
energy is likely
to be consumed
in cities²

85% of global GDP

75% of natural resources consumption

50% of global waste production

60-80% GHGs

Symptoms of the current “Take-make-dispose” LINEAR economic model

Albeit occupying only 2% of earth's surface

The grow potential of Small and Medium Cities is high

© Bloomberg via Getty Images

The evolution of cities is seen as centers of prosperity where *people gather to realize aspirations and dreams, fulfill needs and turn ideas to reality* (UN Habitat, 2013).

Why Dutch Cities?

- One of the most urbanized countries in Europe
- Characterized of a **polycentric urban structure**
- Present air pollution, waste management and competition
- Leader processing and **recycling waste with 78% recycling**, 19% incinerated and only 3% goes to landfill.



Image by William McDonough + Partners and West 8

- Main Question:
- ***What are the crucial success factors for Circular Cities in relation to climate change mitigation strategies?***



Image from internet



Outline

1.0 Conceptual framework

2.0 Research design

3.0 Findings in The Netherlands

4.0 Conclusions of the Dutch small-medium cities

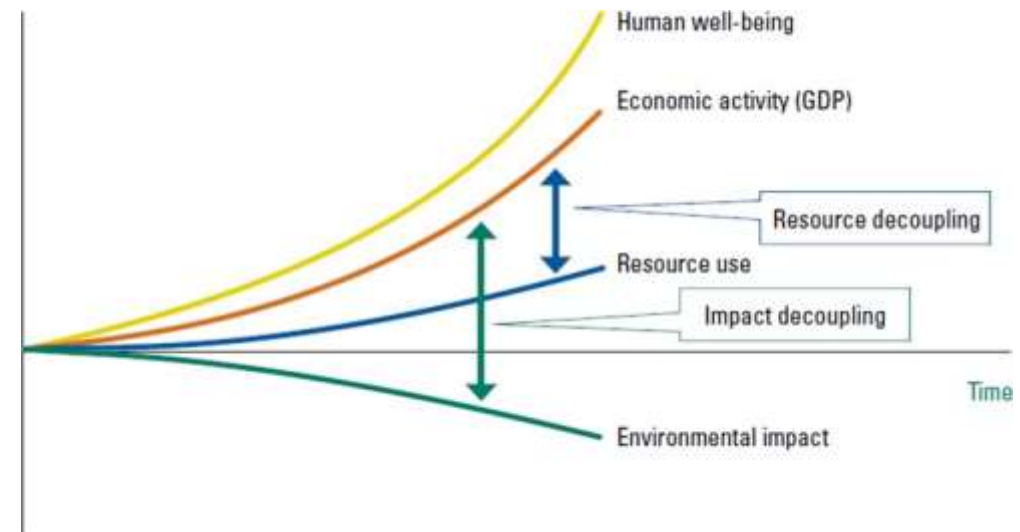
5.0 Indonesia



1.0 The Conceptual framework

CIRCULAR ECONOMY

Decouple economic growth from natural resource use and environmental impact; economic growth that is not correlated to extraction of raw materials and resources (Ellen McArthur Foundation, 2012)

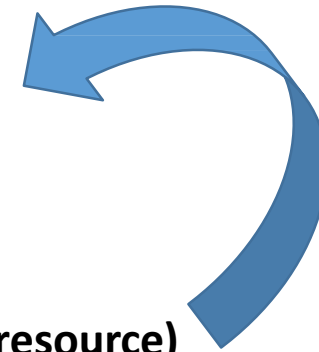


The roots of circularity (systems thinking)

A more circular model

CE aims at:

- A. Reduction of dependency on virgin materials/resources
- B. Creating/yielding more value from (the same) resources
- C. Prevention of waste
(eliminating waste/pollution and transforming it into a resource)



30 MAY 2017
 16:00–17:30
 URA Function Hall
 Networking & Registration from 15:45 – 16:00
 Free Registration
 Register [HERE](#)

Circular Cities, Improving Liveability & Economic Climate in Amsterdam: An Example to the World

“Circular economy is the key to continued successful city life.”
 — **Wim Stigtgard**

Cities and city regions are the hubs for essential flows of people, information, economy, water, materials, energy, food, and health. As urban areas constantly change in size, density, and activities, they must find ways to make their resource systems and infrastructures responsive to the opportunities of new technology and to the challenges posed by climate change and resource scarcity. It is thus high time for a new, regenerative approach to resource use in the city. Such an approach implies radical changes in the way we plan, design, and use cities. In this lecture, Dutch and local experts will share about their experiences and challenges in making our cities more sustainable.

