Towards a circular municipality

A study on which circular economic policies the city of Groningen could implement within existing municipal policies.

Name: Viktor Hugo Schoute
Student number: 3016323
Institution: Rijksuniversiteit Groningen
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Supervisor and first reader: dr. A.E. Brouwer
Second reader: dr. V.A. Venhorst

"Anyone who believes in indefinite growth in anything physical, on a physically finite planet, is either mad or an economist"

- Kenneth Boulding

Abstract

Circular economic principles are increasingly implemented in policies of Dutch municipalities. The circular economy is an overarching concept of several tools that aim to decline the use of raw materials with acknowledging and extending the value of materials. It appears to be difficult for municipalities to implement circular economic policies within existing institutional policies because of the novelty of the concept and complex decisions that have to be made. This study investigates which circular economic policies could be implemented within the exiting institutional policies of the municipality of Groningen to contribute to the transition towards the circular economy. Suggestions from public and private actors are collected to formulate these policies. For this research the municipality of Groningen was selected to perform a case study. Two focus group discussions were organised to collect data and two interviews were held to reflect on the results from the focus group discussion. From the results policies are formulated that are considered most beneficial. First, the municipality of Groningen should implement circular procurement within the institutional procurement policy. This can enlarge the market for circular products and services and set a trend for other organisations. Secondly, circularity should be implemented in the waste policies of the municipality of Groningen. Waste can be reduced through awareness campaigns and value can be recovered through efficient collecting and distributing methods. Thirdly, the municipality should facilitate space and resources for businesses in the construction sector to stimulate innovation in circular construction. Future research should focus on comparing multiple cases of municipalities that want to implement circular economic policies. This will help to better understand which policies can only be implemented by a single municipality and which policies are applicable to municipalities in general.

Key words: circular economy, municipality, policies, transition

Foreword

The first time I was encountered with the concept 'circular economy' was in an episode of the television programme *Tegenlicht*. The episode starts with Kate Raworth explaining that economic theories learned in today's universities are outdated. During my pre-MSc and MSc Economic Geography I have studied theories of Ricardo and Keynes that strive towards the highest possible economic growth, as though this economic growth could be infinite, with infinite levels of resources. These neoclassical economic theories are also adopted by the economic system that we have in our society. Raworth continues by saying that economic success and progress is based on growth, but this very growth makes us fall short on the essentials in life. In the episode they show clips of large dumping grounds, deforestations, floods in the Philippines and people suffering from dehydration in Africa. According to Raworth a drastic change in our societal mechanisms is needed to overcome these social and planetary problems. We must close the loops of materials and resources. The world must strive for the circular economy.

This subject caught my attention and I was wondering what initiatives are being explored in Groningen. I never heard of the circular economy before this episode of *Tegenlicht*. Therefore, I was surprised that businesses in Groningen already experimented with circular business models. I was even more surprised that the Netherlands have set a vision to become fully circular in 2050. Also, cities like Amsterdam, Haarlem and Rotterdam have already created policies on circular economy principles.

During my research I came across a lot of challenges that can counterwork the transition towards the circular economy. Nevertheless, I think that currently governments, businesses and knowledge institutes are working on new ideas to overcome these challenges. I sincerely believe that studies like this master thesis, can help to increase awareness on the topic and ensure people to better understand how to support the transition towards the circular economy. Therefore, I would like to thank you for reading this paper.

I would like to express my gratitude to those people who took the effort to contribute to this master thesis. I would like to thank all participants in the focus group discussions and interviews. Businesses and employees of the municipality were excited to participate in this research. This shows the motivation and enthusiasm around the topic of circular economy. I am thankful for the knowledge and experience the participants shared with me. Furthermore, I appreciate the guidance, advice and support from friends, family and my girlfriend. Finally, I would like to thank my supervisor, Aleid Brouwer. Throughout the process we had several productive meetings that have helped me create this thesis. I am thankful for the comments and for giving me the space to gain the most out of this topic.

Viktor Schoute

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CO_2	Carbon Dioxide
RLI	Dutch Council for Environment and Infrastructure
PBL	Dutch Environmental Assessment Agency

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1. Introduction

1.1 Problem definition

The current economic system is based on the linear economic model. Resources are taken out of the ground, processed into products, consumed and thrown away. After products are thrown away the process starts all over again. For years economic models in theory and practice have been based on an infinite number of recourses. However, an increasing urge for economic growth, a rapidly growing world population and a rising demand for resources are all developments that have put pressure on the applicability of the linear model. The linear system of production relies on large quantities of materials and energy (Ellen MacArthur Foundation, 2013). With the increasing demand for natural resources and increasing supply of waste the physical limits of this earth are reached (Boulding, 1966). A growing group of economists, entrepreneurs and politicians are realising that the linear economic model does not lead to sustainable economic growth. There is a call for an alternative economic system (Ghisellini et al., 2016).

Such an alternative is provided through the circular economic model. It aims to decline the use of raw resources with acknowledging and extending the value of materials, components and products (Ghisellini et al., 2016). The Ellen MacArthur Foundation concluded (2013) that extending the value of resources can decrease the environmental impact, including carbon emissions, deforestation and water use. CO_2 emissions in Europe can be reduced with 61% in the year 2050 if the circular economy is adopted by the transport, food and construction sector.

Regarding businesses, circular systems have already been explored and found to create not only viable, but also attractive businesses models. This because consumers are increasingly concerned about the environmental harm caused in the production processes of the products they buy and the social responsibility of companies. This puts pressure on firms to respect the social and environmental values (Prakash, 2001). In addition, businesses are facing higher supply risks of critical resources caused by the linear business model (Ellen MacArthur Foundation, 2013). Overall it can be assumed that there are plenty of opportunities for firms to implement circularity in their business models.

However, the current system is designed around the linear model, thereby forming barriers that prevent further adoption of circular initiatives (Kok et al., 2013). Existing policies and taxation that are created to support linear business models could hinder circular business models to succeed (Ghisellini et al., 2016). To overcome these barriers and accelerate the transition towards the circular economy, interaction between governments, businesses and citizens is required (Van Ejik, 2015).

A role for the government is to take away these barriers in the transition towards the circular economy (Kok et al., 2013). The Dutch government has the ambition to become 100% circular in the year 2050. To overcome the barriers in the transition the national government will intervene with stimulating regulations, market incentives, financing, knowledge and innovation and international cooperation (Rijksoverheid, 2016).

The Dutch government also strives for cooperation between different tiers of governmental institutions – i.e. the municipalities and national government. Goals and plans between these two governmental bodies should be harmonized in order to accelerate the transition. Municipalities generally follow the goals set out by national governments. Although such governmental structures are necessary, the same municipalities now have to devote resources to improving the circular economy. That is, the creation of circular policies around their own unique social-cultural and economic environment (RLI, 2015).

There have been studies on implementing the circular economy on a local scale. Researchers often use a specific region as a case study to give recommendations on policies and regulations a government can apply. The outcomes vary broadly due to the variation in scopes and study groups.

Su et al. (2013) studied the performance of circular economic policies in the city of Dalian (China) and generated recommendations on governmental policies. The authors point to the national government for creating policies around environmental taxes, improving public awareness and experimenting with circular economic technologies. In China the national government is taking the responsibility in creating circular economic policies. Chinese municipalities are obliged to execute these policies.

Ilic and Nikolic (2016) did research on implementing circular economy policies on a local level in Serbia. They state that the municipality must lead the way for accelerating the transition towards the circular economy. Municipalities are responsible for waste management in Serbia and should create policies around reducing, reusing and recycling resources.

These two cases show that the political situation in a country is determining what municipalities can do to contribute to the transition towards the circular economy. Monitoring other cases is needed to increase the knowledge on this topic (Ghisellini et al., 2016). This way overarching circular economic policies can be formulated that can be implemented in the existing policies of multiple municipalities (Ghisellini et al., 2016).

