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## ID 617 NEW LENS SCENARIOS TO SHAPE THE FUTURE OF INDONESIAN'S FIRST CIRCULAR CITY

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### **Abstract**

*This study aims to develop a scenario for Cimahi, a city in Indonesia to take a major step forward to a circular economy (CE) and become the first Indonesian circular city (CC). The project will focus on the city's waste system and identify aspects that can act as drivers to transition away from the current linear economy model. It incorporates tangible and practical collaborative measures to aid the move toward a circular city status. The scenarios will help urban and city planners to navigate the uncertainty of the future in the short and long term in managing the city waste system. Each scenario describes the situation and potential impacts that will have on Cimahi's waste systems and informs about the opportunities, risks to anticipate the possible implications on urban problems due to city waste. This will target waste trading and recycling operations and promote the improvement of relevant institutions for waste trading and more participatory activities among stakeholders. The main breakthrough will be to identify the waste sector areas that provide a significant and tangible contribution to the practical implementation of a circular city. The results will make a scientific contribution to the circular economy discussion at the city level in terms of its implementation in a developing country. The scenarios themselves will enable Cimahi to identify and scale up its formulation of projects and their adoption at various levels in the waste sector. The findings will aim to establish a plan for Cimahi as an important pilot project as the first Indonesian circular city signalling a repurposed waste chain as the focal issue.*

**Keywords:** *circular economy, circular city, scenario, Indonesia, developing country, indicators*

### **Introduction**

Waste is a leading visible problem for cities and waste management will remain a key focus for circular metabolism in developing countries, including Indonesia (e.g., Ferronato et al., 2019; J. Padilla & Trujillo, 2018; Nizami et al., 2017). Like many other developing countries, in which the CE concept has started to be adopted, it shows that in some cases, Indonesia has already implemented the principles to some extent (Nurdiana et al., 2019). In 2025, Indonesia is expected to generate 70.8 mil tons per year, of which 60% of the waste composition is organic and followed by plastic at 14%. In this regards, it seemed that Indonesia stresses on the activities of waste picking, by combining and placing it on the sustainability agenda



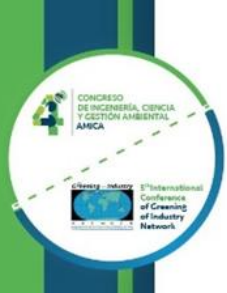
particularly by Indonesian companies<sup>7</sup>. Some literature shows how Indonesia is transitioning the paradigm from end pipe solution, 3R (reduce, reuse, recycle), EPR (Extended Producers Responsibility), and now to a CE. The literature findings also indicated the shifting of Indonesian policy directive, in particular about waste from Law No. 18/2008 concerning the solid waste management, to Law 32/2009 on Environmental Protection and Management and the issued of Government Regulation/*Peraturan Pemerintah* (PP)<sup>8</sup> No. 81/2012.

Recently, CE discussions in waste may extend to wider aspects, such as waste collection, waste trading, recycling, and remanufacturing (Wilts, von Gries, & Bahn-Walkowiak, 2016). As a living system, a city requires simultaneous integration between its environmental, economic and social aspects. Until now, there are visible gaps in this integration to enable circular economy tenets (Homrich, Galvão, Abadia, & Carvalho, 2018). However, on the one hand, CE has received considerable attention as an approach that promises to reconcile ecological systems and economic growth (Franco, 2017), on the other hand, the legislative, institutional and cultural issues are considered as some of the significant challenges towards CE (Homrich et al., 2018). Prendeville et al. (2018) also identified that political leadership, a future vision, identifying experimental approaches, developing contextual knowledge and stakeholder engagement are necessary conditions. In parallel, the data collection and availability, behavioral aspects, and also financial support are among the most crucial challenges for CE implementation (Geng et al., 2012; Bechtel et al., 2013). Other potential problems, i.e., finance, critical economic enablers, skills, consumer behavior and business models, and multi-level governance were also discussed by Bourguignon (2016). Added to this, Ritzen and Sandstrom (2017) mentioned that the most dominant barriers to CE included attitude and knowledge, the integration between functions, value chain structure, finance, and technology.

As well as any other cities in Indonesia, waste becomes a big issue in Cimahi. Its population density surges at 13,964/km<sup>2</sup> within an area of 40,2 km<sup>2</sup>. The waste generation rate is estimated at 2.5 litres/person/day. Cimahi is selected as it is an industrial city with mixed land use urban planning and increasingly interconnected systems suffering complex environmental and social problems. It represents a complex urban challenge with mixed land use and faces an urbanisation problem, as well as how to manage and transform issues to provide better living conditions given huge environmental problems. Ineffective city waste management has created multiple side effects. These include negatively affects on floods and undesirable social problems for slum areas. Waste dumping into rivers and streams has serious effects on water quality for those who depend on the river for their life. The rise in industrial and municipal waste

<sup>7</sup> Afsah and Wheeler (1996), OECD (1999), Nazeck, E.M (2001), Sutamihardja (1994) in Resosudarmo (2002), Syahrir et al (2002), Alisjahbana and Yusuf (2003), GHD Hassal, Sa'id (2008), Rahman, M.N et al (2009), Novessro (2009) and Willar et al (2010), Kaniawati (2017), Kementrian Lingkungan Hidup dan Kehutanan (2017).