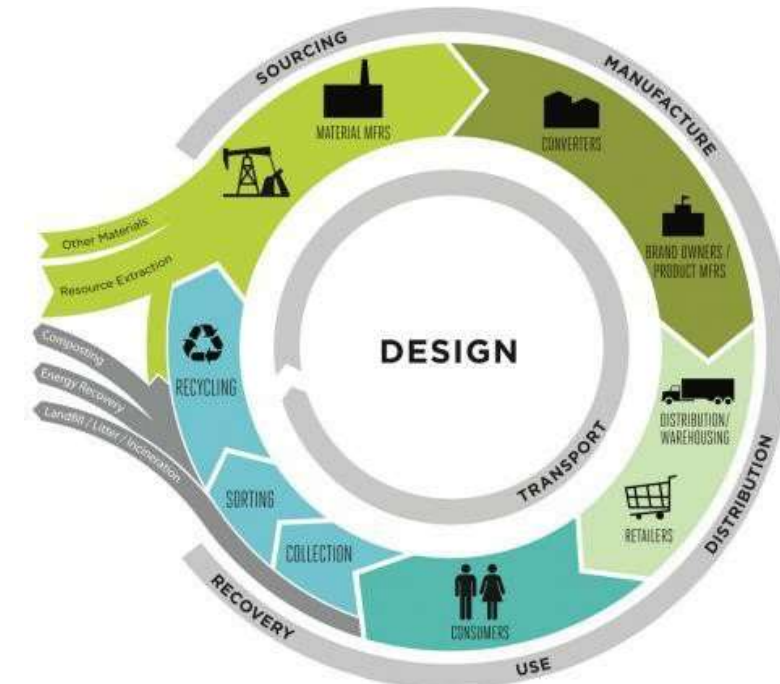
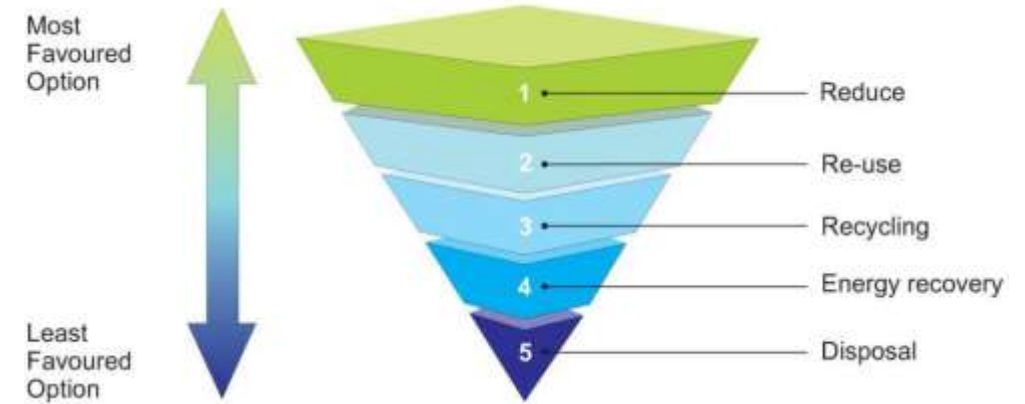
LECTURE SERIES

Speaker
Wim Stigtgard
 Executive Director
 Stigtgard was Director General of the Environmental Science Group (ESG), Wageningen University and Research, prior to his role. He has worked as advisor for the Dutch Ministry of Agriculture, Nature and Food Quality (LNV), as well as project manager for Natuur.nl, a leading consultancy promoting intersectoral development. He was the managing director of ARCADIS Netherlands, a leading engineering firm in environment, buildings and

Co-speaker
Bob Geldermans
 Director
 Bob Geldermans leads the Circular City research program at AMG and is a researcher at the Delft University of Technology, in Delft; he was head of the urban Climate Design and coordinated the Urban Energy Challenge at Cradle Labs, collaborating in the first symposium on 'Circularity in the Built Environment'. Bob has worked as a free-lancer and as a consultant for Dutch Integrated Sustainability (Rotterdam) and the Ministry of Economic Affairs.