Although almost all municipalities in the Netherlands have created plans on becoming circular, more research is needed on which circular economic policies a municipality can implement within the existing institutional policies (Gemeente.nu, 2017). This because of the novelty of the concept of circular economy. Due to a lack of knowledge and experience it can be difficult for policy officers to formulate circular economic policies for the municipality (Lindner et al., 2017). Furthermore, in case of implementation, several complex considerations must be made. First, a vision and goals have to be formulated. Setting a vision is important to understand what the municipality want to accomplish with implementing circular economic policies (Copius Peereboom, 2015). For example, one of the visions set by the municipality of Rotterdam in implementing circular economic policies is that the institution wants to reduce, re-use and recycle. Waste doesn't exist, and the municipality expects that in the future financial benefits can be achieved from residues (Metabolic, 2018). Second, a municipality must focus on a specific theme regarding circular economy. This because the concept of circular economy is broad and has many interpretations. The municipality of Rotterdam is focusing on the themes: circular procurement, municipal material loops and recover from waste (Metabolic, 2018). Nevertheless, with a broad concept as circular economy it can be challenging for policy officers to set priorities (Copius Peereboom, 2015).

For this research the urban municipality of Groningen is selected as case study. Cities can have a key role in the transition towards the circular economy in the Netherlands. In an area with a high density of consumers and firms, myriad resources and waste flows are evident. In addition, urban governments can - in certain situations - react faster than a national government (Ellen MacArthur Foundation, 2013).

The municipality of Groningen has the ambition to contribute to the transition towards the circular economy. This is exemplified by the agreement of June 2018, where the municipal council of Groningen has agreed to implement circular economic policies (Zirkzee, 2018). Furthermore, actors should be stimulated and facilitated to work according to the circular economic principles (Zirkzee, 2018). Policies should also suit the ambition of the municipality to become CO_2 neutral in 2035. To reduce the CO_2 emissions in the region to zero, the city has a plan to further decrease energy consumption and replace carbon-based energy sources for sustainable energy production (Gemeente Groningen, 2015). However, with a lack of experience and knowledge it is unclear for the municipality which circular economic policies should be implemented within the existing institutional policies (Zirkzee, 2018).

1.2 Research question

This study will contribute to the existing research body on circular economic policies that a municipality can implement if it wants to contribute to the transition towards the circular

economy. This contribution is made by studying the case of the municipality of Groningen and formulating circular economic policies that are beneficial to implement within the existing institutional policies. It is important to study the interaction between different public and private actors. This is relevant because both parties have an interest in contributing to the transition towards the circular economy and it is inevitable that policies have an influence on private actors. This research will address the following main research question:

Which new circular economic policies, as suggested by both policy officers and businesses (active in Groningen), could be implemented within the existing institutional policies of the municipality of Groningen to contribute to the transition towards the circular economy?

This question raises three sub-questions:

1. What is the contribution of municipalities in the transition towards the circular economy?
2. How do public and private actors see things differently regarding which municipal circular economic policies should be implemented within the existing institutional policies of the municipality of Groningen?
3. What regional and institutional characteristics are obstacles and opportunities for implementing circular economic policies as seen by representatives of the municipality and businesses in Groningen?

It is relevant to study the municipality of Groningen because the city wants to contribute to the transition towards the circular economy. However, which circular economic policies would fit into the existing policies remains unclear. The results of this study can be used by the municipality of Groningen as a guideline for implementing circular economic policies within the existing institutional policies.

1.3 Structure

The next chapter reviews the existing literature regarding the circular economy and municipal circular economic policies. It is followed by an explanation of the relevant concepts in this research. These concepts are clarified in a conceptual model. The conceptual model shows the relationship between the circular economic principles and the different policies a municipality can implement within existing institutional policies. The methodology chapter explains the choice for focus group discussions and semi-structured interviews as the research method. In this section attention is paid to the validity and reliability of this research as well. The result section presents an overview of the outcomes from the focus group discussions and semi-structured interviews. The analysis of the data is based on the concepts and relationships presented in the conceptual model. The result section will be followed by the conclusion. It briefly summarizes the main findings. In the discussion that follows, the results are situated in the context of the broader theoretical framework. There will be a reflection on the strengths and weaknesses of this study as well.

2. Theoretical framework

2.1 Circular economy

A growing group of economist, entrepreneurs and politicians are realising that the linear economic model does not lead to sustainable economic growth. The increase in demand for resources has put pressure on the physical limits of the earth. There is a call for an alternative model and such an alternative is provided by the circular economic model (Ghisellini et al., 2016).

In the following paragraph, literature on the concept of circular economy will be reviewed. First the history of the concept of circular economy is discussed. In addition, three different views on the concept of circular economy are explained.

2.1.1 The history of circular economy

Although circular economy is currently a popular term, studies in the past have written about the topic without explicitly mentioning the words "circular economy". One of the early writings on the topic of the modern environmental crisis and the physical limits of natural resources was by Boulding (1966). In his paper he describes how the role of economic growth and consumption increases the extraction of raw materials from the environment and the level of waste discarded into the environment. Eventually we will reach a critical point at which future generations will suffer from scarcity in resources, followed by ecological damage. Boulding (1966) points towards a closed system in which all parts of the system are interlinked. No resources are taken from outside the system and no resources will leave the system. Politics and economic theory must acknowledge nature's physical limits in pursuing economic growth.

The term "circular economy" first appeared in Pearce and Turner (1990) which builds on Boulding (1966). The authors created a conceptual framework for the circular economy. This model illustrates a closed economic system in which flows of material and energy are interlinked between economic activities.

Recent studies picked up the concept of circular economy again and many new articles have been written on this topic. There are various views in literature on the current understandings of the concept of circular economy (Table 1). A threat of many different views on a concept can be that it becomes too vague to implement and the development loses momentum (Kirchherr et al., 2017). On the other hand, Merli et al. (2017) explain why the concept of circular economy must not be seen as a static concept. Historical principles and concepts such as regenerative design, performance economy, cradle-to-cradle and industrial ecology are all intertwined with the concept of circular economy.

Kirchherr et al., (2017) have examined 114 circular economy definitions and coded them by core principles. In the following paragraph three principles of circular economy - regenerative and distributive design, the 3Rs principle and material cycles - will be further explained. These principles are seen by Kirchherr et al., (2017) as most employed by other literature.

Author	Definition
Kok et al. (2013)	*"The circular economy aims to become a new paradigm that essentially changes the functions of resources in the economy: waste material of one (industrial process will be input for another, and products will be repaired, reused and recycled." (p. 14)*
Geng et al., (2013)	*"A circular economy is an industrial system focussed on closing the loop for material and energy flows" (p. 1526)*
Dupont-Inglis (2015)	*"(circular economy) is about decoupling growth from resource consumption (…). It's about designing products that are easier to reuse or recycle."*
Zhijun & Nailing (2007)	*"The circular economy, which is a mode of economic development based on ecological circulation of natural materials, requires compliance with ecological laws and sound utilization of natural researches to achieve economic development." (p. 95)*

Table 1: General definitions of circular economy

2.1.2 Regenerative and distributive design

Raworth (2012) introduced the concept of the doughnut economy. Raworth (2012) criticizes the current way of thinking about the economy. No longer should economic theory focus on growth, efficiency and profits. Rather we should create a global economy where every person can strive for profit but at the same time the environmental ceiling is not crossed. This steady state between social and planetary boundaries is illustrated by Raworth (2012) in a doughnut shape (figure 1). To reach this steady state two principles need to be followed. These principles are related to circular economy. First, an economy must be *regenerative* by design. This principle describes a system in which resources are used repeatedly instead of using up the resources from the earth. Secondly, an economy must be *distributive* by design. Resources cannot always be used to build the same product repeatedly. It would be inefficient to bring the same product back to the producer. Rather, there should be a distributive network in which the resources from the production of one product can be used in another process. For this network to be successful Raworth (2017) is calling for an open source design. It must be clear what kind of materials a product contains, because when a product is turned into waste it should be clear what materials can be reused and where the materials can be used for.

