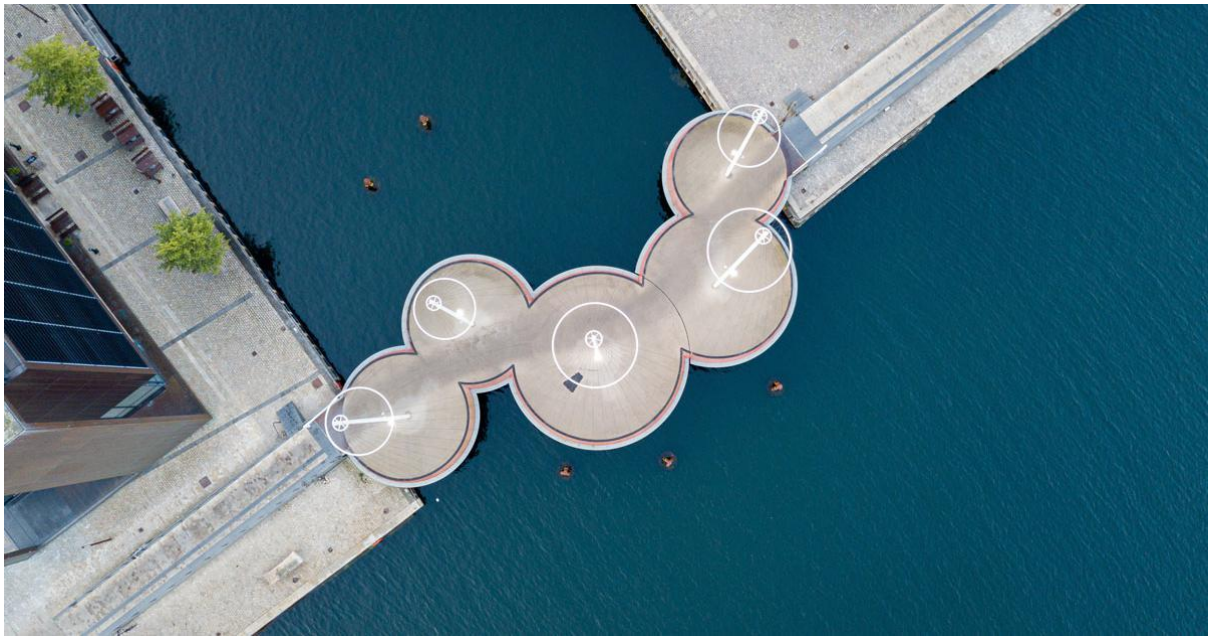
TRANSITIONING TO CIRCULAR ECONOMY

THE CASE OF THE CITY OF COPENHAGEN



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Cities and Sustainability

Master Thesis

2021

AALBORG UNIVERSITY

STUDENT REPORT

PREFACE

This study is conducted by the last semester student of Urban, Energy and Environmental Planning programme, Cities and Sustainability specialty, and is carried through April to June, 2021. The author holds a bachelor's degree in engineering of Regional Development and Urban Economics from Riga Technical University. Her previous projects at Aalborg University have dealt with sustainable mobility, smart waste management, and circular economy indicators.

Acknowledgments

First and foremost the author would like to thank her supervisor Anja Marie Bundgaard, that took part in this challenging task and never stopped providing valuable guidance throughout the research process. The author would also like to thank the people interviewed – Jonas Åbo Mortensen and Susanne Lindeneg. Without their expertise and insights of the waste management and circularity processes in the City of Copenhagen it would have been a way more difficult task to carry out this research. Big thanks goes out to Esther Penthien for being a great link to the Center of Urban Development in the City of Copenhagen. Lastly, the author would like to thank her family and friends for their continous support, advice and encouraging words throughout the process.

Reading Guide

The project is structured in chapters and sub-chapters, and a full list of them can be found in the Table of Contents. The figures and tables are all numbered in order and can be identified in the List of Figures and List of Tables at the end of the report. The APA 6th edition referencing style is used throughout the report, with a full Reference list provided at the end of the report. Following the Reference list, an Appendix can be found with interview guidelines. Some of the reviewed material was in Danish and the author has A2 level in Danish, therefore the author is responsible for any misinterpretations or errors of translation. The picture on the front page is a Stock photo attributed to Nordic Innovation (www.nordicinnovation.org)

ABSTRACT

Circular economy has received an increasing attention in both academia and in practices. There are more and more cities that are transition to become circular, however there are several policy and governance issues related to that. Cities are often struggling with setting strategic visions and establishing a proper system for measuring the progress of implementing circular economy.

This study looks into a concrete case – City of Copenhagen, Denmark – to evaluate their success within circular economy and to explore the possibility of strategic urban planning accelerating the transition towards becoming more circular.

In order to carry out this study, a research question is formulated:

How could Strategic Urban Planning on a city level accelerate a transition towards circular economy in the City of Copenhagen?

The main purpose of the study is to analyse the policy and governance perspective of circular economy within the City of Copenhagen, as well as apply strategic urban planning approach to their current efforts and give recommendations for a transition towards circular economy.

Keywords: *circular economy, circular cities, strategic urban planning, City of Copenhagen, policies, governance, measuring implementation*

EXECUTIVE SUMMARY

The population in the urban settlements is growing, and it is expected that by 2050, 70% of the world population is going to live in the cities. Unfortunately, cities contribute with huge energy consumption and generation of greenhouse gas emissions, putting climate change as one of the biggest challenges cities have to face.

Cities have the capacity, knowledge, and resources to tackle these challenges and contribute to sustainable development, where one of the approaches accelerating a green transition is circular economy. More and more cities are mobilising their efforts to become circular, however there are several problems related to this. Development of proper policies is insufficient, governance practices are still very silos based, and the approaches for measuring implementation of circular economy within cities are not clear.

This study looks into the case of City of Copenhagen to understand their current efforts within circular economy and provide insights from the strategic urban planning that could accelerate this transition.

The study follows abductive approach and has built the research design around case study. Main methods employed are literature review for developing conceptual framework, and document analysis and semi-structured interviews to analyse the City of Copenhagen. The concept used for the analysis is Strategic Urban Planning introduced by UN-Habitat.

Within state of the art academic articles, practitioners' reports and city strategies are reviewed in order to describe preparation for the transition towards circular economy, policy, and governance practices, as well as importance and approaches of measuring implementation. The overall conclusion is that cities should start with understanding their status quo, identify their potential and build the strategic policies from there. When it comes to governance practices, they should be transparent and multi-levelled. In order to properly measure the implementation of circular economy, it is necessary that the cities develop targets they want to reach and establish system for measuring success.

City of Copenhagen is located on the Eastern part of Zealand and is part of the Capital Region of Denmark. It is the most populated municipality in Denmark. For defining circularity in their city, the Ellen MacArthur Foundation's Butterfly model is used.

The city is analysed following UN-Habitat's approach and the evaluation is divided in four categories – Urban Situation Analysis, Sustainable Urban Development Planning, Sustainable Action Planning, and Implementation and Management of CE projects.

Technical and Environmental Administration is the one in charge of most of the circular economy efforts within the city, they are also the ones overviewing the Circular Copenhagen. Resource and Waste plan 2024, that serves as the action plan for achieving the waste management targets set for the municipality. Even though there are several documents setting the strategic course and vision within the city, they are not specific for the circular economy, and within that area the municipality is lacking a strategic vision.

Within the Resource and Waste plan, City of Copenhagen has introduced 6 topics with 29 measures and 13 concrete objectives that need to be reached by 2024. The topics deal generally deal with improving waste management practices in the City of Copenhagen. One of the most notable initiatives emerging from the Resource and Waste plan, is the development of Circular Copenhagen Innovation platform, that is mostly dealing with establishing public-private partnerships for reaching the targets set in the plan. The Innovation platform also deals with

reporting different initiatives City of Copenhagen is undergoing to external stakeholders and involved parties, such as C40, Circular Cities Declaration, etc.

When it comes to measuring implementation of circular economy, City of Copenhagen does not have a concrete approach. They have a mid-term evaluation of the Resource and Waste plan coming soon, but the details of a specific evaluation are not completed yet. The municipality allows the idea of introducing new actions in some of the topics if the milestones are not going to be reached.

Strategic urban planning could definitely help the City of Copenhagen to transition to circular economy by setting a common vision for that. If the city truly wants to become a circular city, there are additional efforts needed, that are very targeted towards this transition. There are good initiatives already seen in the City of Copenhagen, and management practices can work for the transition, however they have to be unified under the same strategic course – become a circular city.

This study contributes to the field of urban planning by investigating circular economy practices in the City of Copenhagen and by applying strategic urban planning approach.

LIST OF ACRONYMS

CE	Circular economy
EU	European Union
KL	*Kommunernes Landsforening* Local Government Denmark
OECD	Organisation for Economic Co-operation and Development
SDG	Sustainable Development Goals
SUP	Strategic Urban Planning
TEA	Technical and Environmental Administration
UN	United Nations
UN-Habitat	United Nations Human Settlement Programme

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1 INTRODUCTION

Currently 50% of the world population (3.5 billion people) live in the cities, and it is predicted that by 2050 70% of the world population is going to live in urban settlements (United Nations Statistics Division, n.d.). Even though cities occupy only 3% of Earth's land, they attribute with 60-80% of the energy consumption and generate approximately 70% of the human-induced greenhouse gas emissions (UN-Habitat, 2019) putting climate change as "one of the greatest challenges facing cities" (UN-Habitat, 2019, 7). The rapid pace of urbanization puts enormous pressure on cities' services (e.g., waste and water management), living environment and public health (United Nations Statistics Division, n.d.).

Cities and their managers (e.g., policy makers and urban planners) have the capacity and knowledge to deal with these challenges, tackle the climate change and contribute to the sustainable development (Prendeville, Cherim, & Bocken, 2018). Cities are "mutable 'multi-faceted' entities formed by 'various agents, organizations and networks'" (Prendeville et al., 2018) that are seen as important catalysts for initiatives leading to a more sustainable future (Ellen MacArthur Foundation, 2017; OECD, 2020; UN-Habitat, 2019). One of the ways cities can do that is by using circular economy approaches and stimulate the transition towards more circular societies (Ellen MacArthur Foundation, 2017; OECD, 2020).

CE is understood as a system where nothing goes to waste, and it is based on three core principles: i) design out waste and pollution, ii) keep products and materials in use and iii) regenerate natural system (Ellen MacArthur Foundation, 2019). In Kirchherr, Reike, & Hekkert (2017) 114 definitions of CE are reviewed, and a broad definition of CE is proposed, as follows:

"A circular economy describes an economic system that is based on business models which replace the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes, thus operating at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations." (Kirchherr et al., 2017)

Even though CE concept and approaches has been around for decades (Ghisellini, Cialani, & Ulgiati, 2016; Merli, Preziosi, & Acampora, 2018), it has gained more attention in the past years, especially amongst institutions, scholars and businesses (Merli et al., 2018), and it is often closely related to sustainability (De Schoenmakere, Hoogeveen, Gillabel, & Manshoven, 2018; Geissdoerfer, Savaget, Bocken, & Hultink, 2017; Kirchherr et al., 2017; Suárez-Eiroa, Fernández, Méndez-Martínez, & Soto-Oñate, 2019).

CE principles bring a variety of environmental, social and economical benefits to the cities as well (Alaerts et al., 2019), and it can foster the emergence of thriving, liveable and resilient cities (Ellen MacArthur Foundation, 2019). Cities have the opportunity to embed principles of CE across all its functions and elements, including built environment, energy systems, urban mobility system, urban bioeconomy and production systems (Ellen MacArthur Foundation, 2017).

There is no agreed and unified definition of what a circular city means (Williams, 2019). When typing in "Google" search engine and asking for a "circular city definition", there are not that many results that would define this concept. The first definition and the bottom of the first page is from Circular Cities Declarations, that defines circular city as:

"one that promotes the transition from a linear to a circular economy in an integrated way across all its functions in collaboration with citizens, businesses and the research community. This means in practice fostering business models and behaviour which decouple resource use from economic activity by maintaining the value and utility of products, components, materials and nutrients for as long as possible, in order to close material loops and minimise harmful resource use and waste generation. Through this circular transition, we seek to improve human wellbeing, reduce emissions, protect and enhance biodiversity, and promote social justice, in line with the Sustainable Development Goals" (Circular Cities Declaration, n.d.-b)

Even though this definition tackles many of the elements that circular cities are dealing with, it is not a commonly used definition. Policymakers and urban planners are currently mixing and confusing circular city approaches, and that mainly comes from different understandings of what a circular city is (Marin & De Meulder, 2018). Policymakers are struggling with their perception of circularity in urban contexts, including cities, making the initiatives and concept ambiguous (Prendeville et al., 2018). The lack of properly used terminology is a barrier when defining circularity in cities, and, if the terminology is not consistent, it can lead to different outcomes (Petit-Boix & Leipold, 2018).

It is rather hard to measure success in CE in cities, when there are difficulties defining it in the urban context (Bolger & Doyon, 2019). CE policies can help to describe and define circularity in a proper manner. Development of CE policies and frameworks on different levels (international, supranational, national, local) can address the problems CE is trying to solve and bring benefits that CE can create (Ellen MacArthur Foundation, 2015). City governments have the unique possibility to lead the transition towards CE, because of their ability to involve key stakeholders from public and private sectors, while utilizing the policy levels and measures at their disposal (Ellen MacArthur Foundation, 2019; Oberle et al., 2019). Unfortunately, often times governance of CE is problematic, because of thinking in silos (Jonker & Montenegro Navarro, 2018; OECD, 2020), so it is important that the administrations move away from that and introduce more holistic and strategic approaches (Jonker & Montenegro Navarro, 2018).

Several cities have introduced their CE policies (Fitch-Roy, Benson, & Monciardini, 2021), however it can be seen that they primarily focus on last stage of the so called "take-make-dispose" system"[1] (Merli et al., 2018), through waste treatment (mostly recycling) (Hartley, van Santen, & Kirchherr, 2020) or resource management (OECD, 2020). Ghisellini et al. (2016) argues that CE is an interdisciplinary concept and should not only focus on better waste management, otherwise it might lead implementation of CE to fail.

One notable city in this context is City of Copenhagen in Denmark. In 2016 Copenhagen became a part of the Circular Cities Network[2] launched by Ellen MacArthur Foundation (Ellen MacArthur Foundation, 2016). In late 2020 Copenhagen, together with other major European cities, signed "Circular Cities Declaration" that enables the transition from a linear to circular economy (Circular Copenhagen Platform, 2020). Currently, Copenhagen does not have a strategy developed specifically for CE, the main plans in relation to this are Resource and Waste Management Plan and Copenhagen Climate Plan (Circular Cities Declaration, n.d.-a). Even though Copenhagen is recognized as "a frontrunner in sustainable urban development" (Circular Cities

[1] "Take-make-dispose" is a currently dominant economical model, that is understood as a linear system, where resources are taken, made into products, and after disposed – they become waste (Ellen MacArthur Foundation, 2015). Circular economy works as an opposing model trying to tackle the challenges and flaws seen in linear economy.

[2] "A global network of city leaders who are pioneering the application of circular economy approaches to address today's urban challenges" (Ellen MacArthur Foundation, 2016)

Declaration, n.d.-a), according to OECD's survey on "Circular Economy in Cities and Regions" in terms of advancement towards the CE transition Copenhagen is recognized as a "newcomer" – the relevance and potential of the CE is recognized, but the options for advancing and implementation are still explored (OECD, 2020).

Another point regarding CE policies is that it is important that they have targets and goals that can be easily measured and therefore the progress of implementing the strategies can be tracked (Ghisellini et al., 2016; Saidani, Yannou, Leroy, Cluzel, & Kendall, 2019), because "what cannot be measured, cannot be improved" (OECD, 2020). According to UN-Habitat "Guide for Municipalities" (UN-Habitat, 2007d) "Implementation and Management of Projects" is one of the phases of Urban Strategic Planning Processes, emphasizing the importance of monitoring and reporting of initiatives. In OECD's survey on CE in cities and regions, only 14% of the surveyed cities mentions that they have an information and data system that allows to track progress and measure implementation of CE, while 59% responded that they do not have any specific information system (OECD, 2020). This is a challenge because it is not clear what data cities base their evaluations on and what milestones are used to measure the progress.

Previously, it had been explained that CE brings social, economical and environmental benefits and that it is a interdisciplinary approach, however if and when the measures in policies are proposed, they mainly focus on measuring environmental and economical dimensions, forgetting about the social dimension (Calisto Friant, Vermeulen, & Salomone, 2021).

In order to address the challenges related to strategic policies and measuring implementation of CE in cities, the main research question is proposed as follows:

How could Strategic Urban Planning on a city level accelerate a transition towards Circular Economy in the City of Copenhagen?

In order to help to answer the main research question, the sub-questions are introduced:

1. *What are the current Circular Economy policy and governance practices in Europe and how is the progress of implementation measured?*
2. *What is the current situation in the City of Copenhagen in terms of Circular Economy?*
3. *How can elements from Strategic Urban Planning advance the implementation of Circular Economy in the City of Copenhagen?*

This study aims to contribute to the academia by investigating a circular city Copenhagen and its attempts to transition to CE.