1.1 Moving to Circular Economy in NL (Cramer, 2014)

- In 1979 Ad **Lansink's hierarchy** (ladder) was accepted in parliament
- In 1990, policies on prevention and reuse of waste and identification of **30 priority waste streams**.
- **Eco-design** (Brezet , Hemel et al) policies were also introduced in the 1990s
- 2002 comparable approaches as **Cradle to Cradle** (Braungart & McDonough)
- Dutch policies moved to the direction of **resource management** (*waste seen as a resource*)
- Concept of circular economy comes closer to put in practice



OUTLINE OF A CIRCULAR ECONOMY

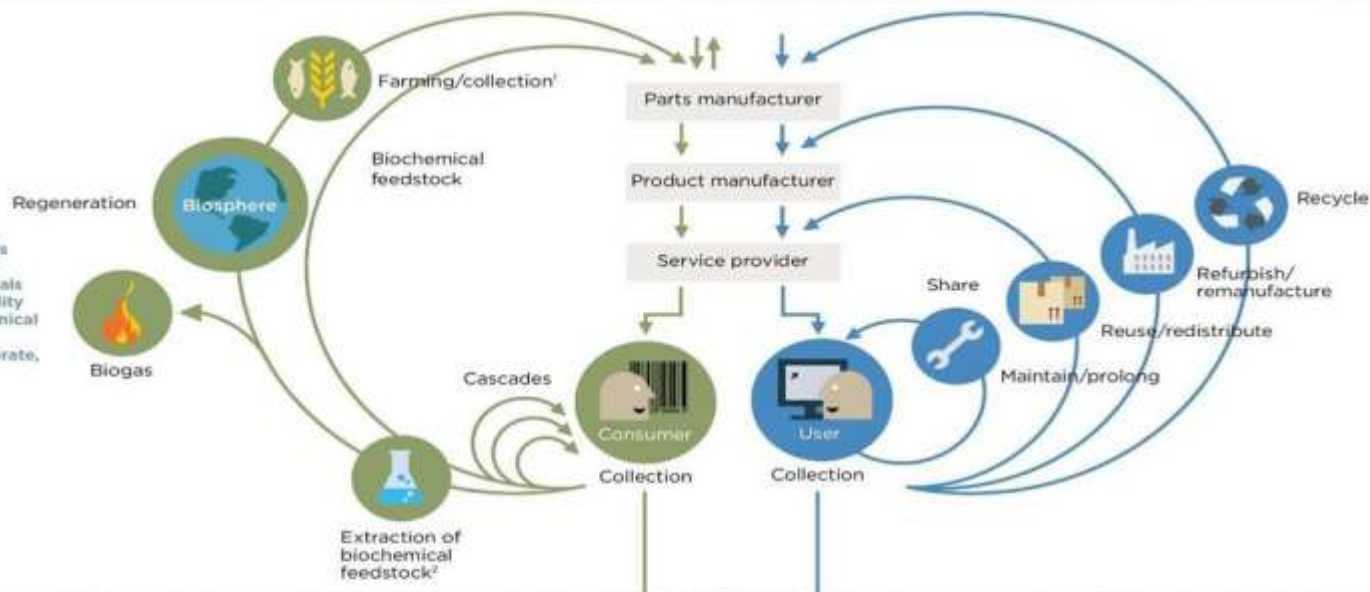
PRINCIPLE 1

1
Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows
ReSOLVE levers: regenerate, virtualise, exchange



PRINCIPLE 2

2
Optimise resource yields by circulating products, components and materials in use at the highest utility at all times in both technical and biological cycles
ReSOLVE levers: regenerate, share, optimise, loop