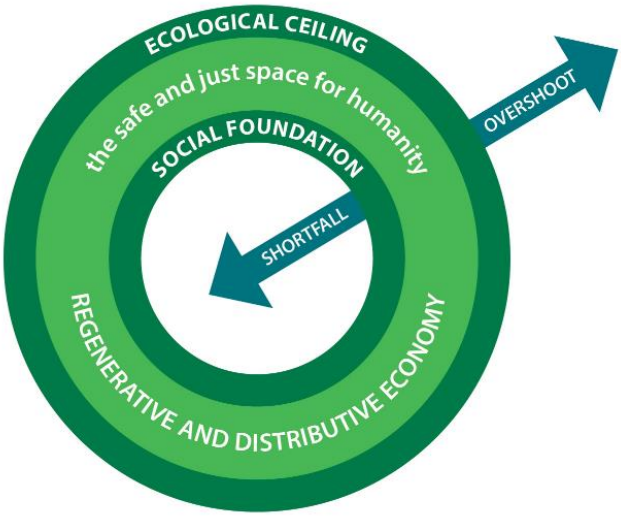

Figure 1: Doughnut economy (Raworth, 2017, p. 25)

2.1.3 3Rs principle

Ghisellini et al. (2016) state that circular economy often emerges in publications in the form of the 3Rs principle. The principle of reduce, reuse and recycle is further explained in the thesis. With the principle of reduction, the aim is to decline the number of used materials like energy and virgin raw resources. This can be achieved by making production processes more efficient and reducing consumption. The reuse principle refers to using products or components again for the same purpose for which they were designed. Fewer resources and energy are needed to reuse products compared to creating new products from raw materials. The recycling principle refers to creating a product from materials that are seen as waste. When a product is turned into waste the materials can be used to produce the same product or used in the production of other products. With recycling usable resources are not lost. The related environmental impact of disposing waste and attracting new raw materials is being decreasing. Rethinking the design of a final product with less toxic and better recyclable materials can make it easier to recover materials from products that can no longer be consumed (Raworth, 2014).

The 3Rs principle can be extended to the 9Rs principle (Cramer, 2014). Each of the Rs show a different level of circularity which can be ranked from highest to lowest priority (figure 2). Therefore, a distinction can be made between different levels of circularity. According to Cramer (2014) the highest level of circularity is 'refuse' and the lowest level is 'recover'. This allows actors to understand how waste can be brought back into the cycle in an optimal way.
The principle of refuse is based on 100% reducing the use of certain materials in a production process and final product. For example, producing straws from paper instead of plastic. (Cramer, 2014).

For products that are no longer suitable for consumption there is the option to repair or refurbish the product and bring it back to the market again (Savaskan et al., 2004). When a product is no longer suitable for consumption because it is broken, repairing a product can be the solution. When a product is repaired it can be sold on the market again. Thinking about a new restorative and regenerative design of a final product can make it easier to repair products (Ellen MacArthur Foundation, 2013). When a product is no longer suitable for consumption because there is no demand for it, refurbishing can be the solution. Refurbishing a product improves the usability the product. For example, a smartphone can be refurbished by updating its driving system. This will increase the value of the product which leads to a higher demand (Savaskan et al., 2004). Implementing systems for repairing and refurbishing products in a region can be challenging. It depends on the fact that both demand of refurbished or repaired products and the supply of returned products must be present (Savaskan et al., 2004). Often there is a geographical gap between demand and supply which makes these processes a logistic challenge (Savaskan et al., 2004). For example, the demand for refurbished and repaired smartphones is high in third world countries. In western countries the supply of second-hand smartphones is large, because people buy new phones more often. Because of this geographical gap firms do not think it is profitable to make refurbishing and repairing electronics their core business (Zink & Greyer, 2017).

Remanufacturing products is using materials from products that are waste to make a product that has the same function (Vollebergh, et al., 2017). Re-purposing a product is comparable to reusing a product. However, a product is reused for a different purpose instead of the same purpose for which it was designed (Vollebergh, et al., 2017). In Ghisellini et al. (2016) re-purpose and remanufacture are principles that are covered within the principle of recycle.

When materials no longer have the value to be recycled, energy and materials can be recovered (Vollebergh et al., 2017). For example, the nutrients from organic waste can be recovered to be used as green gas or compost (Metabilic & Urgenda, 2015).

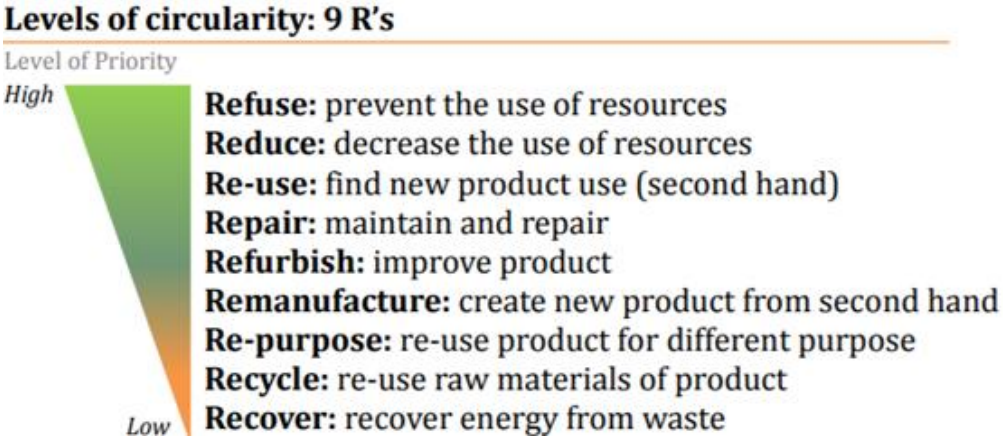

Figure 2: 9Rs principle (Cramer, 2014, p. 3)

2.1.4 Material cycles

The Ellen MacArthur Foundation (2015) defines the circular economy as:

"(…) one that is restorative and regenerative by design and aims to keep products, components, and materials at their highest utility and value at all times, distinguishing between technical and biological cycles." (p. 2).

In this definition the distinction is made between the material flows of technical and biological cycles (Figure 3). Biological materials are non-toxic, are easily absorbed by nature and can be used for feeding the earth to grow new products. To extract value from waste efficiently, first biochemical feedstock must be extracted followed by anaerobic digestion or composting. Technical products, for example plastics, cannot be absorbed by nature and those materials should be wasted as little as possible. This is possible by going through the following cycles; 1) maintenance of the product, 2) reusing and redistributing products, 3) refurbish products and 4) recycling materials.

Bocken et al. (2016) explain two strategies towards the cycling of materials. Slowing the material loops is the first strategy. Products must be designed to last for a longer time and the product-life must be extended. For example, by repairing a product the utilization period can be extended. These measures slow down the flow of resources. The second strategy is closing the resource loops. Through recycling materials from products that can no longer be used, a circular flow of materials emerges. The Ellen MacArthur Foundation (2013) is closing the materials loops even further. Residues from production processes can be used as resources for another product.