The report is structured as follows. First, in Chapter 2 a description of the theories and methods used in the study are provided, as well as description of the approach for developing a conceptual framework. Then follows Chapter 3 with the State of the art, that describes the current CE practices in Europe and frames the conceptual framework used for the analysis, explained in Chapter 4. In Chapter 5, a Case Description is provided to show the geographical and situational background for CE in the City of Copenhagen. The analysis of SUP and elements of it in the City of Copenhagen is provided in Chapter 6. Finally, the Discussion is provided in Chapter 7, followed by Conclusion in Chapter 8.

2 MATERIALS AND METHODS

2.1 THEORIES OF SCIENCE

Problem based learning, that is a key learning element at Aalborg University, has several principles, where the first, as the name implies, is starting with the problem (Askehave, Linneman Prehn, Pedersen, & Thorsø Pedersen, 2015). However, the problem has to be "authentic and scientific based" (Askehave et al., 2015). In order to find such problem, several research strategies can be used, and Farthing (2016) emphasizes that for students often times it might be beneficial to start out with a hypothesis that one seeks answer to. Research strategy used in this study that allows testing a hypothesis is abduction.

Abduction (see Figure 1) has an empirical starting point (puzzling situation), however it goes hand in hand with theoretical understandings. It seeks to discover why people do certain thing by uncovering knowledge, meanings and rules, that could provide an indication of their actions (Blaikie, 2004). The abductive "research process, alternates between (previous) theory and empirical facts (or clues) whereby both are successively reinterpreted in the light of each other" (Alvesson & Sköldberg, 2018, 5). The empirical data has influence on the researcher's initial understanding of the research topic (Blaikie, 2004), and it can be combined with a theory in order to discover the patterns that can bring understanding or explanation to the topic (Alvesson & Sköldberg, 2018). Since, there is often "many or an infinite numbers of possible explanation for a phenomenon" (Gimmler, 2019, 30), it can be beneficial to decide upon a theory that can be tested or a hypothesis. As Alvesson & Sköldberg (2018, 5) argues that "single case is interpreted from a hypothetic overarching pattern, which, if it were true, would explain the case in question". That is also the case of this study, since a single case is taken and *tested* for a theory of strategic urban planning, where a hypothesis is that strategic urban planning could, in fact, accelerate the transition to CE in the City of Copenhagen.

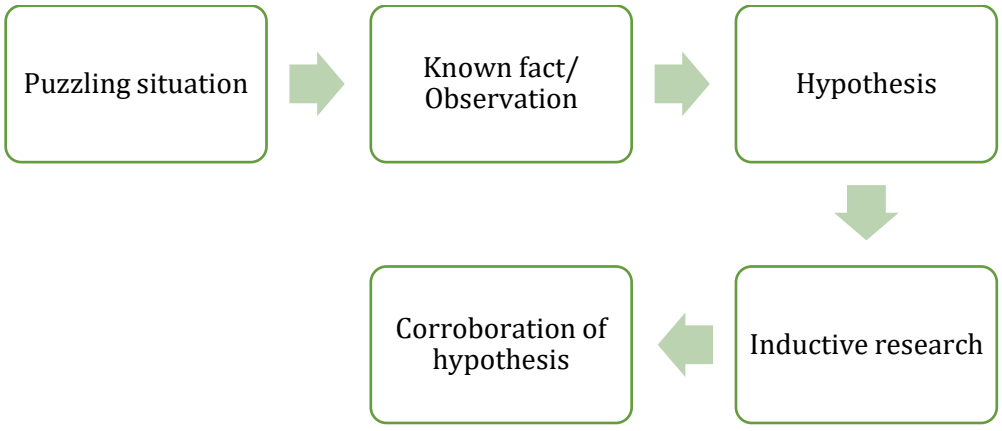

Figure 1. Schematic illustration of abductive research process (adopted from (Gimmler, 2019))

Bryman (2008) also describes the main considerations for epistemological and ontological orientations in qualitative research.

As already described before, qualitative research predominantly employs inductive approach for the relationship between research and theory. The main epistemological orientation is interpretivism, that prefers "emphasis on the ways in which individuals interpret their social world" (Bryman, 2008, 22). Abductive research strategy is also often times linked to interpretivism, because of the iterative approach that allows adjusting or even changing the theoretical starting point (because of the new empirical findings and interpretations of it)

(Alvesson & Sköldberg, 2018; Blaikie, 2004). As for the ontological considerations constructionism is used, meaning that social phenomena are continually being accomplished by social actors and that they (social phenomena) are constantly being reviewed (Bryman, 2008).

2.2 RESEARCH DESIGN

This study forms the research around case study design.

There are several understandings of what a case study is and how it can be used in urban planning (Farthing, 2016). Farthing (2016) argues that the best approach to perform a case study is by seeing cases as referring to a situation (or a problem) of interest in a study, for example, an attempt to solve or develop a consensus on planning problem. That is also the case of this research.

City of Copenhagen is chosen as a case for this study for several reasons. Firstly, Copenhagen is often times recognized as one of the greenest and most sustainable cities in Europe (sometimes, even in the world) that draws a special attention to it (European Commission, 2013; Urban Life Copenhagen, n.d.; Wilmott, 2020). Secondly, after an initial exploration it was understood that Copenhagen is calling itself a circular city, however the information on how the work is organized and what policies are shaping this work is limited (City of Copenhagen, 2019b, 2019a). Lastly, author is familiar with urban planning principles in Denmark, and chose Copenhagen because of its potential as a circular city (OECD, 2020).

Bent Flyvbjerg is known as one of the biggest supporters of case study method. He says that "case study *can* be used "in the preliminary stages of investigation" to generate hypotheses" (Flyvbjerg, 2006, 220), and that is partially how case study method is used in this study as well. Following the abduction principles, initial research and observations of the case have helped to develop a hypothesis that strategic urban planning can improve the implementation of CE in the City of Copenhagen. However, Flyvbjerg (2006) continues by saying that case study is not used only for preparation and the initial phase of research, it can be used as a method to test hypothesis and analyse the empirical data as well.

Yin (2003) talks about case study research designs and how that can influence the nature of research. There is a 2x2 matrix presented with four types of research designs (see Figure 2). In this research a holistic, single-case design is used (Type I), because it only focuses on the CE governance in the City of Copenhagen (that is where the singularity comes in). On the other hand a holistic approach is exploited, because it is important to describe the background of the problem and clarify the deeper causes behind the given problem (Flyvbjerg, 2006).

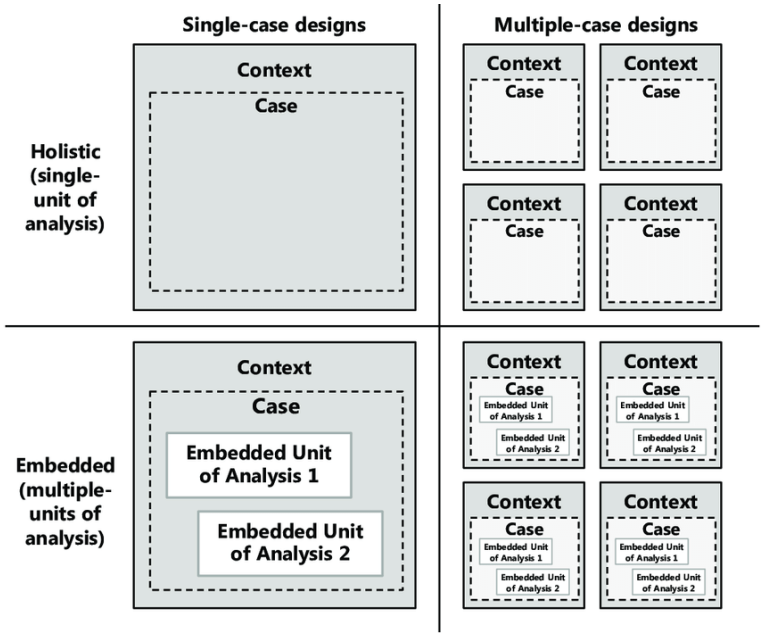

Figure 2. Basic Types of Designs for Case Studies (Yin, 2003, 40)

When it is clear that the chosen case is a strategically chosen, single case, it is necessary to understand what the purpose of the case is and what kind of questions are going to be answered. Flyvbjerg (2006) introduces four strategies that are based on information-oriented selection, and the strategies are: extreme/deviant, maximum variation, critical and paradigmatic cases. In this study City of Copenhagen is understood as an extreme case because the information is gathered on this case only, but in a deep and close manner that can be used to explain the problems and address the challenges identified.

This study uses the case study research design, and that is illustrated in the figure below.

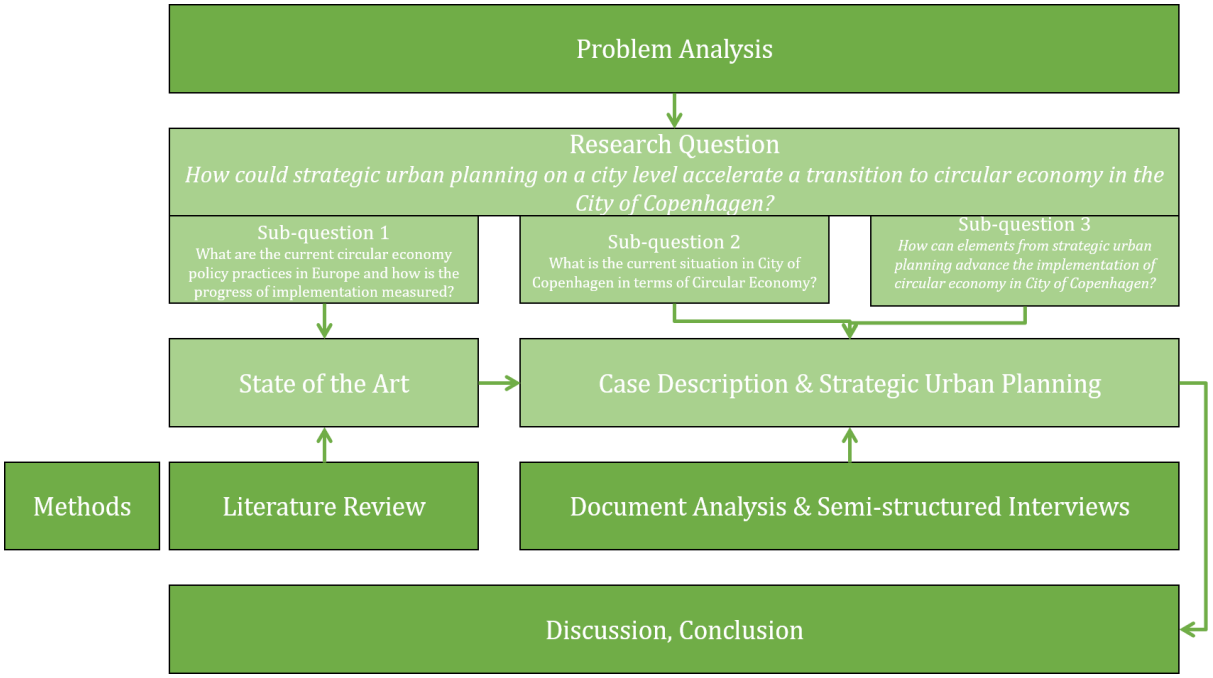

Figure 3. Research design (own production)

2.3 METHODS

In order to answer the main research question and support the case study research design, methods used in this research are literature review, document analysis and semi-structured interviews. Data in this study is primarily generated via document analysis, but was also supplemented with semi-structured interviews, and therefore becomes a mixed method study (Gross, 2018).

2.3.1 Literature Review

In order to understand the State of the art within circular cities and develop a conceptual framework for the analysis of the study, literature review was performed.

The literature review started out with a systemic search in order to find literature on specific topics and follows the approach used by the author previously (Petersone, 2021). It can be carried out by applying internet search, but to gather peer reviewed and academic articles, it is important to retrieve results from research libraries and databases (Rienecker, Jørgensen, & Skov, 2015).

The databases used for the search were Scopus and Web of Science, and the searches were performed in "title, abstract, keywords". Only peer reviewed articles in English were used. The search was performed on 30th April, 2021, and included articles published online from 2016 until April, 2021. 2016 was chosen as a starting point, because it builds on authors' previous research, where it used the same year (Petersone, 2021). Even though previously only articles from Europe and China were used, this time it was decided to broaden the search and not include geography as a limitation.

The main search term used was "circular economy" in a combination with "city", "planning" and a wildcard[3] "local govern*". The focus on search was within the field of urban planning, however it was decided to leave the term "urban" out of the keywords, because it greatly narrowed the results, but excluded articles that talked about planning in cities without mentioning "urban".

The search gave 145 results in Scopus database and 143 in Web of Science. After eliminating duplicates and screening the titles, a bit more than 60 articles were found as potentially relevant for the study. When reading the abstracts, the biggest attention was paid to the general topic, whether the article reviewed CE in cities. Both general approaches and specific applications to concrete cities were found relevant and included in the final list of articles.

As another approach of finding relevant literature, snowballing was performed in order to not miss out on the original sources that touches upon relevant concepts that were, for example, later used as the conceptual framework. According to Rienecker et al. (2015) snowballing allows finding strong sources, since they have been used as references in published articles.

Another source of literature was articles and documents provided by the supervisor and study mates of the author.

Since the purpose of the literature review was also to explore what specific approaches are city governments employing to transition to CE, it was necessary to review grey literature. Some applications were found through snowballing in the academic literature, however most of them came from internet search. For that, database of case studies on CE in cities from Ellen MacArthur Foundation was used (Ellen MacArthur Foundation, n.d.), and only cases from Europe were

[3] Wildcards is an approach of searching approximate phrases (Scopus: Access and use Support Center, n.d.). In this case it included phrases as, for example, *government, governance, governing.*

chosen, because the author has more knowledge about planning practices in Europe and therefore concrete applications are easier to understand and interpret.

In the end, the final list of literature used in literature review consisted of 28 academic articles, 21 sources of grey literature, as well as few other sources, such as webpages.

2.3.2 Document Analysis

In order to describe the case, gather empirical data on Sustainable Urban Planning practices in the City of Copenhagen and identify the gaps, document analysis was used.

Document analysis is one of well known research methods used in qualitative research, and it can include a wide range of different documentary sources – personal documents, official documents, mass-media outputs, etc. (Bryman, 2008). In order to gain meaning and empirical knowledge of the topic studied, it is important that the document analysis is reviewed, examined and interpreted in an appropriate manner (Gross, 2018).

The main documents used in this research (see Table 1) are, as Bryman (2008) calls them, official documents deriving from the state. That means they are official documents produced by *the state*, that can be municipalities, governments and so on.

Mostly documents made by or for City of Copenhagen were used, however some country/ national level documents were analysed as well to provide the background for initiatives and illustrate the reasoning for the current situation.

Table 1. Documents used in document analysis (own production)

Document type	**Name**	**Year**
Municipal plan	World city with responsibility. Copenhagen's Municipal Plan 2019.	2019
Municipal action plan for SDGs	The Capital of Sustainable Development. The City of Copenhagen's action plan for the sustainable development goals.	2018
Status on the municipality, facts and figures	Status på København 2020	2020
Municipal waste management plan	Circular Copenhagen. Resource and Waste Management Plan 2024.	2019
Municipal government structure	The City of Copenhagen Government 2018-2021	2018
Municipal budget	Vedtaget Budget 2021	2021
Vision of TEA	Co-create Copenhagen. Vision for 2025.	2015
Status document on goals for TEA	Fællesskab København. Status på mål - 2019	2019
Strategy of FA	Økonomiforvaltningen Strategi	2019
Organization of TEA	Teknik- og Miljøforvaltningen organisation	-

Gross (2018, 545) points out that it is necessary to remember that "all documents exist within the context of their creation", meaning that the influences and situation of the time and place of their creation impact the way they are represented. So, it is also important to understand what were the conditions and circumstances under which the documents were created.

The method of data analysis used was qualitative content analysis. Bryman (2008) explains that in order to analyse the content of a material, main themes should be agreed upon and described, however not always they are specified in detail. The main themes used in the document analysis reflect the conceptual framework and SUP (see Chapter 4), and they are:

- Definition of circular economy
- Strategic planning
- Governance
- Measuring implementation

Gross (2018) stresses that documents are developed for different purposes and different audiences, that is why it is necessary for the researcher to interpret the data in order to concisely categorize and analyse it. There might be differences in the vocabulary and terms used in the documents, therefore the researcher needs to be aware of such things and describe them when encountered (Gross, 2018).

2.3.3 Semi-structured interviews

To support the main notions found in the document analysis and fill the missing links, method of semi-structured interviews was used.

In order to produce qualitative data and get personal insights from different stakeholders within CE in Copenhagen, semi-structured interviews were used. "The interview is a conversation that has a structure and a purpose determined by one party – the interviewer" (Kvale & Brinkmann, 2018, 10). Qualitative interviews have the opportunity to explore the ways in which the interviewees experience and understand their world, and it is a powerful method for producing knowledge related to human situations (Kvale & Brinkmann, 2018).