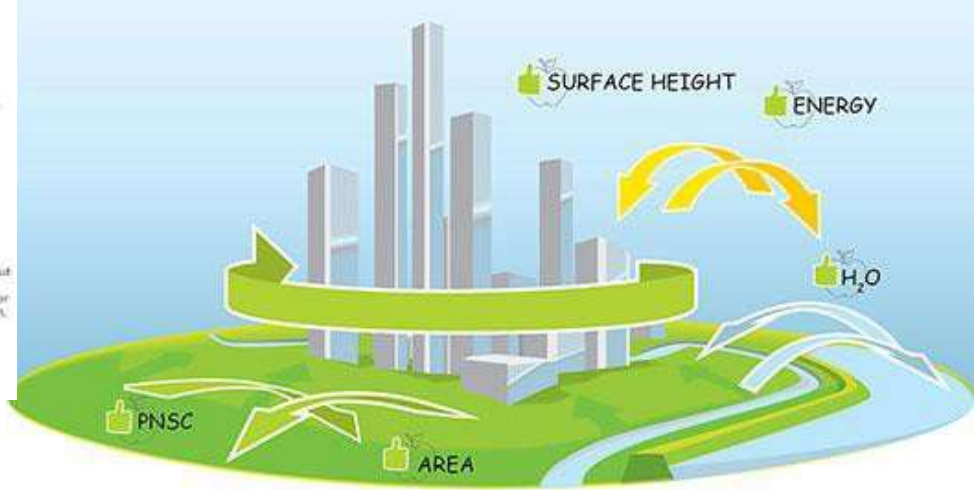
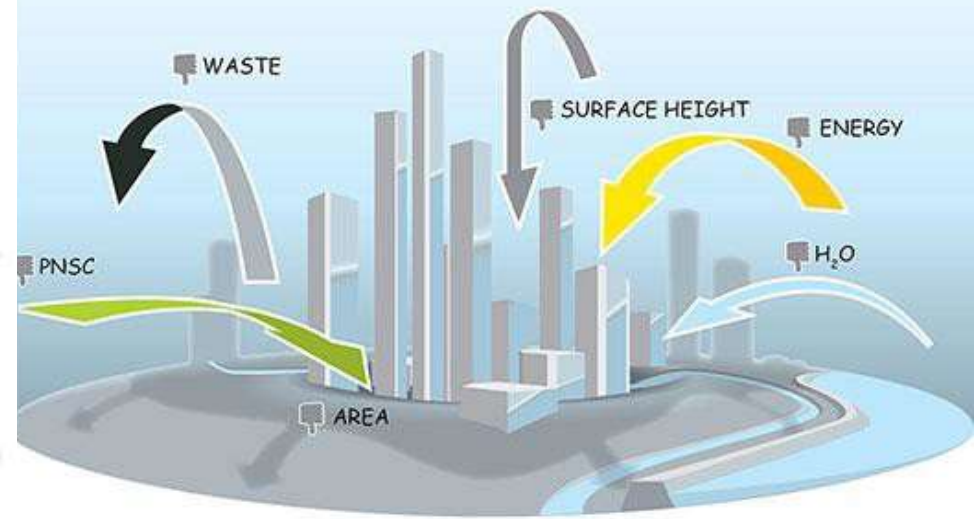


PRINCIPLE 3

3
Foster system effectiveness by revealing and designing out negative externalities
All ReSOLVE levers



1. Hunting and fishing
2. Can take both post-harvest and post-consumer waste as an input
Source: Ellen MacArthur Foundation, SUN, and McKinsey Center for Business and Environment; Drawing from Braungart & McDonough, Cradle to Cradle (C2C).



1.3 Ellen McArthur Foundation's ([EMF](#)) exploration of cities in the CE

- A circular city (CC) embeds the principles of a circular economy **across all its functions**
- It eliminates the concept of waste and **keeps assets** at their **highest value possible**
- Elements in a CC:
 - Built environment;
 - Energy systems;
 - Urban bio-economy;
 - Urban mobility systems;
 - Production systems
- EMF discussed on the benefits of CE in **supporting Urban Policy**
Show cases: textile, plastics and food



1.4 Cities and Climate Change

CLIMATE CHANGE DEPARTURE WHEN CITIES WILL FEEL THE EFFECT

With no cuts in greenhouse gas emissions, the shift into new climate territory for different cities in the world will occur in different years, give or take about five years say scientists.



The global mean year of climate departure is 2047. The mean for the tropics (shown in hatched area) is 2038, compared to 2053 for all other latitudes.



- Cities play a crucial role in limiting global warming to below 2°
- Mitigation options are inclined towards: **low-energy, low-carbon or climate-neutral cities.**
- Bulkeley & Besil (2003) found four reasons why cities are a significant arena to address climate change:
 - **Energy and supply management**
 - **Transport, supply & demand**
 - **Waste management**
 - **Land use planning**

1.5 Research Background

Topic: *The Nexus between Circular Economy and Climate Change Mitigation Policies in Small and Medium-sized Dutch Cities*

- **Minimal application** of circular economy in climate change policies (Mungo and Franco, 2019)
- Inadequate placement of circular economy concept in the borders of urban sustainability as in the **dominating business narrative**
- Work on Prendevillea, et.al (2017) discussed the:
 - High possibilities for **urban mining of technical and biological nutrients within cities'** boundaries
 - Effective collaborations in **closing resource loops** and minimize waste due to the **close geographic proximity** of stakeholders **within cities**