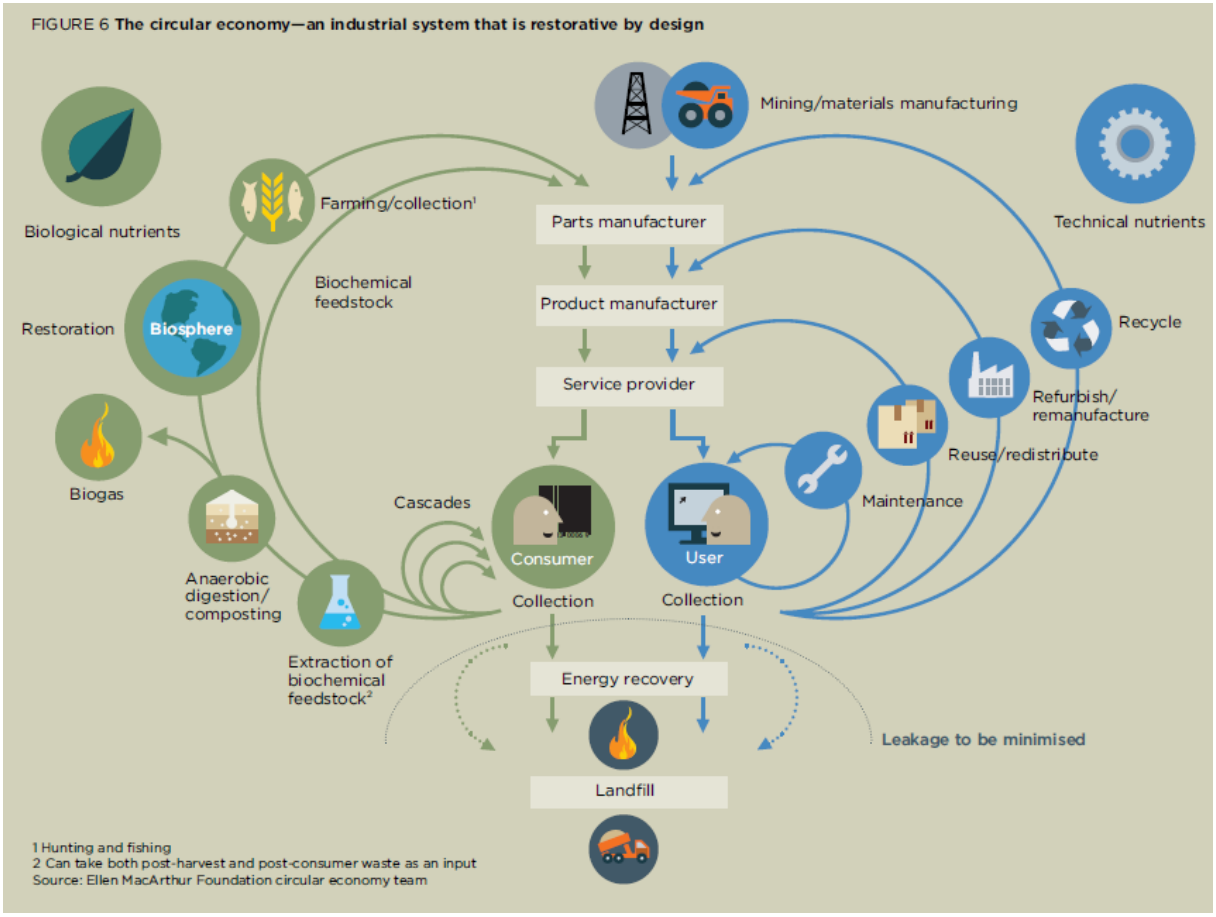

Figure 3: Technical and biological cycles (Ellen MacArthur Foundation, 2013, p. 24)

2.1.5 Definition circular economy

From analysing different studies on the circular economy, it can be said that the theories coincide with each other. The theory of the regenerative and distributive design, 3Rs principle and materials cycles are emerged to formulate a single definition of circular economy that is used throughout this paper:

Circular economy is an overarching concept for several principles that aim to decline the use of raw materials with acknowledging and extending the value of materials, components and products.

2.2 The transition towards the circular economy

There are three trends that make the shift away from the linear system inevitable (Su, et al., 2013). First, the scarcity of resources is increasing. This causes an increase in the prices of rare materials. With rising costs sustainable alternatives become more attractive. Secondly, with better information technology it becomes easier to trace back materials through the supply chain. Thirdly, the shift in consumer preferences has been notified. Sharing products and consuming less plastics are two trends that already show a transition towards the circular economy (Su, et al., 2013).

There have been several studies on the management of the transition from a linear economy to the circular economy. This paragraph will discuss what the current theory is stating on the processes in the transition. Furthermore, two phases are described of a roadmap towards the circular economy. In this roadmap the role of private and public actors is described for each phase. In addition, attention is paid to the role of the municipality in the transition next to the contribution of the national government and the business sector.

2.2.1 Theory on transition

A transition is defined by Rotmans et al. (2001) as a set of changes that are connected to each other but take place in different areas, such as, technology, economy, institutions and culture. The three components that determine the increase of indicators for social development are speed, size and time (Figure 4). For example, when considering an increase in the number of households separating their waste as a development in the transition towards the circular economy, speed, size and time are defined as follows. Time is the period over which an increase in the number of households that separate their waste is being recorded. Speed is the quantity of households that started separating their waste within a specific period. Size is the total population that started separating their waste.

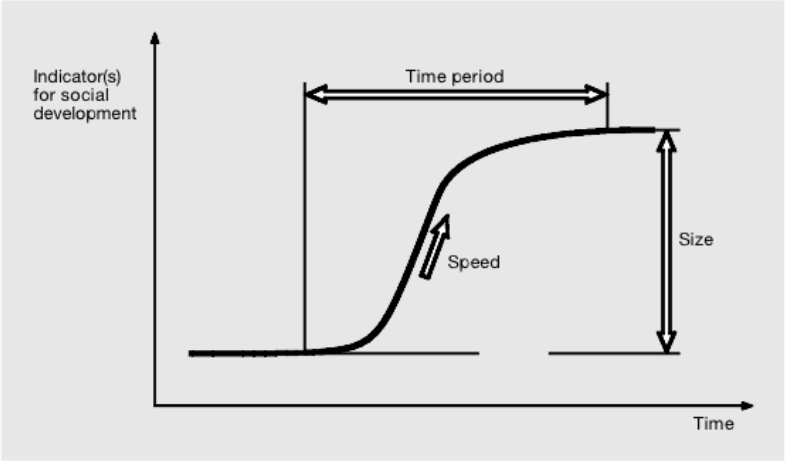

Figure 4: Dimensions of a transition (Rotmans et al., 2001, n.p.)

2.2.2 Roadmap towards the circular economy

The Ellen MacArthur Foundation (2013) has created a roadmap towards a circular world in 2025. This roadmap describes two phases: the pioneering phase and the mainstreaming phase. The roadmap is relevant for this research because the role of government in the transition is broadly discussed by the Foundation. Furthermore, the roadmap follows a chronological path between 2013 and 2025. Therefore, ideas are relevant for the current time. One of the main topics discussed in the roadmap of the Ellen MacArthur Foundation is the interaction between private and public actors. Other literature - i.e. Rotmans (2012) and Rizos et al. (2015) - also consider the interaction between public and private actors important in the transition towards the circular economy. The phases of the roadmap will be described below.

The pioneering phase

The pioneering phase starts the roadmap and takes five years to complete. In this phase it is up to the business sector to acquire more expertise and start experimenting with circular design (Ellen MacArthur Foundation, 2013). As described by Rotmans (2012) the transition should start from bottom-up initiatives. New business models will be created by firms that are experimenting with circular economy. They will be the first to experience the opportunities of the circular system. When others see these opportunities, change is urged forward (Ellen MacArthur Foundation, 2013).