Yin (2011) stresses that semi-structured interviews and their conversational mode have many advantages, including the opportunity to develop more personal and targeted approach during the interview, however at the same time interviewer's task is to stay neutral and use the interview protocol developed in advance.

The quality of the interview method "rests on the craftmanship of the researcher" (Kvale & Brinkmann, 2018, 39), therefore in order to prepare for the qualitative, semi-structured interview the author followed the seven steps/ suggestions described in Kvale & Brinkmann (2018), and they are as follows:

1. Thematizing – the purpose of the specific interview needs to be formulated in advance
2. Designing – in order to design the interview, it is important to understand the desired knowledge that the interviewer wants to gain from the interview, but also the moral and epistemological implications
3. Interviewing – interviews need to be conducted based on the interview guide, but not forgetting the reflective approach (or "analysing when interviewing", as Yin (2011, 139) has put it)
4. Transcribing – preparation of the interview material for analysis
5. Analysing – modes of analysis depend on the purpose of the investigation and the natural of the interview material
6. Verifying – confirm the validity, reliability, and generalizability of the findings
7. Reporting – the findings of the study need to be communicated in a way that lives up to the scientific criteria, is considerate of the ethical aspects and is readable and understandable.

Even though paying attention to thematic and dynamic aspects of the interview's questions, interviewers also need to keep in mind the later analysis and the data/ information that has been developed (Kvale & Brinkmann, 2018). Another point that is emphasized strongly in both Kvale & Brinkmann (2018) and (Yin, 2011) is the art of active listening – reflecting on what the

interviewee has said and asking for clarifications are only few of the aspects of active listening, but are not limited to nodding, facial expressions, relevant pausing and so on.

When exploring potential interviewees, an initial search on Google was performed by typing "Circular Economy Copenhagen" (also, "Cirkulær økonomi Københavns Kommune"). The first result retrieved is the document "Circular Copenhagen. Resource and Waste Plan 2024", however the only contact found in the document is generic e-mail of Technical and Environmental Administration in City of Copenhagen (City of Copenhagen, 2019a). An e-mail was sent to them, unfortunately without any success. There were some other key people from TEA identified through reports and presentations found on Google, however none of them had the time for an interview.

After looking through other results, the website of Circular Copenhagen innovation platform was found. Seen as a direct link to the municipality and Resource and Waste plan, it was decided to contact the Project manager Jonas Åbo Mortensen of the initiative, whose e-mail could be easily found on the website. He then agreed to have an interview and the topics discussed can be seen in Table 2. As one of the last questions during the interview, Jonas was asked about other relevant people that could be interviewed, and he suggested getting in touch with Finance Administration.

At a later point while reading through OECD's report on CE in Cities, relevant people from City of Copenhagen were identified and contacted, where one of the people – Susanne Lindeneg – agreed to have an interview. Initially, they were contacted in order to talk about the work for OECD's report, but it turned out that Susanne is leader of a team "Circular Economy" in TEA at City of Copenhagen, so the interview could also touch upon broader topics, that are noted in Table 2. Since Susanne's interview already happened close to the thesis hand-in date, she was not asked about other relevant people to interview.

To follow Jonas' suggestion and gain more knowledge about urban planning approaches in City of Copenhagen, Finance Administration and specifically the Center for Urban Planning were contacted. Unfortunately, none of the people had the time for an interview, but some questions were answered via e-mail communication.

All interviews were carried out in an online setting using Microsoft Teams, and the main topics of the interviews were sent to the interviewees in advance via e-mail.

The interview guides were created specifically for each interview and followed during the process. Interview guides (see Appendix 1 – Guidelines for the Interview with Jonas Åbo Mortensen& Appendix 2 – Guidelines for the Interview with Susanne Lindeneg) included introductory and final remarks, main topics, and open-ended questions for discussion, as well as consent for recording and agreements for the further communication regarding specific quotes and/ or follow-up questions and/ or clarifications.

Table 2. Overview of the conducted interviews (own production)

Name	Role	Institution	Date	Topics
Jonas Åbo Mortensen	Project Leader	Circular Copenhagen Innovation platform	21-05-2021 (with a follow-up communication via e-mails)	The platform; Partnerships; Political and strategic planning aspects; Collaboration with the City of Copenhagen; Best practices
Susanne Lindeneg	Team Leader	Technical and Environmental Administration, City of Copenhagen	04-06-2021 (with a follow-up communication via e-mails)	Implementation of Resource and Waste plan; Collaborations within and outside of the municipality; Financing the waste management; Role of the national government

After the interview, the initial reflections and thoughts were noted down, as suggested by Kvale & Brinkmann (2018). Then followed the transcribing of the interviews, analysis, verification, and reporting.

Both Jonas and Susanne were contacted after the interview with some follow-up questions or something that was not clear while transcribing. They provided their inputs, and they are included in the list of references. It was also agreed that in the time between thesis' hand-in and exam the author is going to send an Executive summary to both Jonas and Susanne for their feedback and reflection on the work done.

2.4 Developing Conceptual Framework

In order to develop a conceptual framework for the analysis part of the study, a literature review was performed (see Chapter 2.3.1).

After conducting literature review, it was chosen to base the analytical part around the concept of Strategic Urban Planning developed by UN-Habitat (2007a), where the main purpose is to determine where an organization (in this case – a city) is heading and how it can get there by analysing the current situation first, identifying strong and weak points, and opportunities and threats, and developing a strategic action plan to achieve the previously set targets.

The purpose of using this approach was to identify to what extent City of Copenhagen has already worked with SUP and what can still be improved according to the good practices and recommendations in UN-Habitat reports "Inclusive and Sustainable Urban Planning: A guide for municipalities" (UN-Habitat, 2007a, 2007b, 2007c, 2007d).

Initially the UN-Habitat framework was developed with specific learnings from the Balkan cities as a tool to tackle the ongoing challenges related to military conflicts occurring in the region. Nevertheless, it was decided to use the approach anyway, because it provides a universal framework for strategic planning that can be applied to different cities. The finding of an application of this concept to CE in cities developed by Bolger & Doyon (2019) amplified the relevance for using the framework in the context of City of Copenhagen.

In Bolger & Doyon (2019) strategic planning is used because of its ability to guide future action and to balance multiple objectives in multidimensional processes. Their research objective is rather similar to this, where the main research questions stand as follows:

"How are local governments facilitating circular economy initiatives through strategic planning? What are the opportunities and barriers when applying circular economy principles through local strategic planning?" (Bolger & Doyon, 2019, 2185)

Even though there are similarities, Bolger & Doyon (2019) study was only used as an inspiration and an entry point for the analysis of this research. Following the abductive process (see Chapter 2.1), conceptual approach for the analysis was slightly adjusted *on the go*, meaning that after describing the current situation in the City of Copenhagen and conducting interviews, it was seen that there were specific aspects that needed to be addressed, even if that was not the initial idea, for example, description of monetary and finance side of the CE management in City of Copenhagen was expanded in the analysis.

The conceptual framework used for the analysis is explained to a closer detail in Chapter 4.

3 STATE OF THE ART

Cities inevitably play an important role in testing and implementing CE principles, and that can be seen in both academia and in practice. There is increasing attention to the role of the cities in facilitating transformations towards more sustainable production and consumption patterns (Fratini, Georg, & Jørgensen, 2019). Cities are crucial actors in terms of trying out the proponents of the CE and experimenting (Bassens, Kębłowski, & Lambert, 2020; Fratini et al., 2019), since they have high concentration of resources, capital and talent (Ellen MacArthur Foundation, 2017). World Economic Forum (2018) also suggests that, as already previously mentioned, more than 80% of GDP is generated in cities, and that makes them "ideal testing grounds for circular economical models" (World Economic Forum, 2018, 9).

3.1 DEFINING CIRCULAR CITIES

Previously it had been mentioned that there is no unified definition of what a circular city is. In order to tackle as many elements as possible when analysing circularity of Copenhagen, it is necessary to review how do other authors define circular city. A word cloud of the most used terms can be seen below:

Figure 4. Word cloud of the most used terms related to circular cities (own production)

In order to develop a word cloud, descriptions of circular cities in 10 academic articles and 9 praticioners' documents were used. Several sources had described circular cities as a compilation of other definitions they had reviewed, e.g., Girard & Nocca (2020) and Jonker & Montenegro Navarro (2018).

In the reviewed documents, 5 of them were circular city policies for specific cities – Glasgow, Peterborough, London, Amsterdam, and Paris. In majority of these policies cities have not defined what a circular city means in general, however they have specified goals or visions for their cities. Fusco Girard & Nocca (2018) describes the latter as a good practice, because it is necessary to

identify what "areas" can be used to boost the circular processes in specific places. The only exception is Peterborough that have introduced how they understand a circular city in a more general sense (Opportunity Peterborough, 2015).

Even though cities have started their actions towards becoming more circular, the next challenge that needs to be faced is a circular city definition, that would embrace all relevant aspects from CE, but would shift them to the city perspective (Cavaleiro de Ferreira & Fuso-Nerini, 2019) (for example, using the terms compiled in Figure 4). According to OECD (2020) it is difficult to also build an indicator and measuring framework, if there is not an agreed definition of circular cities in place, because it is not clear what it tries to measure.

3.2 Preparing for the Transition towards Circular Economy

In many cases transition towards CE in cities starts with the state of the art. For that several different tools can be used, but the unifying notion is to follow the approach proposed by UN-Habitat (2007a) and answer these questions – where is a city now, where does it want to go and how can it get there.

A similar approach is presented in IMPEL's[4] report "Making CE work", where they present strategic planning cycle (see Figure 5) to develop appropriate CE strategies (IMPEL, 2019). The cycle consists of four stages, where the first one determines the specific context in which the CE operates, then that is used as basis for setting priorities. Afterwards priorities are translated into goals, that form a plan with specific actions and responsibilities.

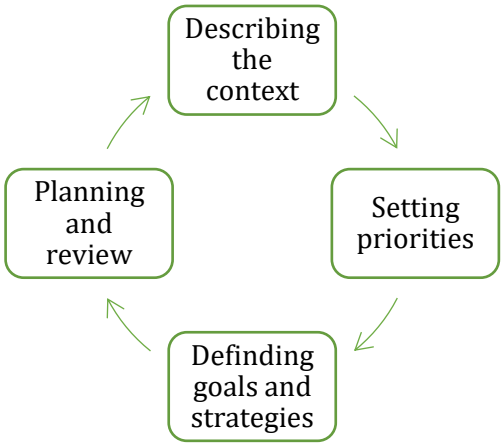

Figure 5. Strategic Planning Cycle (adopted from (IMPEL, 2019))

Ellen MacArthur Foundation (2015) suggests that the policymakers that decide to transition to CE follow three steps to design strategy for that:

1. Align on starting point, ambition, and focus
2. Assess sector CE opportunities
3. Analyse national implications

These steps follow with sub-categories and objectives and desired outcomes for each of them (Ellen MacArthur Foundation, 2015). The methodology was tested in a pilot country – Denmark. By identifying the opportunities, barriers, and national implications, it is expected to form a base

[4] IMPEL - European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL, 2019)

for developing proper policies to advance to CE. However, this toolkit mostly focuses on national or regional perspective, not taking into account city level.

When it comes to applications to concrete cities, Obersteg, Arlati, & Knieling (2020) emphasizes the importance of an urban space when shifting towards CE. They conclude that spatial dimension cannot and should not be underestimated when handling flows in the cities, because that is where the everyday action and use happens and that can change, amongst others things, land use (Obersteg et al., 2020). That is why several authors have analysed the current status of cities reviewed, including Cavaleiro de Ferreira & Fuso-Nerini (2019) to measure Porto's circularity, Christis, Athanassiadis, & Vercalsteren (2019) to give guidance for CE policies in Brussels, and Fusco Girard & Nocca (2018) to review concrete CE implementations in Amsterdam, Antwerp, Glasgow, London, Paris and Rotterdam.

Turcu & Gillie (2020) reviewed CE governance in London, and one of their starting points is to identify how national and regional planning influence local planning, and what actors are involved in these processes, emphasizing the importance of stakeholders and collaborations. Similarly, Vanhamäki, Virtanen, Luste, & Manskinen (2020) looked into transition of towards CE at a regional level, concluding that it is a systemic change that should happen at all levels of governance by working together, where local authorities within a region are working in line with the same vision and goals as there have been set at a regional level.

The reviewed cities have different approaches in understanding their status quo. Amsterdam started out with developing a City Doughnut (Doughnut Economics Action Lab, 2020) that formed the basis for the Amsterdam Circular Strategy 2020-2025 (Gemeente Amsterdam, 2020). In Glasgow's case they identify where they are by describing several initiatives that have and/or are forming the transition towards CE, including other strategies, such as "Our Resilient Glasgow" (Glasgow City Council, 2020). In London's and Peterborough's cases general description or identification of their current status was not found (at least in their policies for CE).

Paris' approach involved defining main challenges for the city and understanding their urban metabolism[5], where the findings show main areas and drivers for implementing CE in Paris, such as opportunities to increase the recycling rate of waste in order to minimize the outputs of the city and circulate more materials within. (Mairie de Paris, 2017).

UM have been applied for policy analysis in cities (C. Kennedy, Pincetl, & Bunje, 2011), and can work as a tool for policy makers for identifying opportunities for CE actions and for monitoring the progress (Bolger & Doyon, 2019) or for developing strategic plans for CE transition (Jonker & Montenegro Navarro, 2018). According to Barragán-Escandón et al. (2017) UM should be the starting process for generating urban policies, because the traditional urban planning does not focus on promoting environmentally friendly cities. UM can also be integrated in the strategic planning processes both as a theoretical, assisting approach and powerful analysing tool (Longato, Lucertini, Dalla Fontana, & Musco, 2019).

In 2020, a report with circular opportunities in the waste sector was developed for the Capital Region of Denmark (Thorin, 2020), that the City of Copenhagen is part of. As part of the report, a material flow analysis of the waste streams in the Capital Region in 2016 was developed (see

[5] Urban Metabolsim can be defined as *"the sum of the technical and socioeconomic processes that occur in cities, resulting in growth production of energy, and elimination of waste" (Kennedy et al., 2007, 44)* The model quantifies the urban processes and allows measurements on four main cycles/ flows: water, materials, energy and nutrients, and there are two general methodologies in place i) based on inputs and outputs, ii) those that use biophysical indicators, using energy and exergy (Barragán-Escandón et al., 2017).

Figure 6). It analysed material inputs in five sectors – households, construction, service, industry and land use and forestry. Then the analysis illustrates the total waste generated, division in 14 waste fractions and treatment of generated waste. As it can be seen, most of the waste is recycled, then follows incineration with energy recovery, landfill, and other types of treatment.

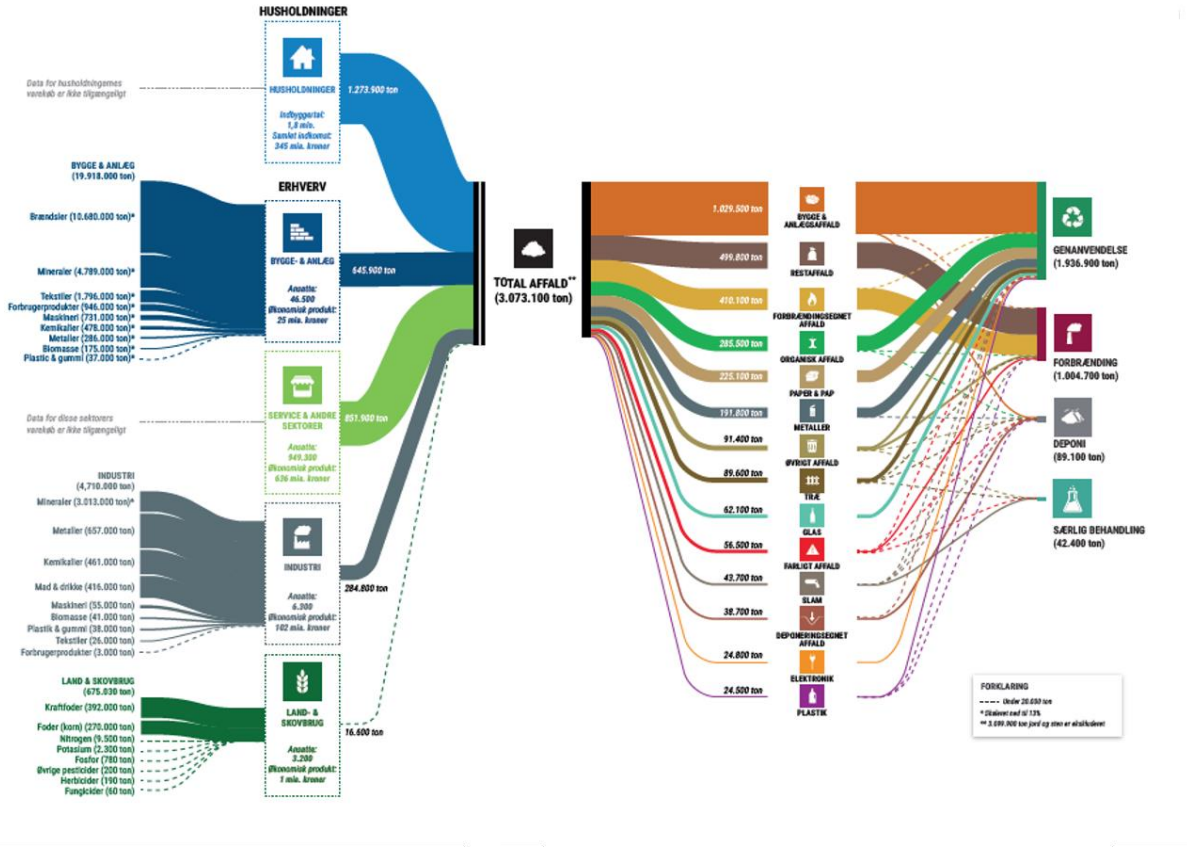

Figure 6. Material flow analysis for the Capital Region of Denmark in 2016 (Thorin, 2020)

Marin & De Meulder (2018) state that UM has been adopted as an umbrella approach for circularity within spatial practice, and that often times it *travels* across disciplines making it a multidisciplinary approach. However, it is important that people that are working with the aspects of UM have integrated thinking (Jonker & Montenegro Navarro, 2018), and also as Christopher Kennedy et al. (2007) suggests – urban policy makers should be able to understand the metabolism of their cities in order to slow down the exploitation of the resources.