Global megatrends shaping the energy sector

Climate change and resource efficiency

- Decarbonisation
- Renewables
- Circular economy



2.0 Research Design

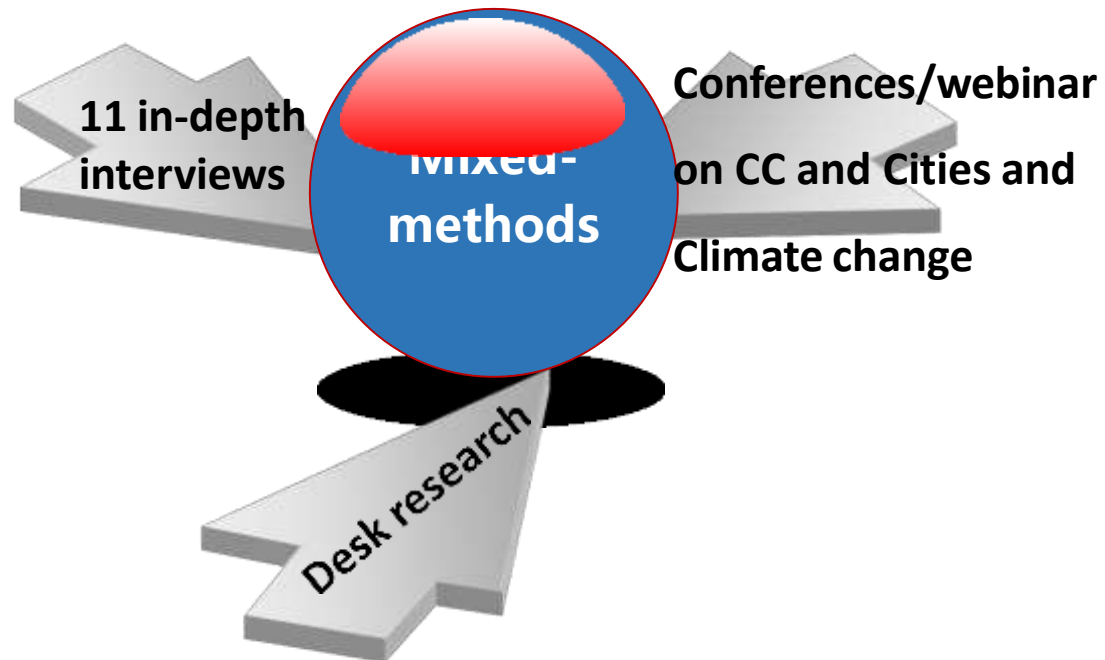
- Main Questions:

What are the crucial success factors for circular cities in relation to climate change mitigation strategies?

In Dutch cities and opportunities in Indonesia



2.1 Methodology



- Research unit: 5 SMCs (Policy makers, academia and SMEs)
- Variables: **size** of the city, **adoption circular ladder** concepts and **implementation of climate change** mitigation policies
- Data analysis: content analysis

2.3 Criteria for selecting case cities

Criteria	Determined by
Have a population of between 50,000 to 250,000 inhabitants	EU definition of a small and medium-sized city
Signed Circular City Deal	The ambition of the Deal to move all participating cities towards circularity by 2050
Adopted identifiable steps towards the transition to a circular city	Project websites, repeated mention of initiatives in these cities in various documents and recommendation by experts
Availability/ability to cooperate	Ability to identify relevant stakeholders knowledgeable about circular economy initiatives in the city within the time available



Moving towards CC

- ★ Almere (205,220)
- ★ Dordrecht (118,307)
- ★ Haarlemmermeer (146,808)
- ★ Venlo (101,155)
- ★ Zwolle(126,641)



Table 1: EU and Horizon 2020 targets (EC, 2017)

Common EU targets in SWM for 2030	Horizon 2020
1. A ban on landfilling the separately collected waste	1. 75% of the 20-64 years-old to be employed
2. Simplified and improved definitions methods for recycling rates throughout the EU	2. 3% of the EUs GDP to be invested in Research and Development
3. Actual measure to promote re-use and simulate industrial symbiosis – turning one industry's by product into another industry's raw material	3. Greenhouse gas emissions 20% (or even 30%, if the conditions are right) lower 1990, 20% of energy from renewables, 20% increase in energy efficiency
4. Economic incentives for producers to put greener products on the market and support recovery and recycling schemes (for packaging, batteries, WEEF, vehicles)	4. Reducing the rates of early school leaving below 10%, at least 40% or 30-34 years-old completing third level education
5. Promotion of economic instruments to discourage landfilling	5. At least 20 million fewer people in or at risk of poverty
6. Recycling 75% of packaging waste; recycling 65% of MSW	
7. Reduce landfill to maximum of 10% of MSW	

3.0 Findings

How can cities retain their value and make more efficient use of their existing resources?