In the Dutch economy businesses are already creating business models that relieve stress from raw materials by promoting the circular economy (Nederland Circulair, 2015). Several best cases are formulated by Nederland Circulair (2015) with an explanation of how these business models suit the circular economy principles. An example of a business model that suit the circular economic principles is that of Weder. This company repairs old furniture and contributes to the circular economy, because the furniture can be reused when being repaired (Weder, 2017). Another example of such a business is Van Hulley. This company creates boxershorts from old

shirts. This means recycling the old shirts to give new value to the materials within (Van Hulley, n.d.). Rotterzwam is an example of a business that promotes the circular economy as well. It uses coffee-ground as a fertilizer to grow mushrooms. Therefore, value is recovered from coffee-ground which normally is a waste product from making coffee (Rotterzwam, n.d.).

Nevertheless, it is challenging for small and medium sized companies to require the levels of investment needed to make their circular business model successful on a larger scale (Rizos et al., 2015). Furthermore, smaller companies often do not have the skills or the money to make a systematic switch to a circular business model (Hart & Dowell, 2011). These companies need help facing these challenges for the bottom-up approach to succeed (Ellen MacArthur Foundation, 2013). The role of the government in the pioneering phase is to make room for growth for innovative businesses that are restricted to a niche market. With an interaction between businesses and governments, innovative start-ups can increase production and sales (Ellen MacArthur Foundation, 2013). For example, through governmental procurement a collaboration can be started with businesses that work with circular business models. This collaboration process improves the contribution to circular economy and leads to economic benefits for the private actors (Witjes & Lozano, 2016).

On the other hand, start-ups still face barriers of existing policies and taxations that were created to support linear business models (Kok, et al., 2013). These barriers need to be overcome to make the circular economy mainstream.

The mainstreaming phase

The mainstreaming phase is the second step in the roadmap towards a circular world in 2025. Where businesses have a prominent role in the pioneering phase, actions from governmental actors are important in the mainstreaming phase (Ellen MacArthur Foundation, 2013). The same argument is made by Rizos et al. (2015), who states that by changing the rules of the game governments can further stimulate businesses to adjust their business model and adopt circular opportunities. It is essential that regulations are adjusted for advancing to a scenario at which circularity becomes mainstream and the full benefits of circularity are captured.

The government can play several roles to achieve this. First, the government can shift the taxation system away from a burden on income towards a burden on non-renewable resources (Ghisellini et al., 2016). Circular economy activities are often labour intensive and less taxes on income would decrease costs for circular business models (RLI, 2015). For example, a burden on non-renewable resources can help closing the loop of materials as described in paragraph 2.1.4. Furthermore, the government can stimulate cross-chain collaboration with introducing regulations and guidelines (Rizos et al., 2015). Regulations to phase out toxic materials in products, where possible, can make it easier for other firms to recycle or reuse products. The re-examination of certification programs can stimulate reusing products, because the viability and safety of circular products becomes more reliable (Ellen MacArthur Foundation, 2013). This shows a different interaction between businesses and governments than in the pioneering phase. The interaction in the mainstreaming phase is based on the government pressuring businesses to adopt circular economy in their business model (Rizos et al., 2015).

2.2.3 Contribution of municipalities in the transition

The shift towards the circular economy requires the cooperation between multiple tiers of government (Loorbach, 2010). This makes it a complex process and hard to coordinate as a government. The room to create specific local policies is limited for lower level of governments because of regulations created by higher level governments (Loorbach, 2010). For example, deposit fees on specific types of plastic bottles are regulated by the Dutch government. A municipality can be hindered by these regulations in the transition towards the circular economy.

The Dutch Council for Environment and Infrastructure (RLI) has formulated a transition agenda towards the circular economy in the Netherlands. The role of the national government and municipalities is explained. It is the role of the national government to set a vision and to create targets. The national government can create an overarching vision and goals that can be adopted

by other governments (RLI, 2015). The vision and targets need to be adopted by the municipalities to accelerate the transition, because cooperation becomes easier when striving for the same goals. A municipality must create policies relevant to the goals and ambitions of the national government. For example, all municipalities must use the same monitor for measuring the level of circularity in their policies (RLI, 2015).

RLI (2015) state that municipalities also have an autonomous role in facilitating and stimulating local circular economic developments. This because it is difficult for a national government to create uniform policies that complement the unique social-cultural and economic characteristics of each region. Municipalities must recognize and take advantage of these characteristics. This also counts for institutional characteristics of the municipality (RLI, 2015).

An example of how unique economic characteristics of a region can have influence on which circular economic policies are beneficial to implement is found in Amsterdam. .There is a cluster of large jeans producers in the city of Amsterdam. The municipality came up with the idea to start a project called 'Denim City' in which these producers cooperate with knowledge institutes to create innovations around the sustainable production of jeans. This cluster of large jeans producers is a unique characteristic of the municipality of Amsterdam. Therefore, the idea of Denim City cannot be performed in other municipalities in the Netherlands.

In the east of the Netherlands unique social-cultural characteristics are found that can influence the circular economic policies implemented. According to the RLI (2015) there is a strong feeling of community in neighbourhoods in the east of the Netherlands. It is traditional to help and support neighbours where needed and share resources, knowledge and time. This social economic characteristic can be an opportunity for implement circular economy because the transition towards the circular economy requires cooperation and sharing of knowledge and resources.

Through these examples it becomes clear that social-cultural and economic characteristics of a region can have influence on the circular economic policies that are applicable for a municipality.

2.3 Policy measures of municipalities

This paragraph will discuss theories on circular economic policies that can be implemented by municipalities. From the literature review, five themes are derived that classify the municipal circular economic policies. Circular economy is a concept with many interpretations. These themes represent various directions a municipality need to consider when implementing circular economic policies.

2.3.1 Municipal procurement

The procurement of local public authorities represents around half of all governmental spending in the Netherlands (Clement et al., 2003). Because of the large purchasing power, municipalities can therefore increase the demand for circular products and services and set a trend for other organisations. This can enlarge the market for circular products and services (Witjes & Lozano, 2016). Furthermore, municipalities can promote innovation by selecting start-ups that are experimenting with business models based on circular economy as tenders (Uyarra et al., 2014).

However, it is often the case that employees responsible for municipal procurement must select tenders for economic reasons. This implies tenders offering the lowest price, lowest overall costs or best price-quality ratio (Witjes & Lozano, 2016). Nevertheless, the quality criteria can also include criteria that are not based on price, but rather focus on circular criteria like reusing and recycling materials. This way municipalities can oblige its suppliers to work efficiently with the resources in their production process (Milios, 2017).

Van Haagen (2018) explains steps that need to be taken for a municipality to implement circular economic principles in the procurement process. First, a vision and goals are set on what the municipality wants to achieve with circular procurement. Circular procurement policies can be implemented for forcing existing tenders to implement circularity in their business model. Furthermore, municipalities can focus on promoting businesses that innovate with circular

economic business models and set the trend for citizens and other firms. Second, selection criteria are formulated for the selection process of tenders. The quality of the product or service delivered should outweigh financial aspects of the procurement. Circular procurement criteria almost always point to the quality of a product or service. For example, the quality can indicate for how long a product can be consumed or if the materials in a product can be recycled. Third, plenary sessions are organised with tenders. In these plenary sessions representatives of the municipality will sit around the same table with multiple tenders. According to Witjes & Lozano (2016) collaboration is vital for circular procurement policies to stimulate businesses to implement circular business models. Through collaboration experience is gained and it becomes clear what municipalities expect from the contribution of tenders to the transition towards the circular economy.

In paragraph 2.1, three principles came forward that are considered most employed by literature, regenerative and distributive design, the 3Rs principle and material cycles. To contribute to the transition towards the circular economy, procurement policies should follow these principles (Ghisellini et al., 2016). Which circular economic principles relate to circular procurement depends on the characteristics of a procurement. For example, selecting a firm that delivers reused desks or refurbished computers is related to the reuse and refurbish principle as explained by the 3Rs and 9Rs principles (Ghisellini et al., 2016; Cramer, 2014). When criteria are set for a restorative and regenerative design of product bought by the municipality, the principles discussed by Raworth (2014) are applicable.