It is important to know where a city is heading in order to develop a framework with milestones and objectives to reach, that help measuring the progress. This is where proper policy mix and good governance come in place to help cities transition to CE.

3.3 Policies and Governance

CE often is discussed more as a practical application not as a universal framework (Bolger & Doyon, 2019), therefore strategies on different governance levels can come in place to bridge the gap between theoretical and practical approach. However, there is still a gap in knowledge on how cities can encourage the transition towards CE (Fratini et al., 2019).

Circularity as a concept is increasing in the subject of policy innovations and urban and regional strategies (Marin & De Meulder, 2018). There are several cities that have developed their CE

strategies (Amsterdam, London, Paris to name a few (Gemeente Amsterdam, 2020; London Waste and Recycling Board, 2017; Mairie de Paris, 2017)), but also actions are taken on a supranational level. One of the most notable is European Union's CE package in 2015 with "Closing the loop" action plan (European Commission, 2015), that was followed by a newer version of the action plan in 2020 (European Commission, 2020). In 2019 European Commission released a communication stating that all 54 actions proposed in the "Closing the loop" action plan are either completed or being implemented (European Commission, 2019), however the evaluation is not done to detail, so it is hard to ascertain how the actions have been implemented. Despite that, European Commission identified open challenges that need to be tackled in the upcoming years with the New CE Action Plan, including having more collaborative approach and focus on regions (European Commission, 2019). That is supported by two evaluations done by Ellen MacArthur Foundation (2020) and Pantzar & Suljada (2020).

Regarding CE policies in Denmark, in 2017, The Advisory Board for Circular Economy compiled a list of 27 recommendations in 4 categories for a circular transition (Advisory Board for Circular Economy, 2017). Later on, these recommendations were discussed, adopted, and turned into a strategy. In 2018, Danish Strategy for CE was introduced. The CE Strategy identifies 15 initiatives in six sectors (Ministry of Environment and Food & Ministry of Industry, Business and Financial Affairs, 2018, 12):

1. Strengthen enterprises as a driving force for circular transition
2. Support CE through data and digitalization
3. Promote CE through design
4. Change consumption patterns through CE
5. Create a proper functioning market for waste and recycled raw materials
6. Get more value out of buildings and biomass

OECD (2019) stresses that the strategy does not include additional policy targets, instead it recognizes the role of private companies that are seen as a driving force for the circular transition.

In late 2020 Danish government put up a communication of an Action Plan for CE 2020-2032. In total it introduces 126 initiatives that support the actions (Miljøministeriet, 2020):

- Less waste and better utilization of natural resources
- More and better recycling
- Better utilization of biomass
- Sustainable construction
- Plastic in a circular economy

Currently the plan has not been approved yet, it is still undergoing consultation with the involved stakeholders, such as, companies and municipalities. The communication is closely linked to the EU's New CE Action plan, and it supports the actions there (Miljøministeriet, 2020).

Even though there are initiatives taking place at a national and supranational level, there are points for confusion when it comes to circularity in cities (Marin & De Meulder, 2018). For example, Prendeville, Cherim, & Bocken (2018) emphasizes that policymakers often lack direction on how to realize circular cities, because it is conflated with sustainability. Marin & De Meulder (2018, 3) stresses that framings on interpreting CE in cities remain unarticulated, "creating confusion about the imaginaries' statuses".

Even though Vanhamäki, Virtanen, Luste, & Manskinen (2020) mostly focuses on regions in their study rather than cities, the model proposed in the study can also be applied for cities, where

vision makes the centre of CE in the region, then follows *goals* that encloses the *vision*, and lastly follows *actions* that supplement both *vision* and *goals*.

In the reviewed cities, two that emphasize the importance of SUP are Paris and Glasgow, where the planning has similarities with the model Vanhamäki et al. (2020) proposed. Vision of the cities is places in the centre, where follows goals and actions. Both cities talk about including CE in their goals, because the vision is to become more sustainable and liveable, and they believe that CE can be a key in achieving that (Glasgow City Council, 2020; Mairie de Paris, 2017).

As already mentioned before, CE policies should be targeted for a specific case (IMPEL, 2019), and that can be done by identified barriers of implementing CE, as Ellen MacArthur Foundation (2015) suggests in the "Delivering the Circular Economy. A toolkit for policymakers". It is also mentioned that the policymakers have the opportunity to systematically map appropriate policy options to overcome the barriers (Ellen MacArthur Foundation, 2015). In the toolkit six policy interventions are identified, and they can be seen in the table below.

Table 3. The circular city policy intervention types (adapted from Ellen MacArthur Foundation (2015) & Prendeville et al. (2018))

Strategy	Description
Information and awareness	Increases information and awareness of CE and aims to change patterns of behaviour. Are often times associated with knowledge institutes and collaborations with them. Purpose is to gather as much information as possible to ease the transition to CE.
Collaboration platforms	Partners along and across the value chains, facilitating partnerships between business, academia, governments, etc. Can also be industry specific. Purpose is to identify the needs of partners and leverage their expertise and networks.
Business support schemes	Financial support, development of new business models, particular focus on SMEs. Closely linked to the policymakers and governments. Purpose is to support (usually) local initiatives, such as circular start-ups.
Public procurement and infrastructure	Public sector providing purchasing power and minimising material losses and environmental impacts. Purpose is to further CE development via tendering power.
Regulatory frameworks	Defines adequate legal frameworks, rules, and regulations from the policymakers' side. Purpose is to develop CE in the cities.
Fiscal frameworks	Encourages CE activities from a monetary point of view, creates fiscal incentives for CE. Purpose is to create national frameworks and tax systems that support the CE activities. (Less relevant on a city scale)

Such policy interventions can be seen as examples in many European countries and cities, for example, in Ireland, Finland and Denmark (Ellen MacArthur Foundation, 2015). In Amsterdam's Circular strategy they have set 3 types of policy instruments – regulatory & legislative, economic, and soft, where strategy and spatial planning are in the same "Regulations" category (Gemeente Amsterdam, 2020). In Glasgow strategic planning is not part of the CE route map, however CE is part of their council's 6 year strategic plan, that initiated the creation of City charter, that is "an informal agreement between the council and the citizens that lists shared commitments, aims and standards" (Glasgow City Council, 2020, 53). In London, they emphasize that by integrating CE into London's policy framework it can accelerate the development of CE, and that the cooperation should be bottom-up (from local to supranational) (London Waste and Recycling Board, 2017).

In Paris the CE is seen as an integral part of other existing policies, so the relevance and potential interaction is identified (Mairie de Paris, 2017).

Earlier this year, Ellen MacArthur Foundation introduced five universal CE goals with the aim to "help governments build healthier economic recoveries and lower the cost of transition for business" (Ellen MacArthur Foundation, 2021, 6). The goals are:

1. Stimulate design for the CE
2. Manage resources to preserve value
3. Make the economics work
4. Invest in innovation, infrastructure, and skills
5. Collaborate for system change

These goals can be applied to both cities and business, but they should work as a complementary tool for policymakers when deciding on the ways to go. The city perspective is especially emphasized in goals 3-5 (Ellen MacArthur Foundation, 2021).

It is important to move from principles to actions. It is necessary to have strategical policies that can path the way towards CE, however it is as important to establish specific goals and actions that need to be taken in order to achieve the vision of circular cities (Alaerts et al., 2019; Heurkens & Dąbrowski, 2020). CE is "multi-actor, multi-level, multi-phase, and multi-pattern process" (Marin & De Meulder, 2018, 3), where the most appropriate way of governing such concept might be multi-level governance (Turcu & Gillie, 2020).

Moving from linear to circular economy can be seen as a complicated process from the governance point of view (Heurkens & Dąbrowski, 2020; Turcu & Gillie, 2020). Prendeville et al. (2018) in their study of 6 transitioning cities have identified governance structures as weak.

Fusco Girard & Nocca (2019) have identified characteristics of good governance for guiding city towards CE, and they are:

- collaborative governance
- adaptive governance
- experimental governance
- reflexive governance

In terms of collaborative governance, Turcu & Gillie (2020) emphasizes the need of acknowledging multi-level networks of stakeholders that shape the cities and their planning. Indeed, importance of stakeholders is stressed in literature many times (Alaerts et al., 2019; Marin & De Meulder, 2018; Obersteg et al., 2020; Petit-Boix & Leipold, 2018; Prendeville et al., 2018).

In Denmark, on a national level the CE is a primary responsibility of Ministry of Food and Environment, however it needs to coordinate processes together with few other ministries, such as Ministry of Climate, Energy and Utilities (OECD, 2019). It also includes the coordination of the Danish CE strategy.

Danish public sector can be characterized as decentralized and follows the principle of subsidiarity, meaning that local governments have the responsibility towards managing their municipal finance and implementing the actions they think are the most valuable to their citizens (KL, n.d.-a). On the other hand, Danish local municipal councils are responsible for developing Denmark and contributing to the Danish welfare of the society.

Danish national approach is to have more outcome-based rather than design-based regulations (specifically in the environmental sector), that make it more flexible for the municipalities and

companies to comply with them (OECD, 2019). For example, if the goal is to increase recycling rates of plastic, it is up to the municipalities (and their collaborations with the companies) to find the most appropriate tool and approach to meet the targets.

When it comes to environmental policies, it is the municipalities that are the key actors in the green transition and making sustainable decisions (KL, n.d.-b; OECD, 2019). National level is in charge of setting legal framework and providing guidance on implementation, however it is the local governments that implement the plans and policies and allocate resources for that (OECD, 2019).

Regarding climate politics, KL has identified 5 reasons why municipalities specifically are important actors in climate efforts (KL, n.d.-b):

1. The municipalities are the closest to their citizens and companies and are creating a framework for their everyday life
2. The municipalities in general are the largest building owners and public employers in the country
3. The municipalities can most directly contribute to a green transition of energy production
4. The municipalities are responsible for overall priorities across different urban sectors
5. The municipalities know the local conditions the best and can implement climate solutions that work.

Policymakers are critical players when it comes to making more circular regulatory decisions (IMPEL, 2019). Local governments have the capacity to scale the CE concept to the city level, however an investigation regarding tools and methods that can be used for the transition is needed (Bolger & Doyon, 2019).

3.4 MEASURING IMPLEMENTATION

In order to track the progress of implementing CE, there is a need to foster holistic approaches assuring suitable indicator systems that are able to evaluate performance of CE policies (Fidélis et al., 2021). Implementation of CE in cities is understood rather broadly, and the discussion of CE is rarely taken from an implementation angle (Prendeville et al., 2018).

There are several challenges when it comes to implementing CE. To add to what has already been mentioned, it is notable that even when cities self-identify as circular, the urban applicability angle is missed and forgotten (Turcu & Gillie, 2020). Fusco Girard & Nocca (2019) mentions that evaluating success (or failure) of cities implementing CE is a complex process, because many initiatives are still in an initial stage, therefore there is lack of data. They also mention that cities are changing constantly, hence it is important to continuously monitor the effectiveness (Fusco Girard & Nocca, 2019).

Guidance on implementing CE is crucial, as well as availability of monitoring frameworks. Without them there is a high risk that the CE shows poor performance, despite the well developed and intentioned actions (Alaerts et al., 2019).

A way how progress of implementing CE can be measured, is by using and applying indicators, however there is lack of established indicators and available data, that can be seen as an implementation barrier (Cavaleiro de Ferreira & Fuso-Nerini, 2019). Even when there are existing indicators being used for evaluating circular cities, they mostly focus on specific sectors, leaving out the holistic aspects that are needed for proper implementation of CE (Girard & Nocca, 2020). Applying indicators can also be seen as a rather complicated process, because that can be done in many ways, and Moraga et al. (2019) presents an overview of different classifications and

groupings that can be used in order to apply indicators. Similarly Saidani, Yannou, Leroy, Cluzel, & Kendall (2019) emphasized the importance of developing appropriate circularity indicators that can be applied to the city (macro) level as well.

One of the tools that are seen in the literature as application of the circular city principles is ReSOLVE framework (Christis et al., 2019; Prendeville et al., 2018). It is introduced by Ellen MacArthur Foundation in 2015, as a tool for "businesses and countries [..] for generating circular strategies and growth initiatives" (Ellen MacArthur Foundation, 2015), however Williams (2019) argues that the framework has shortcoming when applied to cities, because "it was not designed for this purpose".

Latter emphasizes even more how important targeted and city specific tools and applications are, and that cities might need to look for assessments that deal with the CE strategies they seek to implement (Petit-Boix & Leipold, 2018). In Ellen MacArthur Foundation (2017) it is stated that local governments have expressed the need to get access to specific tools and methodologies for enabling their city-level transitions. Fusco Girard & Nocca (2019) stresses that there are already plenty of existing planning tools at the municipal level, and that circular cities are expected to have an integrated vision and management of these tools.

One of the commitments of "Circular Cities Declaration" is "Monitoring the progress made and impacts of our circular economy activities" (Circular Cities Declaration, n.d.-b), that means that cities that have signed the declaration have to develop ways of measuring the progress. Even though City of Copenhagen has signed the declaration, Nordic Council of Ministers has identified that there are no examples in Danish municipalities of systematically measuring progress towards CE, and that it includes Copenhagen (Bauer et al., 2020).

In several European cities there are measuring approaches in place. In Amsterdam a monitor, that is based on the Doughnut model[6], is being developed that will calculate the total burden of materials that the city consumes and produces as waste, where that will help to measure impact on CO2 emissions and the environmental costs (Gemeente Amsterdam, 2020). Important to point out is the fact that the monitor also focuses on social aspects and is keeping track of Amsterdam's ambitions to improve the welfare of their citizens. If there is no data available for a specific category, the monitor provides guidelines for developing such indicators, and it focus on three value chains: Food & Organic Waste Streams, Consumer Goods, and the Built Environment (Gemeente Amsterdam, 2020).

In Glasgow they have created an action plan that consists of 31 actions, categorized in 6 themes, that need to be started and/ or implemented by the end of 2022 (some actions have extended deadline, because of Covid-19 outbreak) (Glasgow City Council, 2020). For each action a description, theme, target, owner (responsible stakeholder) and timeline is presented.

For London's CE Route map there are actions noted for every category (built environment, food, textiles, electrical, plastic), however they do not have specific targets or deadlines for achieving the actions (London Waste and Recycling Board, 2017). On the other hand they have identified the wanted outcomes. The Waste and Recycling Board has also committed to developing a set of key performance indicators to measure the success of implementing the route map, and in

[6] An economical model, first introduced by Kate Raworth in 2012, talks about a framework for sustainable development by combining the concept of planetary boundaries with the complementary concept of social boundaries (Raworth, 2012). Several cities have used this model to describe and identify their "safe and just space for humanity", including Amsterdam (Doughnut Economics Action Lab, 2020).

addition on an annual basis an update on the route map is provided to reflect the progress (London Waste and Recycling Board, 2017).

As an addition to Paris' CE Plan there were roadmaps introduced in order to handle the amount of actions proposed by the plan. Every roadmap focuses on 10-15 concrete actions, and in between them there are diagnostic studies and feasibility of actions carried out, that involve the evaluation of the roadmaps (Mairie de Paris, 2017). Until 2020, there were 2 roadmaps developed for Paris (Ville de Paris, n.d.).

In order to act in accordance with the commitments noted in Circular Peterborough plan, a set of indicators were developed and a specific measurement plan to track the progress, hence 8 targeted indicators for Peterborough were proposed (Morley, Looi, & Zhao, 2018). In addition to indicators, an overview of potential data sources and responsible governance arrangements are identified to make it easier to use and apply the indicator set.