- Diagnosis: conduct material flow analysis and current state analysis (CSA)
- Experimentation with concepts to shift from waste management to resource management
- Green public procurement policies as circular procurements
- Request material passports and (dis) assembly plans from contractors



3.0 Research findings cont...

- Networks to effect cross-sector and cross value chain collaborations
- Local digital and sharing platforms to connect citizens and achieve circular waste streams
- Conduct Total Cost Ownership/Life Cycle Costing thinking
- Encourage local entrepreneurs to produce and sell locally

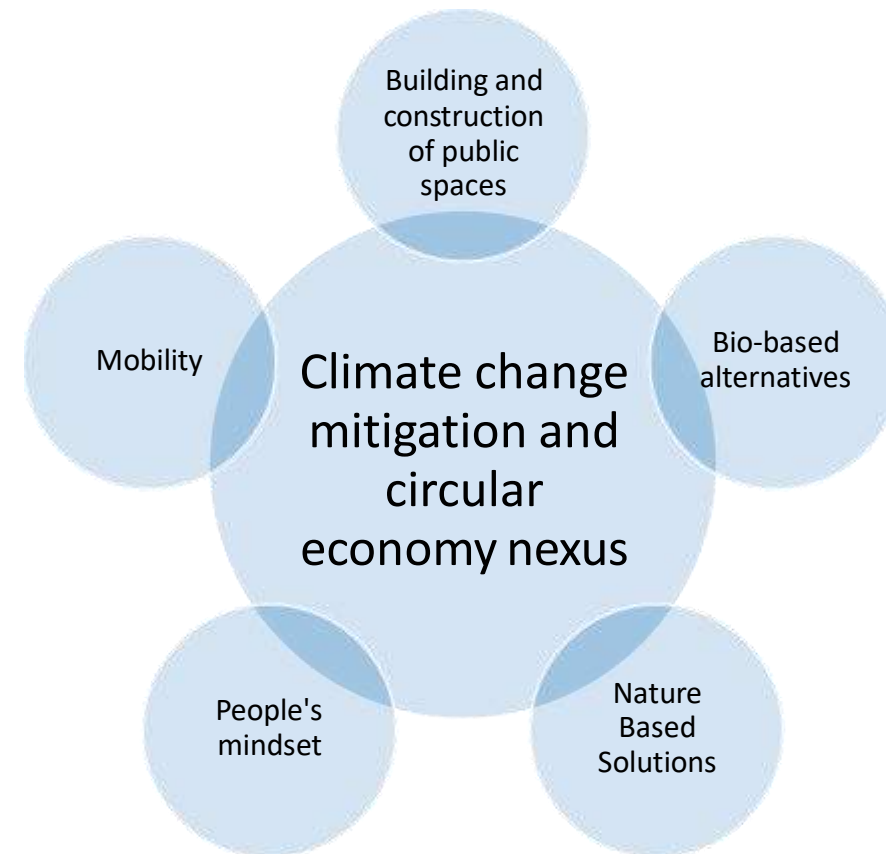
Example of production systems: develop regional circular plastic chain



3.0 Research findings cont...

What is the interrelationship between circular economy and climate change mitigation strategies?

- Though not directly, CE is expected to **help** cities reduce their GHG emissions
- The coordination process is still vague in allocation of human and financial resources
- Current shift in **political priorities** is promising

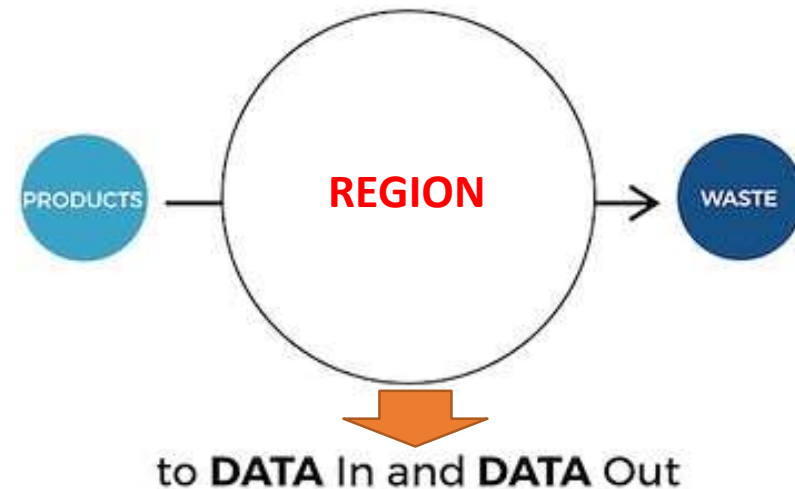


Areas of high potential nexus

3.0 Success factors for cities in transition?

- Use innovative non-financial instruments such as **sustainability tenders and circular procurement** to stir creative competition
- Encourage flexibility at all levels, as there is still an aspect of **trial and error** in the transition to a circular city
- Facilitate cross-sector and cross-value chains **collaborations** schemes through smart coalitions, innovation contests, etc.
- Give and take a great deal of **trust** in the transition process.