<sup>8</sup> Based on Law No 10 Year 2004 on the Formulation of Laws and Regulations, the Indonesian legislation comes in different forms. PP is in the third hierarchy after the 1945 constitution and Law (*Undang-Undang/UU*) and Government Regulation in Lieu of Law (*Peraturan Pemerintah pengganti Undang-Undang/Perpu*). The next level after PP is presidential regulation (*peraturan presiden or Perpres*) and Regional Regulation (*Peraturan Daerah/Perda*).



threatens the good functioning of the city as a living system. It also complicates how the city handles societal problems associated with ineffective waste management.

The study aligns well with the Cimahi priorities that focus on the need to strengthen regional institutional devices to improve the quality of natural resources management and the conservation of environmental functions. Similarly, this project is in accordance with the Cimahi municipality vision to bring Cimahi forward in a more environmental way. The future scenarios are intended to become a tool for Cimahi to become a circular city as it will engage with relevant institutions in waste sectors and target a zero waste future. To achieve, this needs research to explore stakeholders' motives and how they might better engage in collaboration. Hence, there is a need to introduce and promote the waste trading and recycling scheme by addressing various targeted groups and relevant institutions to ensure the delivery of knowledge and skills to leverage the understanding of waste management towards circular economy approaches. Here, the circular city reflects the achievable and measurable performances of circular economy confined to city level. The targeted waste will be nonhazardous industrial waste from industrial and municipal sources. Taken together, this study will be a descriptive-exploratory analysis to evolve Cimahi as a pilot project of a circular city in Indonesia

## Objective

To ensure that the future scenarios and initiatives are connected to the Indonesian cities reality, this study will be based on empirical information from Indonesian cases in comparison to the general circular cities indicators and methodologies scrutinized from the literature review. Therefore, from the identified problem, the primary research question for this study is:

“how to operationalize and support the circular economy transition in city?”

To answer the research question, there is a need to divide it into several sub-questions. It is assumed that the answers to the research and sub-research questions will help develop scenarios for the circular economy for Cimahi. From the central research question then is divided into some sub-research questions which presented as follows: (i) What are the suitable indicators for Cimahi to evaluate circular economy at the city level?, (ii) To what extent Cimahi has addressed the proposed indicators and how these are perceived among the stakeholders?, and (iii) what might become the proxies and challenges to practice CE at city level?

## Methodology

This study will use mixed methods and compiled information from interviews, Focus Group Discussion (FGD), and literature reviews (e.g., policies documents, peer-to-peer journals retrieved from Scopus, and working papers). The interviews will be conducted in-depth to cover the inclusion of different types of stakeholders involved in the waste chain in Cimahi. The idea is to gather information from diverse stakeholders to avoid any bias due to particular interests. It will also determine what information is currently



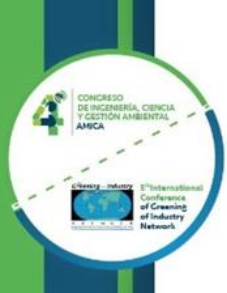
available concerning the city waste system which may be not necessarily have been understood before. The interviews and FGD will involve different stakeholders in waste sectors included the industries, NGOs, community groups (e.g., waste banks, waste pickers), households, local governments, provincial governments, and academia. For this reason, it is necessary to have a descriptive-exploratory analysis from an interdisciplinary approach on how to make Cimahi more regenerative. Here, the scenarios development will encompass a diagnosis and a design phase. The diagnosis will analyse the current state of the waste system in Cimahi. It will define and map the resources and impacts in the waste sector, its potential value, and the stakeholders involved. The design phase will describe the vision of a circular city and explore reliable business models. It will also refine the community engagement needed to address appropriate interventions to move towards a circular city.

The key stakeholders to be included will be drawn from the business and industry sectors in Cimahi and who can bring significant impact to the city in terms of economic growth, environmental impacts and benefits to local households, community groups (e.g., waste pickers association, waste banks), government (municipal and provincial), and academia. There are some 593 large and small industries in different sectors in Cimahi and the study will target interviews to cover 70% of industries and businesses for this selected sector. Information collected from households will be conducted using mixed methods; i.e., qualitative sampling to obtain the information on their behaviour; and, quantitative sampling to obtain the total waste produced per capita and, in doing so, aim to validate the existing data of waste generated per person in Cimahi.

The analysis of interviews will employ content analysis, whereas a quantitative analysis will be applied to provide a picture of the material flows happening in the waste chain and their potential value. The information will be juxtaposed to formulate the design of the road map for waste trading and recycling operations targeted to enable Cimahi to transition and become a circular city.

## **Discussion and analysis**

This part is intended to compile a general deduction of the different approach between Cimahi experiences and the indicators compiled from other practices. For this process, this study takes into account refereed literature and recognized documents to help identifying the different approach which may be not fit into Cimahi situation. To identify the difference, the process will be commenced by framing the indicators and strategy which has been derived from the literature, and followed by vis a vis process to depict the Cimahi practices to those factors. The idea is to give an overview whether the outcomes of such implementation for CE indicators has been relevant with Cimahi, and what stakeholders that have involved in the waste system. Further, this section also provided an analysis of the scenarios development, which based on the interview findings and identify what kind of barriers which may hinder the process. In particular for the barriers, this study grouped the main challenges for Indonesian cases into institutional barriers, social barriers, and business culture. The challenge for CE implementation is translated to enabling the conditions for deploying trust among stakeholders. The collaborative activities could create circular solutions.



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