4 CONCEPTUAL FRAMEWORK FOR IMPLEMENTING CIRCULAR ECONOMY IN THE CITY OF COPENHAGEN

"Urban planning makes it possible to "translate" the concepts of the CE into space and territory" (Girard & Nocca, 2020, 20)

Urban planning can be seen as an institutional tool that allows cities to transition their organization from linear to circular (Girard & Nocca, 2020). Cities have the capacity and opportunities to build liveable and healthy cities, and urban planning can serve as one of the institutional tools to implement and promote that (Girard & Nocca, 2020).

The previous chapter served as a background knowledge to develop a conceptual framework for the analysis. In order to analyse the level of SUP applied to the transition to CE in the City of Copenhagen and identify the gaps, framework developed by UN-Habitat is used as the backbone for that.

UN-Habitat (2007) introduced concept and phases for Urban Strategic Planning Process (see Figure 7), that in this study is called Strategic Urban Planning, as suggested by Bolger & Doyon (2019). As explained in Chapter 2.4, both applications are used as inspirations and as a result from that a specific framework for City of Copenhagen is developed.

Longato et al. (2019) have applied the UN-Habitat model to 8 European cities to test how well their strategic plans follow the path "from the city strategy to the action planning". As the first step of analysing the current urban situation, UM is applied. UM is seen as a useful tool in urban transitions (Bolger & Doyon, 2019), because natural systems play a key role in urban planning as the main urban infrastructure (Girard & Nocca, 2020).

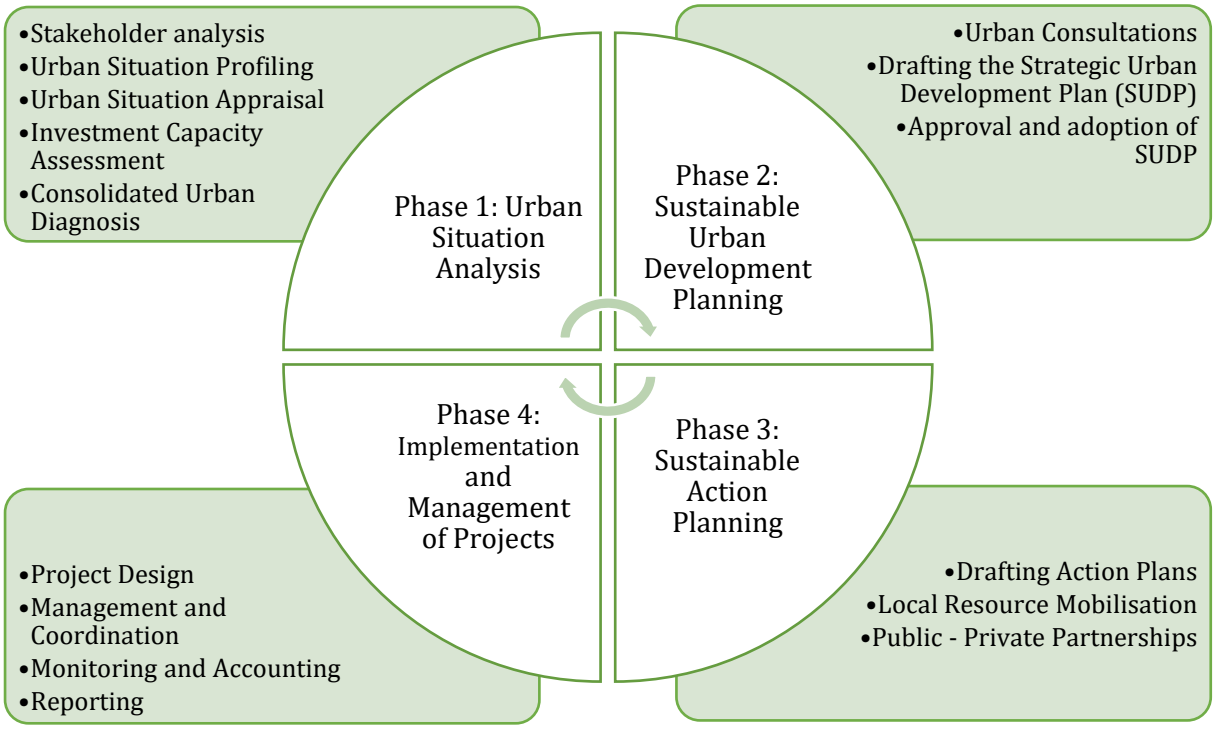

Figure 7. Phases and Stages of Strategic Urban Planning (adopted from (UN-Habitat, 2007a))

Following the phases of SUP, a description and purpose of each phase is following to underline the main notions of the analysis. Not all stages are chosen for the analysis or used in the exact same way as proposed by UN-Habitat, some of them are interpreted to fit the case and CE better. An overview of the analytical framework can be seen in Table 4 below.

First phase of the SUP is **Urban Situation Analysis**. The purpose of this phase is to answer the question "where are we now" and identify the key aspects of a city because "before any [..] city reaches the point of formulating its vision, mission, goals and objectives, it must be fully aware of the assets it has at its disposal and the key issues it must address" (UN-Habitat, 2007b, 6). The importance of this phase is also described in Chapter 3.2. In the end of Urban Situation Analysis it is supposed to be able to provide a consolidated urban diagnosis of the examined organization, in this case – city.

First stage in the phase is Stakeholder analysis, where it is important to identify stakeholders that are relevant for the urban planning processes (UN-Habitat, 2007b), or in this case – CE and waste management processes. Next stages are Urban situation profiling and appraisal. The purpose of these two stages is similar – to gather information in a way that will support decision making and make sure that there is data available for that (UN-Habitat, 2007b), that is why they are grouped together in the analysis. Main focus of this part is to describe waste management and recycling processes in the City of Copenhagen, as suggested by Bolger & Doyon (2019). Then follows an Investment capacity assessment stage whose main purpose, according to UN-Habitat (2007b), is to develop a realistic monetary investment base. It is adjusted to describe waste financing processes in City of Copenhagen, as well as work with Green Public Procurement, because it is one of the priorities in both national and supranational policies (European Commission, 2020; Miljøministeriet, 2020).

Second phase of SUP is **Sustainable Urban Development Planning**, where the purpose is to develop "a vision, mission, goal and objectives; setting priorities and strategic directions; and defining actions" (UN-Habitat, 2007c, 6). The importance of this phase is described in Chapters 3.2 and 3.3. In the end it should provide an idea of what are the strategic priorities for CE in the City of Copenhagen and what actions are needed to be taken to follow the course.

According to UN-Habitat (2007c) this phase consists of three stages – Urban Consultations, Drafting of the Strategic Plan and Approval of the plan. However, these stages are not that relevant in this study, because there are already existing plans that can be analysed, the purpose is not to develop a new plan and secure it for approval. For that reason this phase follows suggested framework from Bolger & Doyon (2019) to understand the Strategic Vision for the City of Copenhagen, that gives an insight of what is the course taken by the city in terms of transition to CE.

Third phase of SUP is **Sustainable Action Planning**, and the main purpose of it is to "turn[..] strategies into practical programmes or activities for implementation" (UN-Habitat, 2007d). The design and implementation of action plans strongly depends upon the strategic priorities identified in the previous phase – Sustainable Urban Development Planning. The importance of this phase is explained in Chapter 3.3. In the end it should conclude whether the planned actions in City of Copenhagen are in hand with the strategic planning and to what extent public-private partnerships are supporting the transition towards CE.

This phase consists of three stages, as described in UN-Habitat (2007d), from which two of them are not included in this study, and they are Drafting Action Plans and Local Resource Mobilisation. There are already existing action plans in City of Copenhagen, so they have been analysed in Actions Related to Sustainable Urban Development. Bolger & Doyon (2019) suggests relating

actions to Urban Situation Analysis, so that is also partially covered in this chapter. Local Resource Mobilisation is discarded because in UN-Habitat (2007d) it talks about generating understanding whether a municipality has the necessary resources (mostly human and social) to implement the action plans, however it is understood that City of Copenhagen do not have problems with mobilising local resources, as interviewees mentioned that there is enough people working on these issues and they are not experiencing shortages in staff (Lindeneg, 2021b; Mortensen, 2021). An important stage that is included in the analysis is Public-private partnerships, that were briefly introduced previously in Investment Capacity Assessment.

Fourth and last phase of SUP is **Implementation and Management of Projects**, which unfortunately does not have a separate guide created, as is the case with the three previous phases, that is why this phase is built upon the framework in Bolger & Doyon (2019). The importance of this phase is outlined in Chapter 3.4. In the end it should provide an overview of existing CE projects in the City of Copenhagen and their management, as well as how the implementation of CE is measured in general.

The phase consists of three stages – Project design, Management and Coordination, Monitoring and Accounting, and Reporting, however there is not detailed explanation provided for these stages. That is why the phase is analysed in two stages developed by the author – Coordination of Circular Economy projects and Measuring implementation of Circular Economy in City of Copenhagen.

Table 4. Analytical framework for stages of CE strategic planning process in City of Copenhagen (adopted from (Bolger & Doyon, 2019; UN-Habitat, 2007a, 2007b, 2007c, 2007d)

Stage of SUP	Themes	Main data source	Desired outcome
Urban Situation Analysis	Stakeholder analysis	Interviews	Identification of stakeholders involved in waste management
	Waste management and recycling	Documents	Current practices and management
	Finance and budget	Documents	Financing waste management
Sustainable Urban Development Planning	Strategic planning	Documents	Strategic vision and course
Sustainable Action Planning	Actions to support strategic vision	Documents	Understanding of specific actions that are undertaken
	Public-private partnerships	Interviews	Examples of concrete partnerships
Implementation and Management of CE projects	Coordination of projects	Interviews	Organisational structure
	Measuring implementation	Interviews	Process of measuring success regarding transition towards CE

5 CASE DESCRIPTION

In order to understand geographical and situational backgrounds in City of Copenhagen, a case description is provided to illustrate where it stands.

5.1 GEOGRAPHY AND ORGANIZATION OF THE CITY OF COPENHAGEN

City of Copenhagen (Copenhagen Municipality directly translated from Danish *Københavns Kommune*) is the largest municipality in Denmark by the population, with 638.117 thousand inhabitants, as of 1st January, 2021 (Statistics Denmark, n.d.-c). Over the span of 10 years, the population of Copenhagen has increased by almost 21%. City of Copenhagen is part of the Capital Region of Denmark[7].

The municipality is located on the Eastern part of Zealand, and consists of 10 districts (see Figure 8) – Amager Øst, Amager Vest, Bispebjerg, Brønshøj-Husum, Indre By, Nørrebro, Østerbro, Valby, Vanløse, Vesterbro/ Kongens Enhgave, where Amager Vest is the most populated, with 81.320 thousand people, as of 1st January, 2021 (Københavns Kommunes Statistikbank, n.d.). Most Copenhageners (almost 90%) live in multi-dwelling houses, then follows detached houses, student hostels, terraced, linked or semi-detached houses, and other types (Københavns Kommunes Statistikbank, n.d.).

Within the borders of the municipality, another municipality can be found – Frederiksberg – but that is not part of City of Copenhagen, even though geographically located in the middle of the area (Københavns Kommune, 2020). The total area of City of Copenhagen is 90,10 km2 (Statistics Denmark, n.d.-a).

According to Statistics Denmark (n.d.-b) City of Copenhagen is the richest municipality in Denmark with nearly 41,7 billion kroner allocated to the municipal budget in 2021. In general, more than 75% of municipal revenue comes from local taxation (OECD, 2019). In the adopted budget publication for 2021, City of Copenhagen has set a vision for the spendings – investing in welfare and the green city of the future (Københavns Kommune, 2021c).

The governance in the City of Copenhagen is organized as follows (see Figure 9). The main decision making body is the City Council that consists of 55 members, and its chair is Lord Mayor; then follows 7 committees, that are in charge of day-to-day of tasks within their subject area (City of Copenhagen, 2018). There are also administrations, that perform the tasks related to their respective committees, meaning that, for example, Finance Administration is *under* Finance Committee and mostly works within the areas of their committee.

For each of the administration, core services are identified and can be found in City of Copenhagen (2018) or in the working plans for the respective administrations, for example, for Finance Administration in Økonomiforvaltningen (2019).

[7] There are five regions in Denmark, where one of them is the Capital Region. Their main responsibility is the healthcare management, however they are also responsible for social services and special education, and regional development (to some extent), that includes nature and environment, education and culture, public transport and other (Danish Regions, 2012).

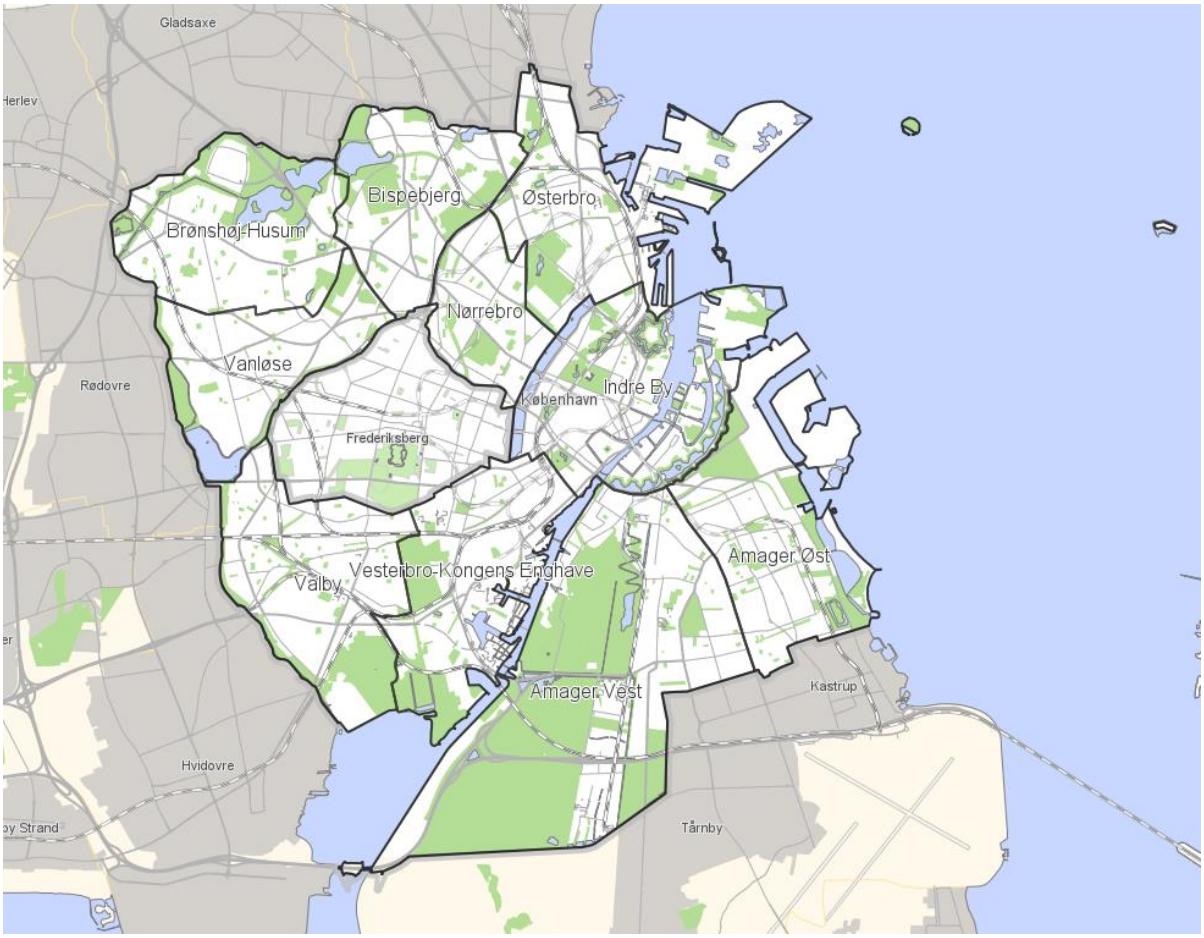

Figure 8. Map of City of Copenhagen with districts (Københavnerkortet, n.d.)

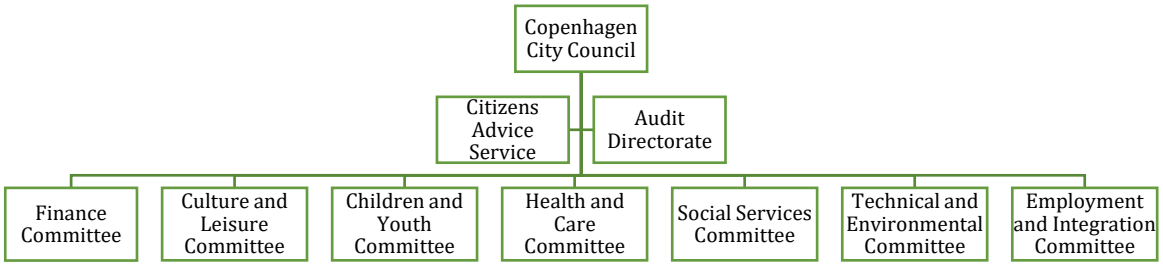

Figure 9. Organizational structure of City of Copenhagen (adopted from (City of Copenhagen, 2018)*)*

5.2 CIRCULAR CITY COPENHAGEN

Before analysing specific actions related to CE in the City of Copenhagen, it is necessary to identify the local background and initiatives happening.