From **PRODUCTS** In and **WASTE** Out



to **DATA** In and **DATA** Out



4.0 Concluding remarks of the Dutch small medium cities

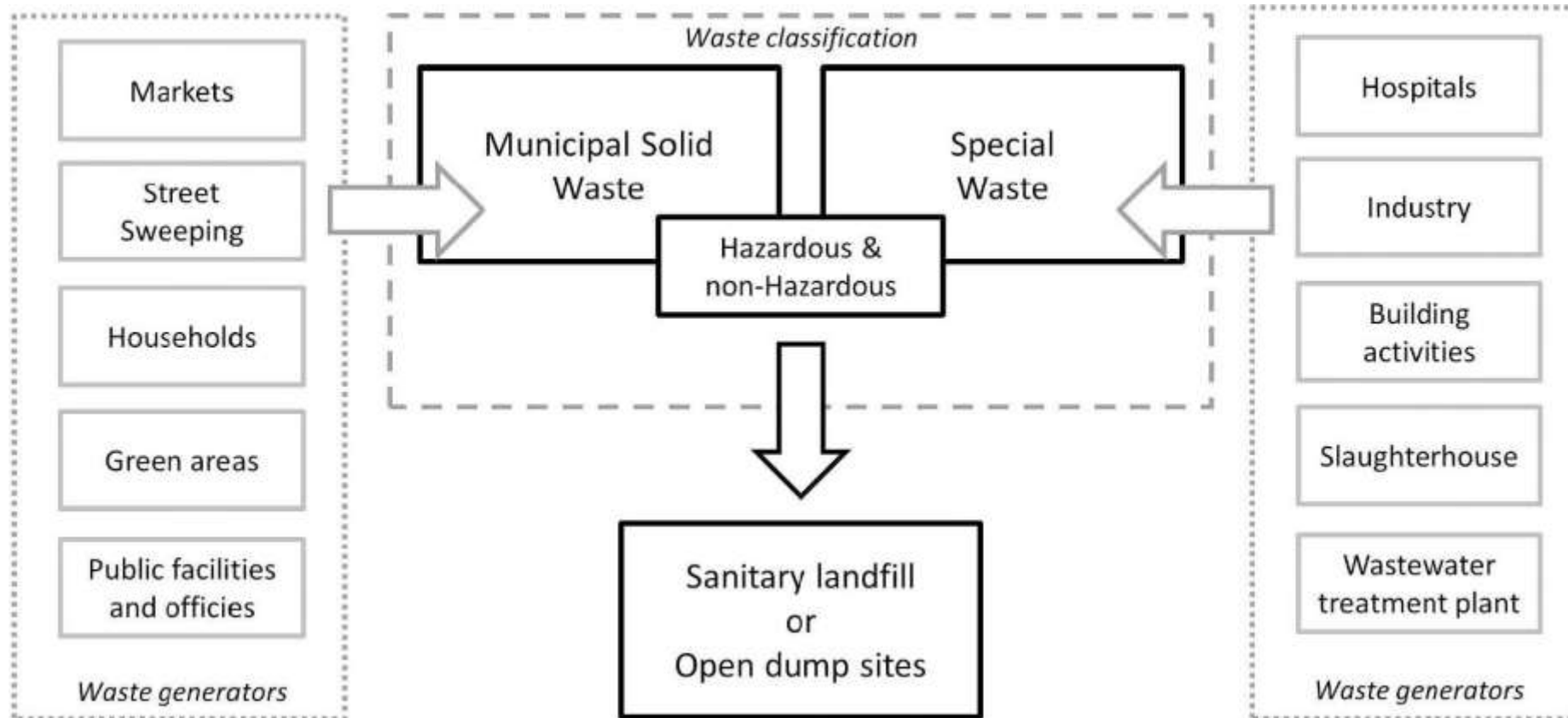


- **Innovations linked to resource recovery and energy transition** e.g. district heating, provides circular solutions that will directly influence climate policy
- Local governments should demonstrate financially **attractive business models**.
- (Ongoing) **Shift in government policies and economic systems** e.g. Venlo incorporating cradle to cradle and circular economy
- Accountability of progress towards CE (Metrics)