2.3.2 Construction

Around 40% of all waste streams in the Netherlands comes from the construction sector (Cramer, 2014). Therefore, it is important to close the loop of construction and demolition waste flows with the reuse and recycling of for example concrete, metals, glass and wood. The role of the municipality is two folded here. On the one hand, the municipality can create criteria for circular procurement of the construction of public buildings (TNO, 2016). Examples of criteria can be the durability of materials or selecting renovation over demolition. On the other hand, the municipality can promote circular construction in the private sector with urban mining policies (TNO, 2016). Urban mining is collecting materials from any form of demolished buildings, infrastructure or products in an urban area. These materials are then used as resources for the manufacturing of new products. Therefore, less raw materials will be used in the construction of for example new buildings (Cossu & Williams, 2015).

Implementing circular construction and urban mining in a society can be challenging for two reasons. There is a geographical gap between the demand and supply of remaining resources after the dismantling of constructions. The processing and reuse of these remains can only be used by nearby construction projects that are built at the same time. This is often not the case (TNO, 2016). Secondly, it is often unclear what kind of materials are present in the structures that are demolished and the quality of these materials (Nicolli et al., 2012). Municipalities can facilitate so called 'material hubs' that can be used to deal with both problems. Storing the remains of demolished buildings in a hub can be a solution for the gap between the demand and supply of these materials. Sorting these materials can be helpful to map out the materials present in the demolished buildings. With these actions the municipality can help the construction sector to overcome the challenges of circular construction. This can stimulate firms to experiment and innovate with circular construction (TNO, 2016).

For new building projects the municipality can make it mandatory to keep track of the materials used and the possibilities of using these materials (Metabolic, 2018). This information can then be stored in a so-called 'material passport' for the building. Therefore, more information is available on the material content and quality (Milios, 2017). The municipality can also set regulations on these passports. For example, new buildings must have a minimal amount of recycled materials or a minimal percentage of materials that can be reused (Finnveden et al., 2013). Municipalities can implement these policies in the zoning plan (Metabolic, 2018).

Another way to stimulate circular construction is applied by the municipality of Leiden, the Netherlands, for the construction of 150 houses. As shown in Van der Nagel (2017), the ambition was to construct 150 temporary house modules that would be exploited for twenty years and then demolished and recycled. To make the project financially more attractive for project developers, the municipality financed the circular foundations. With so called 'Grondabonnementen' the housing cooperative businesses can rent the foundations for a period of at least twenty years. The terms of the contract are that the houses built on the foundations must follow the criteria of circular construction. This way the municipality can ensure that the materials are reused and recycled after twenty years.

The municipal circular economic policies related to circular construction municipalities can contribute to the transition towards the circular economy. The policies discussed above support closing material cycles through stimulating businesses to recycle and reuse materials that are seen as waste. Closing material loops is related to the theory on material cycles as explained in paragraph 2.1.2 (Ellen MacArthur Foundation, 2013; Bocken et al., 2016). Furthermore, the example of the municipality of Leiden explains how a municipality can stimulate businesses to design buildings that are regenerative and distributive. Therefore, circular construction policies also contribute to the principles of Raworth (2013) discussed in paragraph 2.1.4.

2.3.3 Organic waste management

Annually municipalities are responsible for collecting and distributing on average 1.4 million tons of organic waste from households in the Netherlands (Vereniging afvalbedrijven, 2017). These organic materials are often used to create value in the form of green gas or compost. Governmental policies should focus on reducing the level of avoidable food waste and making the process of creating value of unavoidable organic waste more efficient (Ellen MacArthur Foundation, 2015). It is important to explain what the effects are of overconsuming food and give tips on keeping food fresh (Borrello et al., 2017). A national government can organise campaigns to increase awareness around food waste (Quested et al., 2013). Municipalities can start local campaigns around food waste that suit the needs and interests of their citizens and businesses (Metabolic, 2018).

To recover value from organic waste a municipality can create space for start-ups to experiment with farming using digestate as fertilizer. Digestate is a residual of the production of biogas but is often not used as fertilizer because of regulations (Rehl & Müller, 2011). Furthermore, a municipality can increase the value of organic waste coming from green areas in the region with offering this waste to green gas or compost producers (Metabolic & Urgenda, 2015). The infrastructure to collect and transport organic waste must be adjusted to stimulate households to separate waste (Milios, 2017). Clean and separated materials make it easier to recycle (Milios, 2017).

Reducing the organic waste from businesses and households is related to the reduce principle of circular economy explained in paragraph 2.1.3. There will always be some organic waste, but the value from this waste should be recovered efficiently (Milios, 2017). Circular economic policies that stimulate the recovery of value from waste is related to the recover principle as explained by the 9Rs principle in 2.1.3 (Cramer, 2014).

2.3.4 Non-organic waste management

One of the larger problems within non-organic waste is that of packaging (Ellen MacArthur Foundation, 2015). Materials used in packaging become waste relatively quickly after the product inside the package is consumed. Processing packaging is often challenging because of two reasons. On the one hand, it is hard to collect because consumers often do not separate plastics from other waste. On the other hand, plastic packaging has a low material value when it is turned into waste. It is therefore necessary that municipalities create policies to reduce the consumption of plastic packaging and stimulate the recycling of waste (Metabolic, 2018). Municipalities must inform households and firms on how to produce less non-organic waste. Furthermore, consumption patterns must change. Consumers should be stimulated to buy products that are easier to recycle

or recover value from when turned into waste. For example, packages that are made from organic materials instead of plastics (Ellen MacArthur Foundation, 2015).

To increase the quantity and quality of recycling it is fundamental that businesses redesign products that originally are hard to recycle. For example, start-ups that ban non-recyclable toxic materials in their products (Gregson et al., 2015). Municipalities must support these start-ups. Also thrift shops and recycling initiatives of citizens to sustain must be supported (RLI, 2015; Cramer, 2014). Furthermore, the collection and sorting operations should be working effectively (Gregson et al. 2015). As for organic waste, municipalities must collect and process non-organic waste appropriately. Clean and separated materials make it easier to recycle (Milios, 2017).

Reducing the non-organic waste from businesses and households is related to the reduce principle of circular economy explained in paragraph 2.1.3(Ghisellini et al., 2016). Policies related to stimulating businesses to recycle and reuse resources that are seen as non-organic waste can be linked to closing material cycles explained in paragraph 2.1.4 (Ellen MacArthur Foundation, 2013; Bocken et al., 2016).

2.4 Conceptual model

In the conceptual model (figure 5) the processes in the transition towards the circular economy are visualised. The model illustrates how the theories and concepts, described in the previous paragraphs, relate to one another considering the element of time and various stages in the transition towards the circular economy.

The current system is based on the linear economic model. However, recent developments have caused the demand for natural resources to increase and with that the supply of waste. This puts pressure on the physical limits of the earth because resources become scarce and the sea and air become polluted. There is a need for a transition towards an alternative economic system and this alternative is provided through the circular economic model.

There are two phases in the transition from a linear economy towards the circular economy. In both phases the interaction between private and public actors is seen as important. In the pioneering phase the role of the government is to help businesses to overcome barriers and succeed with innovating with circular business models. In the mainstreaming phase rules and regulations are set by the government to pressure private actors to implement circular economic principles.

In addition, it is important that multiple tiers of government are contributing to the transition towards the circular economy. To facilitate and stimulate local circular economic developments, municipalities must also implement circular economic policies. It can be difficult for a municipality to set beneficial circular economic policies. When formulating circular economic policies, it is important that the policies must fit the obstacles and opportunities of the unique social-cultural and economic characteristics of the region. Furthermore, a municipality must consider which phase of the transition is most relevant to understand which role to focus on and how to interact with local private actors. When implementing circular economic policies, a municipality must also consider which themes to focus on. Circular economy is a broad concept with many interpretations. From the literature four themes are derived that classify the various circular economic policies a municipality can implement.