When asked interviewees Jonas Åbo Mortensen and Susanne Lindeneg "how do they define CE", both answered that they do not have a specific definition made by themselves, but they use the Ellen MacArthur Foundation's butterfly model (see Figure 10) and focus on closing the loops (Lindeneg, 2021b; Mortensen, 2021). The butterfly model is also included in the Resource and Waste plan (City of Copenhagen, 2019a).

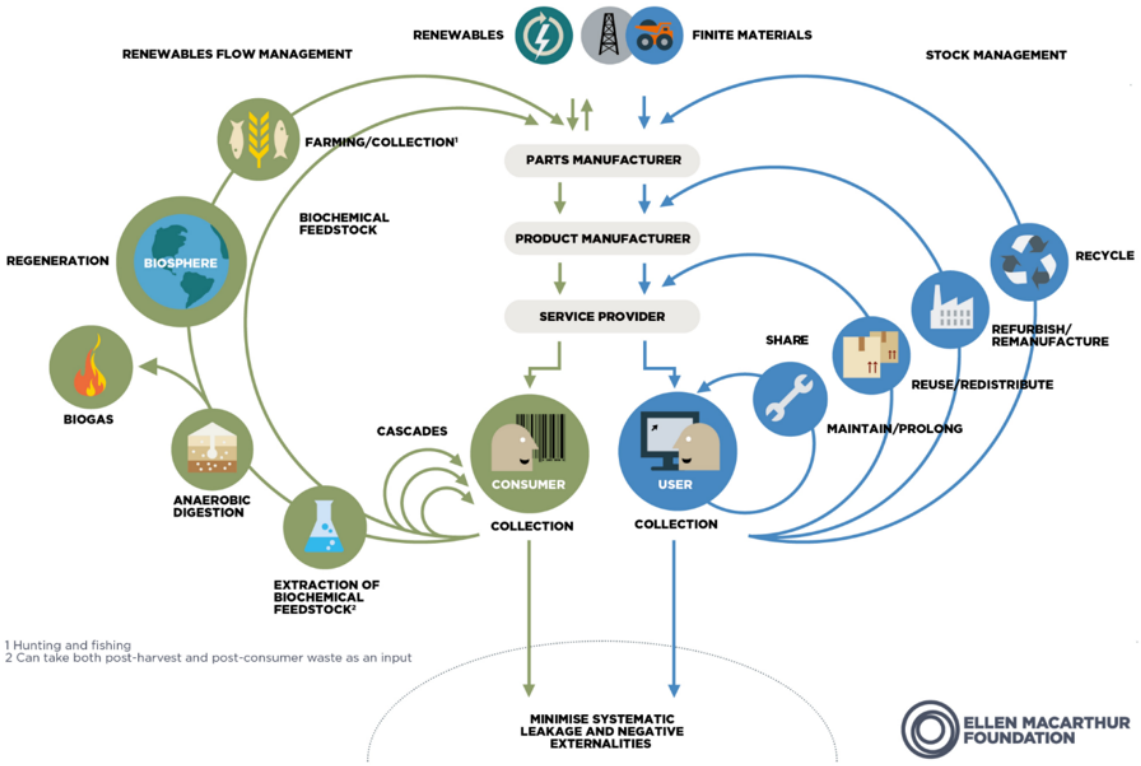

Figure 10. The butterfly model of Circular Economy (Ellen MacArthur Foundation, 2013)

To a closer detail description of how CE shapes the strategic planning in the City of Copenhagen is provided in Chapter 6.2. However, it is important to describe what initiatives are happening in Copenhagen now that can promote CE within citizens, businesses, and other stakeholders.

In a report made by Remmen (2019) as a part of a project "Waste and resources across" there are commitments compiled from the municipalities of the Capital Region of Denmark related to waste management, with a focus on CE. When describing City of Copenhagen, there are mostly initiatives related to the Resource and Waste plan, however the focus on making it easier for citizens to make circular choices is especially pointed out (Remmen, 2019).

Involving citizens in repair and reuse is a big goal for the City of Copenhagen (NABOSKAB, n.d.). In Resource and Waste Plan one of the topics deal with introducing more swap and reuse options in the City of Copenhagen, and for that there are existing options mapped (City of Copenhagen, 2019a). There is also a plan of introducing three new local recycling hubs.

European Circular Economy Stakeholder Platform is keeping a database of good practices within CE all around Europe, and there are some initiatives based in the City of Copenhagen (European Circular Economy Stakeholder Platform, n.d.).

- VERAS – platform for swapping, repairing and selling used clothing in order to reduce the textile waste (Veras, n.d.)
- Green Fibre Bottle – initiative for making the beer-in-hand bottles more sustainable by using wood fibres (Carlsberg Group, n.d.)
- Copenhagen International School – educational institution with low-energy buildings, and sustainable materials used in construction, largest building-integrated photovoltaic installation in Europe (C.F. Møller, n.d.)

6 STRATEGIC PLANNING OF CIRCULAR ECONOMY IN THE CITY OF COPENHAGEN

As explained in Chapter 4, the analysis of the potential of SUP in Copenhagen follows the approach proposed by UN-Habitat and later employed by Bolger & Doyon (2019).

6.1 URBAN SITUATION ANALYSIS

6.1.1 Stakeholder analysis

One of the main stakeholders in terms of CE management in the City of Copenhagen from the municipality side is the Technical and Environmental Administration, that is, among other things, in charge of climate, environment and waste management (City of Copenhagen, 2018). TEA is divided in four departments (Teknik- og Miljøforvaltningen, n.d.):

- Parks, Cemeteries and Cleaning
- Buildings, Parking and Environment
- Mobility, Climate Adaptation and Urban Maintenance
- Planning, Analysis, Resources and CO2 reduction.

Waste management, therefore CE, falls under the latter of the departments (Lindeneg, 2021b). TEA is also responsible for overviewing the Circular Copenhagen. Resource and Waste Management Plan (Lindeneg, 2021b), that sets the main course in terms of waste management and CE (City of Copenhagen, 2019a).

Another municipal stakeholder pointed out by Mortensen (2021) is the Finance Administration, where, among other things, they are in charge of Urban Development and Community planning (City of Copenhagen, 2018). They also play an important role when it comes to Green procurement and business support schemes (see Table 3) (Mortensen, 2021). FA develops and overviews the Municipal plan that sets the city's vision and actions for the physical development (City of Copenhagen, 2019b).

City of Copenhagen partially owns two waste treatment plants, that are directly involved in shaping the waste management in the city (Lindeneg, 2021b) – ARC and Vestforbrænding. Both of these companies have a close link to the municipalities that own them (including Copenhagen), and they are working towards more circular solutions, leaving incineration as the last option, but even then – making sure that there is energy created from incinerating waste (ARC, 2020; Vestforbrænding, 2020).

In the Mapping report (an Appendix to the Resource and Waste Management plan) (Københavns Kommune, 2019b) a general overview of the current waste system in City of Copenhagen is described, therefore other relevant stakeholders are identified, but they are mostly dealing with the waste handling and do not have a strong influence in the decision making processes, thus are not part of SUP (UN-Habitat, 2007b).

When it comes to public-private partnerships and municipality's supports towards companies, it mostly depends on the specific initiatives going on in the city (Lindeneg, 2021b; Mortensen, 2021). A key player in monitoring the initiatives and looking for new partnerships, is the recently established innovation platform "Circular Copenhagen" (City of Copenhagen, 2019a). Even though it is part of the municipality and is not a *stand-alone* initiative (Lindeneg, 2021b), it has enough freedom and independence to be considered a separate stakeholder (Mortensen, 2021).

6.1.2 Urban Situation Profile and Appraisal

As explained in Chapter 4, Urban Situation Profile and Appraisal are put together and focus mostly on waste management and current recycling practices in the City of Copenhagen.

In City of Copenhagen sorting is possible in 11 fractions (and even more, if the waste is brought to a recycling centre (City of Copenhagen, 2019a)), but in order to comply with the new rules introduced by the Danish government a year ago (Regeringen, 2020) they need to introduce the possibility to sort two more fractions – textiles and food and drink cartons (Lindeneg, 2021b). Food and drink cartons are already introduced as of 1st July, 2021 (Regeringen, 2020), and that required very little changes in the system in Copenhagen – food waste had to change the pictogram's color to green to allow plastic and food and drink cartons to be pink (Lindeneg, 2021b) (according to the unified pictogram system in the country (Dansk Affaldsforening, n.d.)). For the textiles there is still time left to figure out the right solution for the City of Copenhagen, since that fraction need to be introduced in 2022 the latest (Regeringen, 2020).

Municipalities are in charge of handling their waste and they have the right to decide on the collection system, however they have the obligation to assure that the household waste is treated in the necessary manner (Regeringen, 2020). Usually, the waste is treated at the waste plants that are private or co-owned by the municipalities (DAKOFA, n.d.). That is also the case in Copenhagen, as explained in the previous chapter. There are other involved parties, such as waste collecting services, that are responsible for collecting the waste and maintain the needed operations (Københavns Kommune, 2019c). However, Lindeneg (2021b) is a bit concerned that the government is not trusting the municipalities enough and wants to remove a lot of the responsibility that the municipalities currently have towards waste management, that is due to the proposed idea of increased privatization of the waste sector. OECD (2019) also believes that exactly the local authorities are the ones that know their areas the best and can decide what solutions are the most suitable.

On the citizen side, City of Copenhagen is doing quite a lot to inform them about the waste management, because as stated by both Lindeneg (2021b) and Mortensen (2021) implementing full CE cannot be attributed to the technologies and approaches – the citizens have to be aware and use them to the best of their ability. City of Copenhagen is regularly sending out newsletters to their citizens about news in the waste management and CE. The newsletter has two editions - for those living in apartment buildings and detached houses (Københavns Kommune, 2021a, 2021b). In the newsletter citizens are also informed about the changes in the sorting fractions, as already stated previously.

Mortensen (2021) also talked about informing the citizens about food waste, that this is one of the priorities within Circular Copenhagen platform at the moment, because they believe that the technology is there to sort, collect and treat the food waste, but the citizens need to be more involved.

Another example is Easy Waste Service (in Danish - *Nem Affaldservice*), where citizens have the opportunity to type in their home address and retrieve facts and figures regarding waste specifically for their building, including when are concrete waste fractions collected (Københavns Kommune, n.d.-a). It also works as a communication platform with the municipality, for instance, to order an emptying of a waste bin. As a part of Easy Waste Service, Waste ABC is also introduced that allows citizens to type in a specific product, packaging and so on that they are about to throw out to see, how exactly are they supposed to handle it, for example, typing in "Cover for mobile phone" (in Danish – *Mobil Covers*) to see that it goes with Plastic waste (Københavns Kommune, n.d.-a).

6.1.3 Investment Capacity Assessment

This section talks about the financial side of waste management and financing CE activities in City of Copenhagen.

As already mentioned before, City of Copenhagen is one the richest municipalities in Denmark, however the waste management is not entirely financed by the municipal budget. As explained by Lindeneg (2021b) common waste budget comes from the fees that are collected from the citizens together with the property tax they pay. Then that budget is balanced over several years. In addition, a special balance of waste management expenses in the city is prepared and divided on the number of households. In this way the waste budget is separated from the rest of the city. The money that is collected via fees creates a budget for day-to-day operational activities of the waste management. The fees for waste management and one-time services compiled in a document that is publicly available through a webpage (Københavns Kommune, n.d.-b) or in the Easy Waste Service mentioned before (Københavns Kommune, n.d.-a).

It is a different case when a new waste plan is introduced. As Lindeneg (2021b) stated, every new waste plan comes with a budget for introducing the new activities and initiatives proposed in the plan. So, the budget that is allocated to this can be seen as something on top of the waste fees collected. One of the initiatives Lindeneg (2021b) pointed out was putting up approximately 750 public sorting points in the urban space. This initiative falls under a topic number 1 "Copenhageners sorting more waste", and is a measure 1.4 "Waste solutions in streets and other public areas" (City of Copenhagen, 2019a).

Even though Circular Copenhagen is also one of the activities funded by the Waste management plan (City of Copenhagen, 2019a), it has its own approach when developing partnerships. According to Mortensen (2021) one of the aims for the platform is to find partners that would be interested in co-financing development projects happening in the City of Copenhagen related to CE. Currently there are four partnerships up and running that are also co-financed by the partners (for detailed explanation see Chapter 6.4), and there is an active call for two other partnerships – recycling of textiles and mattresses (Circular Copenhagen, n.d.-d).

City of Copenhagen has made a commitment to make its procurement more organized and more compliant in promoting environmental and climate agenda (Københavns Kommune, 2019a). In the newest Purchasing Policy, City of Copenhagen has set out 5 strategic areas, and one of them is "More responsible and sustainable purchasing", where it states the necessity of considering the footprint every purchasing contract leaves on the planet (Københavns Kommune, 2019a). With the Procurement policy City of Copenhagen is supporting the general commitments of the city towards reaching SDGs, especially SDG12, that promotes sustainable consumption and green public procurement practices (Københavns Kommune, 2019a).

As a support to the Procurement Policy, earlier this year City of Copenhagen introduced Sustainable Purchasing guidelines with climate and environmental requirements for purchasing. In the guidelines there are requirements noted in 23 different sectors (Københavs Kommune, 2021).

In general Finance Administration is in charge of overviewing the procurement and tendering procedures in the municipality, however there is a strong link to the TEA in terms of sustainable procurement, where they have a Team Green Public Procurement (Christensen, 2018).

6.1.4 Summary

In this section, an Urban Situation Analysis for the City of Copenhagen was carried out.

Firstly, there are stakeholders identified that are involved in the CE processes and management in the City of Copenhagen. The main actor from the municipality side is TEA, with a specific focus on Circular Copenhagen Innovation Platform that is dealing more with concrete initiatives. At the same time two waste treatment plants have strong connection with the municipality and vice versa.

Secondly, waste management in the City of Copenhagen is organized well, and the communication towards citizens is very transparent and actual. Especially notable is the Easy Waste Service that allows the residents get all information related to waste in their building and area. However, the municipality is a bit afraid that due to the potential of privatizing the waste sector they might lose their influence on the waste management in the city.

Lastly, the section touches upon financial aspects of the waste management and CE projects within the municipality. As explained by the interviewee, the financing is twofold – from taxes and specifically allocated budget for the projects. The City of Copenhagen is working a lot towards implementing greener and more sustainable practices in the procurement and tendering procedures as well.

6.2 SUSTAINABLE URBAN DEVELOPMENT PLANNING

6.2.1 Strategic vision for the City of Copenhagen

Strategic vision for the City of Copenhagen is described in "Co-create Copenhagen. Vision for 2025" (City of Copenhagen, 2015). It states that by 2025 Copenhagen is "liveable, responsible city with and edge" (City of Copenhagen, 2015, 2), where the detailed vision and mission are described under "liveable city", "a city with an edge" and "responsible city". In addition to vision for 2025, there are also outlooks for 2050 identified in these three priorities.

It is also important to talk about specific regulatory frameworks (definition according to Ellen MacArthur Foundation (2015), see Table 3) in City of Copenhagen somewhat related to CE, and those are:

1. Circular Copenhagen. Resource and Waste Management Plan 2024 (City of Copenhagen, 2019a)
2. World City with responsibility. Copenhagen's Municipal Plan 2019 (City of Copenhagen, 2019b)
3. The Capital of Sustainable Development. The City of Copenhagen's action plan for the Sustainable Development Goals (City of Copenhagen, 2017)
4. Co-create Copenhagen. Vision for 2025 (City of Copenhagen, 2015)

The focus on CE differs in these frameworks. The Resource and Waste plan is the one that has the most focus on CE with having a concrete Topic 04 "Copenhagen promoting Circular Economy", that consists of 7 different measures, and the main objectives in this topic are two (City of Copenhagen, 2019a):

- 6% increase in collection of household waste for recycling (approx.. 13,040 tonnes)
- Approx. 3,410 tonnes CO2 reduction

The municipality plan is an overall plan for the city's physical development over the next 12 years, and consists of visions and political goals, guidelines, and a framework for the city's development

(Center for Byudvikling, 2021). In the Municipal plan 2019 circularity is mentioned few times, but the most notable is this:

"Copenhagen will be leading in circular economy and use less of the planet's resources through new business models, sharing arrangements, recycling and an all-round great setting allowing Copenhageners and companies to realise the green transition." (City of Copenhagen, 2019b, 24)

The municipality has set ambition to be the leader in CE and they are working with it to strengthen the sustainable development in the city (City of Copenhagen, 2019b).