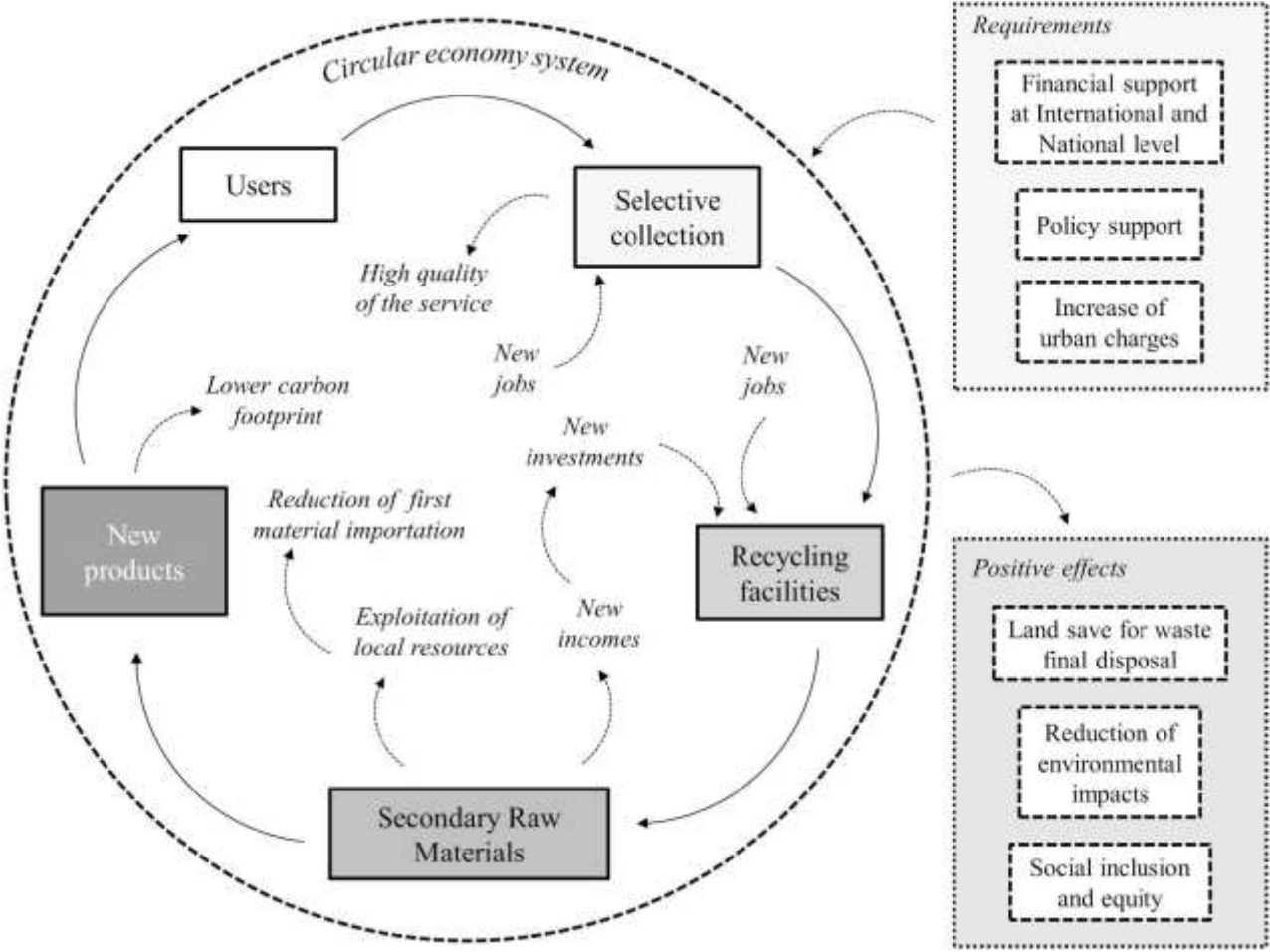
5.0 How could CC be adapted to developing regions? In particular to Indonesia



Starting point: Diagnosis of material flows and improvement of the solid waste management



Categories and sources of solid waste disposed to landfill or open dump sites in low-middle income countries (Ferronato et al., 2019)



Main requirements and positive effects of a CE system (Ferronato et al., 2019)



Transit from waste management to resources management

- Diagnosis of waste generation and identify its potential to upcycle the material and to mitigate climate change
- Prioritize the most relevant wastes to be transformed to resources (each city has its own challenges and strategies), not only environmentally but also economically
- Set goals with clear indicators of recuperation and recycling of the prioritized materials
- Engage with all the different parties that can support such recuperation
- Develop the plan with clear description of needed existing and new infrastructure, capacities, technical developments, financial resources, partnerships
- Execute the plan and evaluate its outputs periodically

Parting shot!

- *'...circular economy, it is coming out pretty fast perhaps as a different point of departure with CO₂ reduction, energy transitions, zero waste, etcetera*



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THANK YOU FOR YOUR ATTENTION