The goal of implementing these circular economic policies is to contribute the transition towards the circular economy, as suggested in the research question of this study. Theory explains that the circular economy can be reached by following the circular economic principles.

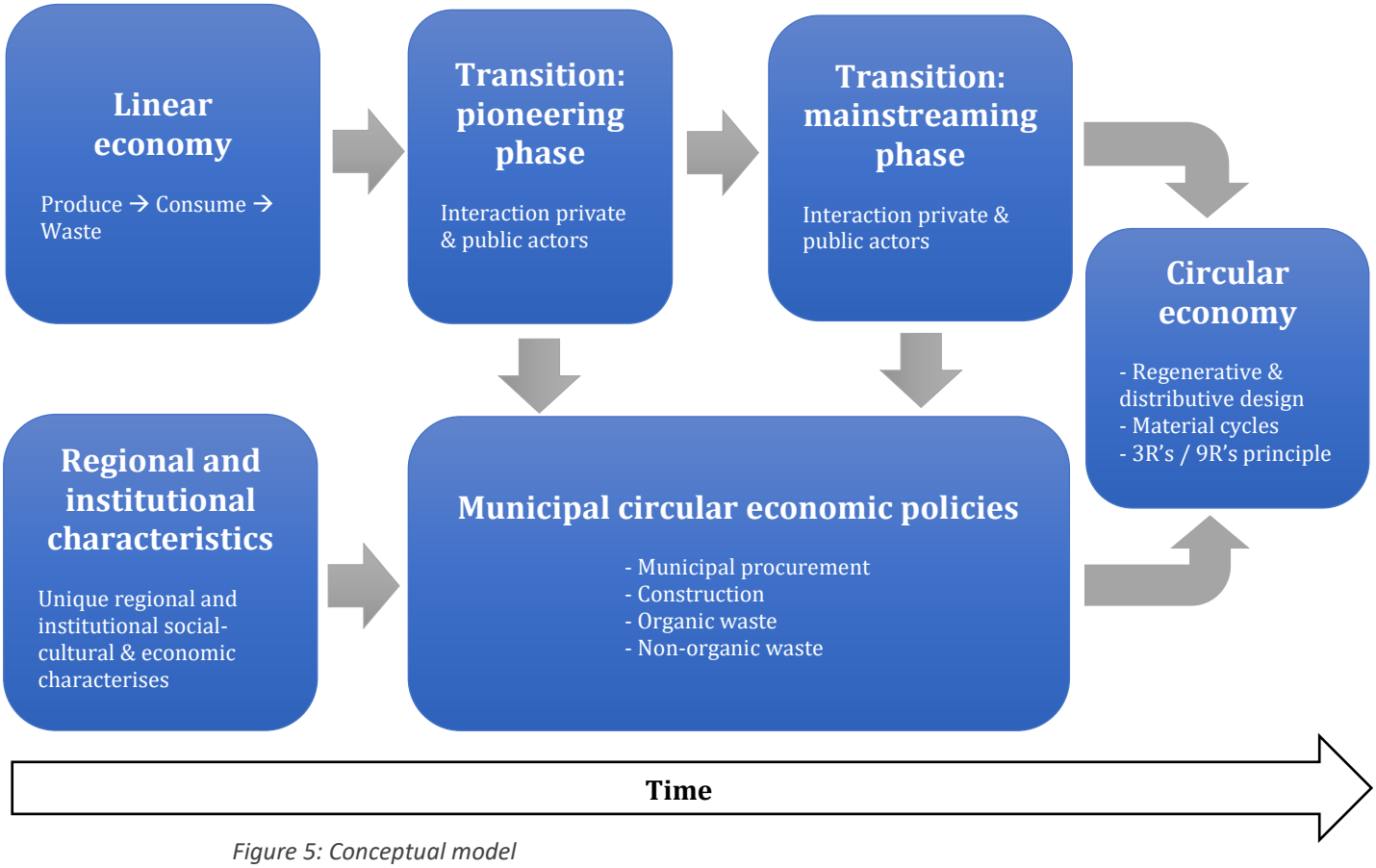

Figure 5: Conceptual model

2.4.1 Expectations

From the literature it was made clear that two phases can be distinguished in the transition towards the circular economy (Ellen MacArthur Foundation, 2013). The role that municipalities play in the transition depends on the phase that is relevant for the current time. For this study on the municipality of Groningen it is expected that the pioneering phase is most relevant. This because developments on circular economy in the north of the Netherlands are currently starting to take off (SMO, 2016). This means that circular economic policies formulated from this research are expected to be based on stimulating businesses to work and experiment with circular economic principles in their business activities. Less focus will be on local regulation.

For circular procurement policies the results from the public and private actors studied are expected to converge. Theory explains that circular procurement can help reach goals of municipalities regarding circular economy and can enlarge the market for businesses that work with circular business models (Witjes & Lozano, 2016). Therefore, both private and public actors can benefit from these policies.

For circular policies on construction it is expected that the municipality of Groningen will stimulate businesses in the construction sector to imply circularity through rules and regulations. From theory two challenges came forward that can retain businesses in the construction sector to imply circularity (Nicolli et al., 2012; TNO, 2013). Therefore, it is expected that the municipality of Groningen should implement circular policies that take away the challenges but also create regulations that force businesses to imply circularity in their construction activities.

Policies regarding organic and non-organic waste are expected to be based on creating awareness to reduce the level of waste produced. From theory it came forward that municipalities can start local campaigns (Metabolic, 2018). Furthermore, circular waste policies should focus on distributing and separating organic and non-organic waste flows. This is to make it easier to reuse, recycle and recover (Gregson et al. 2015)

In the next chapter the methodology of this research will be discussed. Focus group discussions and interviews are methods used to collect data. To determine which circular economic policies are beneficial for the municipality of Groningen to implement the data will be analysed on three topics. Firstly, data will be analysed to determine which phase of the transition is most relevant for the situation of the municipality of Groningen and the roles the municipality should play in this phase. Secondly, the interaction between private and public actors will be studied through comparing the results of the focus group discussion with private actors with the focus group discussion and interviews with public actors. Topics on which public and private actors diverge and converge are interesting to determine beneficial circular policies. Thirdly, from the regional and institutional characteristics of Groningen opportunities and obstacles are formulated that can have influence on the implementation of circular policies.

3. Research methods

The objective of this study is to explain which new circular economic policies the municipality of Groningen can implement in existing institutional policies to contribute to the transition towards the circular economy. In the research design the emphasis lies on detecting obstacles and opportunities for circular economic policies, through a study of interactions between private and public actors. This study is conducted through qualitative research, because this research seeks for interpretations and opinions. Qualitative research methods reveal the behaviour or perception of a sample on a particular topic. In contrast with quantitative research which focusses on finding general patterns and regularities (Clifford et al., 2010). In order to improve validity of this study, three different methods are combined: case study, focus group discussion and semi-structured interviews.

3.1 Case Study

The case study revolves around one phenomenon and examines one or several occurrences (Baarda et al., 2005). The data collected is substantiated and detailed but may also show general conclusions that can be used to create new models (Rice, 2010). For a case to be selected, it must have the right properties that are needed to answer the research questions (Rice, 2010).

The municipality of Groningen is selected as case for this research for a number of reasons. First, Groningen is an urban region. According to the Ellen MacArhur Foundation (2015) urban areas have better characteristics to implement circular economy than rural areas. An urban area has a high density of consumers and firms and there are a lot of resources and waste flows. This means that firms work on a relatively larger scale and municipality have a relatively larger budget than rural areas. Furthermore, urban governments can often make decisions faster in certain situations than a national government (Ellen MacArthur Foundation, 2015). Another reason is that the municipality of Groningen has the ambition to implement circular economy in their policies. In June 2018 the municipal council of Groningen agreed on implementing circular economy in the municipality (Zirkzee, 2018). Circular economy policies should also suit the ambition of the municipality to become CO_2 neutral in 2035 (Zirkzee, 2018).