The action plan for SDGs in Copenhagen also touch circularity when talking about implementing SDG12 "Responsible consumption and production" (City of Copenhagen, 2017). The plan sets out 6 targets, 3 policies/strategies that are related to this implementation and 19 selected initiatives. The implementation of SDG12 in Copenhagen has a close link with the Climate plan, and even though circularity is not directly mentioned in CPH 2025 Climate plan (City of Copenhagen, 2012), it is emphasized in the roadmap for the plan that "circular economy may lead to a long-term reduction in the volume of waste, better use of resources and lower CO2 emissions" (City of Copenhagen, 2016, 18).

In the Copenhagen's vision for 2025, the city is called a Responsible city, and in order to live up to that a focus on "No waste, no resources" is emphasized, where it states:

"In 2025, we will not be able to afford to squander resources. We must make far better use of the city's waste. Copenhagen must be a leader in the circular economy and make less of an impact on the Earth's resources, via sharing schemes, reuse and even better frameworks for involving the people of the city in the green transition." (City of Copenhagen, 2015, 14)

In order to implement all these regulatory frameworks and achieve the targets set out in these policies the work should be transparent and understandable for all involved stakeholders (Mortensen, 2021), and it is necessary that everyone is on the same page and shares a common vision (Lindeneg, 2021b). Center for Urban Development supports this by stating that the Municipal Plan is cohesive with other plans and strategies, both on municipal, as well as regional and national level (Center for Byudvikling, 2021).

6.2.2 Summary

This section gave the insight of the city's strategic course in terms of CE and waste management.

There are four main documents identified as relevant in setting the vision for the City of Copenhagen. According to good governance practices UN-Habitat (2007c) the different strategies should align and should not go against each other, but work together towards a common vision. That is seen in the City of Copenhagen, that the strategies are complementing each other and the newer ones are building on the previous ones that are still in use.

According to Ellen MacArthur Foundation's policy intervention types (see Table 3), most of the policies in the City of Copenhagen are Public procurement and infrastructure frameworks and Regulatory frameworks. There is also evidence of Business support schemes and Fiscal frameworks, but not as much as the previous two. Little to no evidence was found in terms of Information and awareness policies and Collaboration Platforms.

Regarding participatory processes, it was not reviewed, whether there are group urban consultations carried out prior to developing the strategies, as suggested by UN-Habitat (2007c). Nevertheless the municipality should actively involve the stakeholders mentioned in the previous

chapter and establish a working group that works with developing a Vision, Mission, Goals and Objectives that aligns with the common course of the city.

"A "Strategic Urban Development Plan" sets out the objectives, strategic priorities, required courses of action and priority projects of a city. This document reflects the agreements reached through the participatory process, keeping in mind the issue of sustainability in an urban context. The SUDP identifies a number of priorities, each of which determines a set of actions" (UN-Habitat, 2007c, 24).

City of Copenhagen does not have a strategic plan for CE, however they do have other strategies dealing with sustainable development, e.g., Municipal Plan 2019, and that is a good starting point that can work as a stepping stone for a more precise strategy in the future.

6.3 SUSTAINABLE ACTION PLANNING

The following chapter deals with concrete actions related to Sustainable Urban Development and describes to what extent they are related with the strategic course of the City of Copenhagen.

6.3.1 Actions related to Sustainable Urban Development

As the main strategic document in the City of Copenhagen in terms of CE, Resource and Waste plan can be identified because it has elements of the Vision of Copenhagen, as well as other strategic plans that have been introduced prior to this plan.

Resource and Waste plan has three main objectives (City of Copenhagen, 2019a, 8):

- 70% of household waste and light industrial and commercial waste to be collected for recycling
- 59,000 tonnes CO2 reduction
- Tripling of reuse

All objectives are compliant with Co-Create Copenhagen vision for 2025 and CPH 2025 Climate Plan in order to contribute to Copenhagen becoming a leader in CE. There are four basic principles for the management of waste identified in the Resource and Waste plan – recognisability, easy and logical, accessible, and growth (City of Copenhagen, 2019a).

In order to achieve the three targets, set out in the Resource and Waste plan, there are number of measures organised under 6 topics that are to be implemented (see Table 5). In total there are 29 measures and 13 concrete objectives. In addition, for every measure challenges, solutions and effects are described to make it more understandable and transparent.

The main stakeholders identified for the measures in the Resource and Waste plan are recycling centres, resource centres and citizens themselves. Many of the initiatives are very citizen targeted to make it easier for them to adopt to CE practices and have the opportunities to reduce the amount of waste they reduce.

When it comes to recycling all topics cover it in one way or another. Many of the measures are somewhat related to technological initiatives and adopting other technological solutions. As Mortensen (2021) mentioned that finding new solutions for technologies is often times easier and more feasible than improving the existing ones.

Table 5. Topics, measures, and objectives in Circular Copenhagen. Resource and Waste Management Plan 2024 (adopted from (City of Copenhagen, 2019a)

Topic	Measure	Objective
01 Copenhageners sorting more waste	1.1 Anchoring the resource agenda 1.2 Data as a motivator 1.3 Optimisation of sorting options in blocks of flats 1.4 Waste solutions in streets and other public areas 1.5 Waste sorting in all-citizen focused institutions of City of Copenhagen	• 14% increase in collection of household waste for recycling (30,260 tonnes) • Approx. 8,025 tonnes CO2 reduction
02 Development of existing and future collection schemes	2.1 Technological development of waste collection 2.2 New and flexible fractions 2.3 Bulky waste: Development of collection and robotic sorting 2.4 Increased reuse and recycling of textiles 2.5 Preparation of scheme for recycling of nappies 2.6 Increased collection of electronics and more reuse 2.7 Development of concept for sorting in bins of the City	• 3% increase in collection of household waste for recycling (approx. 6,665 tonnes) • Approx. 2,250 tonnes CO2 reduction • Approx. 800 tonnes of waste for reuse
03 More swap and reuse options	3.1 Recycling centres as reuse centres 3.2 Establishment of new local recycling hubs and supplementing with temporary local recycling hubs 3.3 More swap options for Copenhageners 3.4 Establishment of resource lab in Sydhavn Recycling Centre	• Approx. 240 tonnes CO2 reduction • Approx. 5,880 tonnes of waste for reuse
04 Copenhagen promoting circular economy	4.1 Innovation platform Circular Copenhagen 4.2 Reuse of construction materials from the City's properties 4.3 Ensuring development of circular material flows of high quality 4.4 Increasing quality and value of plastics 4.5 Learning for children and young people and participation in waste prevention and waste management 4.6 Copenhageners as circular consumers 4.7 Development of logistics for repair of furniture and longer life of electronics	• 6% increase in collection of household waste for recycling (approx. 13,040 tonnes) • Approx. 3,410 tonnes CO2 reduction.
05 Increased recycling of industrial and commercial waste	5.1 Increased recycling of industrial and commercial waste 5.2 Industrial and commercial waste in mixed residential and commercial buildings – better solutions 5.3 Cleaner recycling of resources in construction and demolition waste	• 15% increase in collection of industrial and commercial waste for recycling (approx. 25,700 tonnes of waste) • Approx. 9,600 tonnes CO2 reduction.
06 New technological solutions for waste treatment	6.1 Post-sorting of residual waste at sorting plant 6.2 Establishment of biogas plant close to the city and development cooperation on biorefining	• 6% post-sorting of household waste for recycling (approx. 14,055 tonnes), and 1% post-sorting of industrial and commercial waste for recycling (approx. 2,175 tonnes) • Approx. 25,150 tonnes CO2 reduction

In monetary regard for every topic there are expenses identified and money is allocated accordingly. The total costs are rounded to approximately 851 million Danish kroners, and the most *expensive* topic is 01 "Copenhageners sorting more waste" with expected costs around 534 million Danish kroners (City of Copenhagen, 2019a). However, in some of the measures it is recognized that they cannot be financed through waste fees, for example, for measure 4.2 "Reuse of construction materials from the city's properties" it states that it needs to be financed through budget negotiations and applying for external funding, such as EU projects (City of Copenhagen, 2019a).

As Lindeneg (2021b) explained they are mobilising their local monetary resources to the best of their ability, and they are constantly looking for ways to apply for funding outside of the municipality. She mentioned a project that deals with capturing carbon on the waste incinerators, where the project team is applying for money at the EU, as well as the state.

Even though it was previously mentioned that the Resource and Waste plan is the most relevant in terms of CE, Municipal plan cannot be ignored, because it is the one that outlines the city's development over the next 12 years (until 2031) (City of Copenhagen, 2019b). It also states in the Municipal plan that "[it] should be seen in the context of Copenhagen's municipal plan strategy 2018" (City of Copenhagen, 2019b, 3), however the strategy is broader and does not touch upon the strategic planning that much, and in terms of CE it mentions that "circular economy should optimize the city's resource use" (Københavns Kommune, 2019c, 33).

Since the Municipal plan was introduced later than the Resource and Waste plan, it does not identify specific goals in the waste sector, it purely refers to the ones written in the latter (City of Copenhagen, 2019b). On the contrary of the Resource and Waste plan, Municipal plan does not introduce specific targets and/or measurable indicators, it only states goals, but according to UN-Habitat (2007b) objectives that show both desired and possible achievements are as important.

6.3.2 Public-private partnerships

The topic of public-private partnerships is already briefly touched in Chapter 6.1.3, however it is worth to mention specific partnerships City of Copenhagen has created in order to develop CE. When asked Team "Circularity" leader about public-private partnerships, she mentioned that the main tool for creating them is via Circular Copenhagen innovation platform, and that it is an approach that the municipality is employing to develop partnerships (Lindeneg, 2021b).

Project leader of Circular Copenhagen explained that in order to develop a partnership, it all starts with a call for partners, that is officially posted on the tendering website of City of Copenhagen, where the main goal is to find someone that are wiling to work together and help the municipality solve previously identified challenges (Mortensen, 2021). This has a lot to do with the procurement (explained in Chapter 6.1.3), however Mortensen (2021) stresses that the work of the platform should be seen as a long-term thing, meaning that it not only deals with bottom-up approach when the municipality calls for partners, but that the collaboration offers can come from the companies as well, for example, if they want to collaborate with the City of Copenhagen, they know that the Circular Copenhagen platform can be a link for that.

The current partnerships are:

- New sorting technologies with IHP Systems, where the main goal is to "to develop software that can recognize black plastic (food) trays for implementation in a robotic-unit at Copenhagen's test sorting facility" (Circular Copenhagen, n.d.-a). Currently the partnership is undergoing the second of the three phases for implementing the solution,

where the main goal for the current phase is further developing algorithms and install the developed system in the testing facility (IHP Systems, 2019).

- Circular food trays with Amager Resource Center, REMA 1000, Faerch, Danish Crown, IHP Systems and COOP where they have developed six join, development goals working towards improving the opportunities for recycling plastic food trays .
- Circular insulin pens – Returpen.dk™ with Novo Nordisk, Apotekerforeningen, The Danish Diabetes Association, Type1, LIF, Nomeco, TMJ, Steno Diabetes Center, PostNord, DHL, the Danish Environmental Protection Agency, and Cities of Aarhus and Kolding, where the main purpose is to explore opportunities for recycling insulin pens, but in the long-term the learnings from the project could be applied for other types of medical waste (Circular Copenhagen, n.d.-b; Returpen, n.d.). Currently, there is a pilot take-back scheme going on, where citizens can easily drop their used insulin pens in pharmacies for recycling (Returpen, n.d.).
- Circular textiles – ReYarn with Trasborg Denmark, Wolkat, ReValuate, Salvation Army Denmark and Bacher Work Wear, and the main purpose is to help City of Copenhagen preparing for textile waste treatment (as explained in Chapter 6.1.2) and share good practices for circular solutions in textile (Circular Copenhagen, n.d.-c).

6.3.3 Summary

This chapter touched upon concrete actions related to the strategic course set by the City of Copenhagen and the public-private partnerships supporting the actions.

The main document analysed is the Circular Copenhagen. Resource and Waste Plan 2024, that has specific objectives and targets organized in 6 different topics. The actions align with the strategic course set in the city because they support sustainable development and CE. However, in other documents there is a lack of concrete actions and objectives set that lacks to provide a realistic picture of how the strategic visions are going to be achieved.

In terms of public-private partnerships the main administrative body responsible for that is the recently established Circular Copenhagen innovation platform. There are currently several initiatives and projects in place that support the actions laid out in the Resource and Waste plan. However, as the Project manager of the platform stated, their vision is to stay relevant after 2024, when the existing plan *runs out*, to remain as the main point of contact within the municipality for future partnerships.

6.4 Implementation and Management of Circular Economy

This chapter talks about coordination of CE projects in the City of Copenhagen, as well as the general approach on measuring implementation towards CE.

6.4.1 Coordination of Circular Economy Projects

Resource and Waste plan of the City of Copenhagen can be seen as a compilation of several projects. As Lindeneg (2021b) explained, there are around 100 people working wit the waste management in the City of Copenhagen, and only around 10 people are working directly with Circular Copenhagen Resource and Waste plan. Then she also mentioned that for each topic in the Resource plan there are different project managers, that are making sure that the initiatives within their topics are implemented (Lindeneg, 2021a). However, not all of the people are from the Waste department at TEA, some work in, so called, sister departments, for example, people giving out housing permits (Lindeneg, 2021b).

At a later communication via e-mail Lindeneg (2021a) explained that the Resource and Waste plan is coordinated by two programme managers, who are responsible for monitoring the activities described in the plan. In addition, there are around 25 project managers that work on numerous initiatives within the Resource and Waste plan, and they are the ones responsible for planning the budget, activities and reaching milestones.

One of the *projects* is the Circular Copenhagen innovation platform. In the Resource and Waste plan it states that the innovation platform is established with the role of continuously reflect on technological developments and the latest knowledge in CE, and that its main purpose is to form basis for radical innovation of new solutions (City of Copenhagen, 2019a). According to the Project manager of Circular Copenhagen Jonas Åbo Mortensen the innovation platform differs from other initiatives within the Resource and Waste plan, because it is also working with achieving the rest of the objectives in the plan (Mortensen, 2021). In order to do so, the innovation platform is actively locating challenges related to the implementation of the plan and looking for potential solutions for tackling them.

When it comes to finding the challenges, Mortensen (2021) explains that the work happens both internally, that is within departments, different experts and stakeholders, but also externally – learning from other cities experiences, and that mostly happens through being involved in several networks, such as, Ellen MacArthur, C40[8], Circular cities Declaration, etc. When asked Team leader Susanne Lindeneg about, how these networks impact their work at the municipality, she mentioned that they "fit like a glove" (Lindeneg, 2021b) and that they are very proud of showing their good examples, but also getting inspired from other cities.

6.4.2 Measuring Implementation of Circular Economy in City of Copenhagen

Being involved in different networks is also a way of monitoring city's progress towards CE. Two of the commitments when signing Circular cities declaration is to monitor the progress of CE activities and to report back to ICLEI[9] on the overall progress in achieving the commitments (Circular Cities Declaration, n.d.-b). Mortensen (2021) explains that his team is in charge of these reports, however they will not be able to answer all the things within their administration, for some aspects they will have to turn to other administrations and ask for their input, for example, progress on public procurement or embedding circularity in urban planning is something that the Finance administration has the most knowledge about.

Another tool used for evaluating progress towards implementing CE in cities is OECD's developed Checklist for Action (see Figure 11) and Scoreboard, that evaluates whether there are proper governance conditions in place (OECD, 2020). The Checklist covers 12 dimensions that are grouped into three clusters – Promoters, Facilitators and Enablers, and is accompanied by the Scoreboard, where each of the dimension is evaluated in a scale from "Planned" to "In place, objectives achieved" (OECD, 2020).

Team leader Susanne Lindeneg was one of the two people representing City of Copenhagen in the work related to the previously mentioned OECD's Survey on CE in Cities, including the Checklist for Action and Scoreboard. Unfortunately, Susanne admitted that they did not have time to be as

[8] "C40 is a network of the world's megacities committed to addressing climate change. C40 supports cities to collaborate effectively, share knowledge and drive meaningful, measurable and sustainable action on climate change" (C40, n.d.)

[9] "ICLEI – Local Governments for Sustainability is a global network of more than 2500 local and regional governments committed to sustainable urban development" (ICLEI, n.d.)

involved in the process as they wanted to, and they could not apply the scoreboard to their city, however she acknowledged that it might be beneficial for the city to do so (Lindeneg, 2021b).

Regarding measuring implementation of CE, Lindeneg (2021b) mentioned that soon it is 3 years since the Resource and Waste plan has been introduced, therefore there is a need for mid-term evaluation, that they have already started working on. At a later communication, she explained that the details of how the evaluation is going to be undertaken, are not clear yet, but most probably they are going to look at the recycling amounts related to the targets in the Resource and Waste plan (Lindeneg, 2021a). During the interview, Lindeneg (2021b) also emphasized that they have a data team, that is constantly evaluating where they are in terms of achieving the objectives set in the plan, so the measuring of implementation is happening on an ongoing basis.

For the Municipal plan there is no implementation plan as such, since its main purpose is to provide overall vision and guiding framework for other strategies and action plans within the City of Copenhagen, however there is a monitoring procedure to analyse the strategic decisions made with the plan (Center for Byudvikling, 2021).

In terms of governance practices, Mortensen (2021) mentioned that CE is still approached in silos, however there is a big effort put to break them down and work across the different administrations and even municipalities. Lindeneg (2021b) also agreed that a lot of work related to CE is happening by cooperating between administrations, departments, and stakeholders. Nevertheless, Mortensen (2021) talked that the general approach in organizing and governing CE in the City of Copenhagen is very decentralized and often times follows specific people, not so much departments, for example, when a person who has been in charge of certain aspects of implementing CE switches to another department, then it can be seen that the work follows the person, because they are the most knowledgeable.

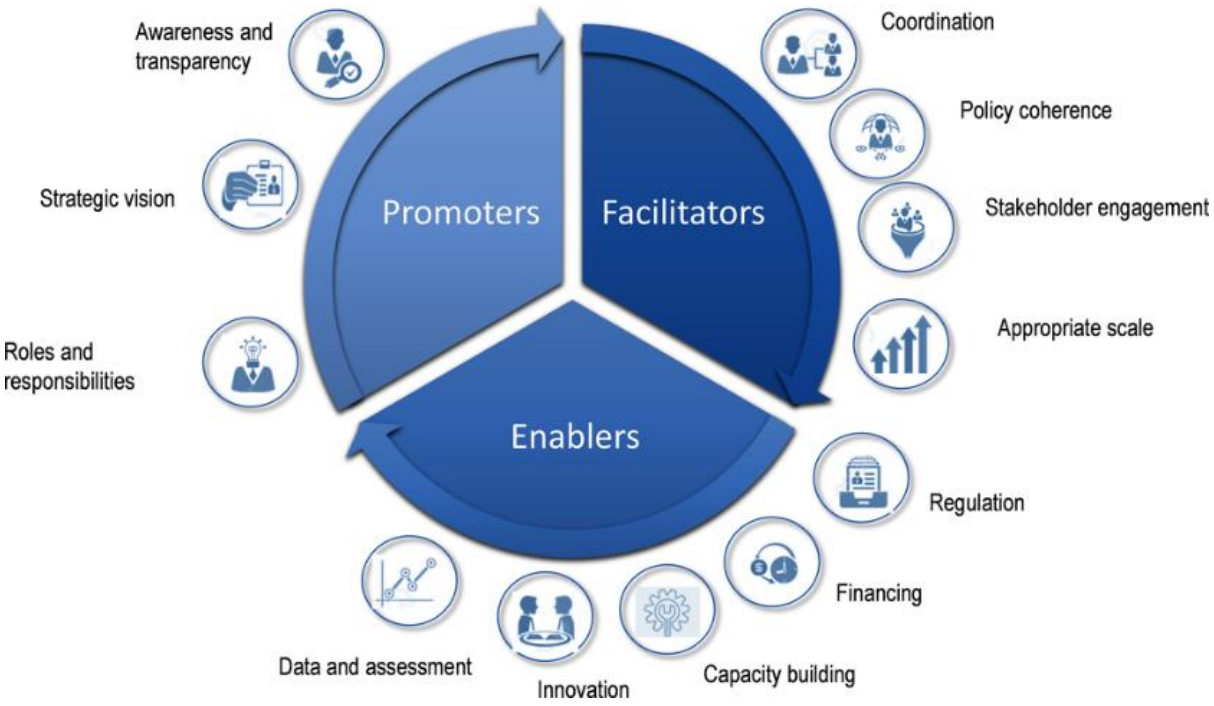

Figure 11. The governance of the Circular Economy in cities and regions: A Checklist for Action (OECD, 2020)

6.4.3 Summary

This chapter dealt with implementation and management of CE in the City of Copenhagen.

For the specific projects in the City of Copenhagen, they have project managers and leaders that are responsible for overviewing implementation. That is also the case for the Resource and Waste plan, where there are two project managers who are in charge of monitoring the actions and measuring the success. However, there is not a unified approach used for measuring implementation of CE on a more general scale.

There are existing tools for measuring implementation of CE in the City of Copenhagen, however they are not employed due to the lack of time and human resources.

7 DISCUSSION

The Discussion chapter, as suggested by Rienecker et al. (2015), provides another viewpoint on the topic of SUP in the City of Copenhagen and throws light on the results, methods and general approach of the study, as well as introduces to the perspective of the study.

Results

The analysis dealt with SUP in the City of Copenhagen and provided insights on what has already been done strategically in the city, but which areas can be improved according to the theory.

In general, City of Copenhagen does not employ a strategic planning approach when it comes to the CE because there is no strategic vision in this area. However, there are other planning documents that set a strategic course for the city, for example, Municipal plan. Even though Resource and Waste plan is not directly linked to the Municipal plan (also because the Municipal plan was introduced later than the Resource and Waste plan), they do have similarities and they work in alignment with each other.

Jonas Mortensen from the Circular Copenhagen Innovation Platform mentioned that even though City of Copenhagen does not have a specific CE plan, it still is one of the central topics of discussion within the municipality, and a lot of initiatives are aligning with the concept. However, in terms of SUP, it has to be included in the strategic planning documents and visions in order to have a thorough and transparent work towards the transition to CE.

The governance structure of CE in the City of Copenhagen is not very clear, there is still evidence of thinking in silos. It is understood that TEA holds the biggest responsibility towards implementation of CE, however there should be a more centralized body overviewing the general course of the transition towards CE. It would also help to follow through the commitments the City of Copenhagen has agreed to by being involved in different platforms, such as, Circular Cities Declaration.

It can be said that the City of Copenhagen thinks strategically overall, but it is not very specific in terms of CE. It can also be seen that CE is still very closely linked to the waste management. Even though both interviewees emphasized the importance of *closing the loops* and sustainable procurement, it is not so visible in the action plan. All 6 topics in the Resource and Waste plan deal with the waste management and finding more sustainable solutions for that. It might be that there are some smaller sub-initiatives that talk about other aspects of CE, however they are not represented well enough for the public to see.

When it comes to measuring implementation and progress towards CE in the City of Copenhagen, there are not any specific tool or approach used to do that. Susanne Lindeneg talked about mid-term evaluation of the Resource and Waste plan; however she did not elaborate on how exactly that is going to be carried because the details were still not clear. From the point of SUP (and the State of the art), such interventions should be in place together with the presentation of the strategic action plans.

The approaches for measuring progress can be found in other European cities, where an especially good example is Amsterdam. Since the City of Copenhagen is closely collaborating with the City of Amsterdam, there is a potential to get inspired and learn from them in order to develop a transparent and publicly available measuring system.

Methods

The chosen methods were sufficient to develop empirical data and provide basis for the analysis. However, due to the limitation of time and availability of the potential interviewees, there were only two interviews carried out. The interviews gave a lot of insights and provided author with better and deeper understanding of the CE processes in the City of Copenhagen, but since both interviewees represented the same administration, they were talking a lot about similar things and explaining the concepts in a similar manner. Nevertheless, it was useful to conduct the interviews and learn about, amongst other things, the governance practices in the City of Copenhagen.

Interviews served a complimentary role in the analysis. Most of the primarily data came from the documents reviewed. If the interviews had been conducted in a good time and there were more of them, it could have been possible to build more on the data gathered and dig deeper into these personal communications.

There were also e-mail communications performed, and, in author's opinion, they can answer some unclarities, however they should not be used as the main source of information, because it is rather hard to understand the context and the purpose of the questions asked. Fortunately, that did not influence the results too much, but the e-mail communications received were used as a support for the ideas got from the other empirical data sources.

When it comes to Document analysis, the approach used was content analysis, for which the main themes were developed prior to the analysis. That influenced the research process a lot. Because of the abductive approach used in this study, it was possible to go back to the initial themes established and slightly adjust them to unveil aspects that the author had not thought about before.

Another thing to remember, is that the chosen case is in Denmark, therefore the working language is Danish. Most of the documents were translated in English, and it was easy to work with them, however there were some that were only available in Danish. The author has sufficient knowledge in understanding Danish, but in some cases, things might not be as clear and conveyed in the most precise manner, because of the language barrier. Nevertheless, author was aware of this challenge before starting the research, and enjoyed the learnings from it.

General approach

This study used approach developed by UN-Habitat for SUP.

The approach was initially developed for urban areas that have undergone some crisis before and needed to re-build their organizational structure from a scratch. The approach deals with SUP and more of the urban development, not so much sustainable development. It was decided to use the approach anyway because of the study carried out by Bolger & Doyon (2019) where it was applied for measuring circularity in two cities – Melbourne, Australia and Malmo, Sweden.

Both the original approach and the adapted one had to be re-adapted to fit the case of the City of Copenhagen, because it was an evaluation of one city, not comparison of more.

In the study of Melbourne and Malmo, there was not a big focus on the national and supranational implications and pressures, however it was the case in this study, because the author found it important to develop an understanding of the background. For that, there was not any particular method or approach used.

A critique towards the UN-Habitat approach is that the tool is developed more than 10 years ago, when not as many things were in such focus as today, for example, sustainable development. There is also a lack of practical application of the tool, except for the one used in this study; besides it is missing the last part of the report, that deals with implementation and measuring of the projects, that is considered to be one of the most important aspects of strategic planning in general. UN-Habitat tool is not thorough enough, it was rather hard to apply it, where many things were left for interpretation. It does not provide a general understanding of the theory behind developing the approach, thus there might be inconsistencies with the grounded theory and more practical approach.

Perspective

There are two main perspectives that the author would like to emphasize.

Firstly, there is a potential to not only continue the analysis of strategic planning approaches in the City of Copenhagen, but it would be beneficial to use a tool to evaluate the current state of success and identify the areas where a bigger attention is needed. A good example of such tool is OECD framework presented in Chapter 6.4.2. In that way it could be possible to identify the weaker points, explore the potential challenges and barriers for improving the scores and providing recommendations for the municipality.

Secondly, a comparative case study could be carried out. It can be both with another Danish city or with any other city. As seen in Bolger & Doyon (2019), there are several learnings from each case that can be used for developing new strategic plans, etc.

8 CONCLUSION

The main purpose of the study was to investigate Strategic Urban Planning practices in the City of Copenhagen and how it contributes to the transition to Circular Economy.

Before answering the main research question, it is important to answer the three sub-questions proposed.

What are the current Circular Economy policy and governance practices in Europe and how is the progress of implementation measured?

In many European countries national and supranational frameworks play an important role when it comes to developing CE policies on a local level. There are not that many notable cases specifically on a city level, however there were four city strategies evaluated to a closer detail – Amsterdam, Glasgow, Paris, and Peterborough, as well as learnings from the reviewed academic articles.

Cities are developing their CE policy frameworks (route maps, strategies, visions), including long-term visions and goals they want to reach, followed by specific action plans. Mostly local governments and specific administrations within are in charge of developing and implementing these policies, and in some cases, there are concrete governance approaches employed to make sure that the implementation of the CE frameworks is smooth and transparent, but in general governance is often times a weak point. When it comes to measuring success and implementation of CE, cities have different approaches, but in most cases, cities have introduced concrete targets they want to reach. Unfortunately, majority of the cities reviewed (and those included in the articles) have not developed a specific timeline and/or framework for measuring the success and proximity to reaching the targets.

What is the current situation in the City of Copenhagen in terms of Circular Economy?

City of Copenhagen does not have a specific framework working only with CE, it is partially included in the Resource and Waste plan. It can be seen that the current CE practices in the City of Copenhagen are strongly linked with the waste management, but there are several great initiatives in that area, especially when it comes to raising awareness within the citizens and informing them about decisions made within the municipality.

Another important initiative in the City of Copenhagen, that has also emerged from the Resource and Waste plan, is Circular Copenhagen Innovation platform that is mainly in charge of establishing and maintaining public-private partnerships within the city.

How can elements from Strategic Urban Planning advance the implementation of Circular Economy in the City of Copenhagen?

Even though the City of Copenhagen does not have a strategic approach when it comes to CE implementation per se, they do employ several aspects from that, e.g., involvement of stakeholders and inter-department collaborations.

However, an important aspect that the city should think about is developing a strategic vision/ development plan that sets the vision and goals for the City of Copenhagen within the field of CE. There is an existing Resource and Waste plan, but it can be seen as an action plan, not as strategic planning document. Such policies not only help to understand the common ground, but it sets specific course, where the city want to go, that can also improve the aspect of measuring implementation that is currently not so clear in the City of Copenhagen.

The answers to the three sub-questions lead to an answer to the main research question.

How could Strategic Urban Planning on a city level accelerate a transition towards Circular Economy in the City of Copenhagen?

The City of Copenhagen is on its way to become a climate neutral and sustainable city, and it has also signed a declaration as one of the European Circular cities, meaning that they have committed to become circular. However, it is not entirely clear, how the City of Copenhagen is aiming to transition to be a circular city.

SUP could definitely help the city in this transition by setting a common vision for becoming a circular city. Firstly, the city needs to understand where they stand and identify their strong and weak points, as well as opportunities and threats. Then the city should establish a Municipal planning team, that works with developing a circular vision for the City of Copenhagen (where the main lessons learned could be from the City of Amsterdam). There is a potential that such team could be linked to the Circular Copenhagen Innovation platform and involve stakeholders not only from the private companies and NGOs, but also different administrations. Finally, the City of Copenhagen needs to establish a procedure for measuring their success towards implementing CE.

This study has contributed to the field of urban planning by investigating CE practices in the City of Copenhagen in alignment with SUP. There is a potential to continue the investigation by developing a more thorough state of the art of the city and evaluate its current achievements in terms of CE.

9 LIST OF FIGURES

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APPENDIX 1 – GUIDELINES FOR THE INTERVIEW WITH JONAS ÅBO MORTENSEN

Friday, 21st May, kl.13:00, Teams

Since Jonas is a project manager for the innovation platform, he might have some insights on the acceleration/ implementation part of my RQ. I want to understand more of the background of the platform and how do the initiatives are linked to Copenhagen being a circular city. I plan to use this interview as a knowledge base for what is happening on Copenhagen and the link with the municipality.

Start out by saying what this interview is all about and what is the purpose of it, what I want to accomplish. Tell about my background.

Agree that it is okay to record the interview Do you have any questions before we start?

- His background

Talking about the project "Circular Copenhagen" itself

- Background of the CC, how did it all start
- Is it the umbrella or just one of the initiatives
- Defining circularity – talk about what "Circular Copenhagen" means to them
- How do they find the innovations (or how do the innovations find the platform)
- Process for establishing partnerships (who is reaching out to whom, how is this monitored)
- What are some of the biggest/ best partnerships

Political/ planning aspects

- How is the work of CC organized?
- To what extent is the City of Copenhagen involved
- What departments do they collaborate the most with?
- What has changed after Copenhagen signed the Circular City Declaration?

Strategies/ long term plans

- On the webpage it says that there are two policies they work with – Waste plan and Climate Action plan. But what about strategies, are there any long term visions?
- Are there any strategies/ visions for themselves as a platform?
- What happens after 2024 (when the waste plan runs out)

Ask about other relevant people to reach out to

I have no further questions. Is there anything else you would like to bring up or ask about before we finish the interview?

- Not using direct quotes, but if that is going to be the case, I will reach out to you for an approval.
- Would you be interested in receiving an Executive summary and possibly a follow up communication between the hand in and the exam? (W 25 (21/06 – 25/06))

APPENDIX 2 – GUIDELINES FOR THE INTERVIEW WITH SUSANNE LINDENEG

Friday, 4th June, kl.11:00, Teams

Susanne might have insights from a planning perspective, talk more about how the work is organized and governed. What are the actions happening, how do they collaborate with different stakeholders. Focus on the stakeholders. Background for the work in Copenhagen. Susanne is also responsible for international relations and cooperations for CE, so that is also a focus point.

Start out by saying what this interview is all about and what is the purpose of it, what I want to accomplish. Tell about my background.

Agree that it is okay to record the interview Do you have any questions before we start?

- Her background

CE work at the municipality

- How is the CE defined?
- How is the work organized, who is responsible
- How are the discussions regarding budget, how do they allocate money to specific initiatives
- How do they collaborate with other administrations

Collaborations

- Talk about business support schemes, public-private partnerships
- How do they identify relevant stakeholders?
- What are the approaches for involving citizens?
- Being involved in different initiatives (C40, Circular cities), what impact does that have on the work at the municipality?

National/ supranational policies

- What is the role of national CE plan and EU policies?
- What responsibilities do they have towards the national government?
- OECD Survey and work on that

Strategies/ long term plans

- Do they have a strategic approach when planning CE? Why?
- How do they measure implementation of CE?
- Can they imagine having a CE strategy/ plan in the future?

Ask about other relevant people to reach out to

I have no further questions. Is there anything else you would like to bring up or ask about before we finish the interview?

- Not using direct quotes, but if that is going to be the case, I will reach out to you for an approval.
- Would you be interested in receiving an Executive summary and possibly a follow up communication between the hand in and the exam? (W 25 (21/06 – 25/06))