3.2 Focus group discussion

To obtain data to explain which circular economic policies the municipality of Groningen should implement, this research is using focus group discussions as research method. In a focus group discussion, a group of people meet to talk about a topic in an informal setting. This creates an atmosphere in which people can interact with each other (Longhurst, 2003). The emphasis in using focus group discussions lies in collecting information from multiple perspectives in a single meeting (Longhurst, 2003). Focus group discussions are recommended when a new field of research is explored by the researcher (Longhurst, 2003). Furthermore, the researcher can obtain results from the interaction that takes place between participants (Bryman, 2012).

It is often not the case that one focus group discussion is sufficient for collecting all the data needed. The results from a single focus group discussion can be unique and not a representation for the results of other groups. More focus group discussions are needed to form a more aggregate picture. However, organising a large number of focus group discussions in a research can have disadvantages. Time and resources of the researcher will influence the number of focus group discussion in a study. Transcribe and analysing data from focus group discussions can be time consuming. Furthermore, having many focus group discussions can increase the complexity of the analysis because a single focus group can deliver a lot of data (Bryman, 2012).

For this research two focus group discussions are conducted. To collect information from the perspective of the municipality a focus group discussion is organised with policy officers of the municipality of Groningen. To view the perspective of the business sector, a second focus group discussion is organised with representatives of businesses active in Groningen. Due to practical limitations it was not possible to perform more focus group discussions from the

perspective of the municipality and the businesses in Groningen. Future research might gain more reliable data when using more focus group discussions.

3.2.1 Selecting participants

The participants are recruited following a research-based recruitment method. According to Longhurst (2003), it should not be the case that a random sample is selected for a focus group discussion. Instead, participants must be selected who have experience with the research topic and feel emphasised with it (Longhurst, 2003).

For the focus group discussion with policy officers of the municipality of Groningen the goal is to recruit participants from different departments. This way a broader range of perspectives on the discussion statements can be uncovered (Rooney et al., 2011). With the right contacts in the municipality it was possible to select policy officers from a variety of departments who had an interest in circular economy. Thereafter the secretariat of the municipality could plan the date and time of the focus group discussion into each participant's agenda. From the eight policy officers selected, five agreed to participate in the focus group discussion.

Recruiting participants for the focus group discussion with the business representatives is more challenging. The goal is to recruit businesses with an interest in the research topic from various business sectors. With participants active in different business sectors it is possible to create a broader range of perspectives during the focus group discussions (Rooney et al., 2011). With selecting businesses from important businesses sectors in Groningen a representation is created of the economy of Groningen. Therefore, economic characteristics of the region are better featured in the research results. Nineteen businesses are selected based on both their participation at an event on the circular economy organised by the municipality in 2017 and on the fact that their business activities are related to the circular economy. This way the interest of the participants in the research topic is ensured. Cold calling is the research-based recruitment method that is used. An email with information about the focus group discussion was sent to nineteen selected businesses. A few days later these businesses were called and asked if they would participate. Five out of nineteen businesses that were contacted agreed to participate in the focus group discussion. From one business two representatives were present at the focus group discussion. This means the total number of participants for this focus group is six.

In table 2, 3 and 4 the names and professions are displayed of the eleven participants of the two focus group discussions. Due to anonymity and confidential considerations pseudonyms are used instead of real names. In the focus group discussions important municipal departments and a broad range of businesses were represented. In the first focus group discussion the municipality of Groningen is represented by four policy officers active in the field of energy transition, sustainable construction, sustainable procurement and environmental development. There is one project leader in urban management and waste management present. In the focus group discussion with the representatives of businesses, two participants are active in the construction sector, one in the hospitality sector and one in processing waste. One participant is the founder of a start-up active in the engineering sector. Because the participants of the second focus group discussion are a representative sample of the economy of Groningen, no further recruiting was needed.

3.2.2 Content focus group discussions

A PowerPoint presentation is created for each focus group discussion (Appendix I). The content covered in the PowerPoint presentation are the introduction, timetable, explanation of circular economy and discussion topics.

The focus group starts with an introduction. In the introduction the central question of this research and the purpose of the focus group are explained to the participants. Furthermore, the role of the moderator and note-taker are explained to the participants. The note-taker checks if the video recorder is working during the session and takes notes. The degree of involvement of the moderator depends on how structured the focus group discussion must be (Bryman, 2012).

This also explains the number of questions addressed (Bryman, 2012). For this research three general questions are asked to stimulate the discussion. This less-structured setting will give more insight in the participant's point of view (Bryman, 2012). What participants see as relevant and important is emphasised. Furthermore, more detailed and rich answers are generated compared to structured focus group discussions. The role of the moderator is to intervene to keep the discussion going or when the discussion goes off topic (Longhurst, 2003).

The first question in the focus group discussion should not be too difficult or provocative. Instead the participant should feel at ease by the first question (Longhurst, 2003). For the first question in this research the participants are asked to introduce themselves and explain their affinity with circular economy. It is important that the participants know each other's background to make them feel more comfortable (Hennick et al., 2010). The session continues with three questions that can start a discussion. The first discussion question regards the contribution of new circular economic policies on existing institutional policies that contribute to the ambition of becoming CO_2 neutral. To introduce the topic a brief explanation is given on the concept of circular economy and how a transition can contribute to the ambition of the municipality to become CO_2 neutral in 2035. The input from the focus group discussion can be used to better understand if and how the circular economy instruments will fit the plans of the municipality to become CO_2 neutral in 2035. The second discussion question concerns the role of municipalities in general in the transition towards the circular economy. Before discussion starts, the role of the national government and business sector are explained and the interaction between public and private actors. The input from the focus group discussions can help to explain what the role of the municipality could be in the transition toward a circular economy, next to the roles of the national government and the business sectors. Therefore, data is collected to answer the first sub-question. It may also give new input on the interactions between businesses and the municipality in the transition towards the circular economy. The third discussion question is about new circular economy policies the municipality of Groningen can implement in existing institutional policies. The four themes explained in the theoretical framework are brought forward separately to discuss which circular economic policies are beneficial to implement. The goal is to create a better understand on which new circular economic policies the municipality of Groningen could implement to contribute to the transition towards the circular economy. In addition, data is collected on the regional and institutional characteristics for these four themes. Therefore, results can help to answer the third sub-question of this study.

After all the themes are discussed the participants are thanked for their participation and input. Participants are invited to join a session in which the outcomes of this research are presented. In the final question the participants are asked if there are any remaining remarks.

3.3 Semi-structured interview

To create a more aggregate view on which new circular economic policies the municipality of Groningen can implement, two semi-structured interviews are conducted. The goal of these interviews is to reflect on the results of the focus group discussions. The results show a different point of view on the data which increases the accuracy of the research (Bryman, 2012).

In these semi-structured interviews, the researcher uses a list of questions or specific topics that need to be covered. The interviewee has a leeway approach in responding to the researcher. Follow-up questions that are not stated in the interview guide may be asked (Bryman, 2012). However, this does not mean that the interview is just a chat. The questions or topics that are listed must be followed and must be relevant to the research (Longhurst, 2003).

The participants that are selected have experience with and feel emphasis towards the research topic (Longhurst, 2003). Cold calling is the research-based recruitment methods that is used. Two participants were selected for the interview. They are selected because they are both active within the municipality of Groningen and were not present at the focus group discussions. One participant is a policy officers at the department of economics. The other is a councilman for the municipality of Groningen. Furthermore, they are both responsible for implementing circular

economy principles within the policy of the municipality. The selected participants were called to make an appointment for the interview. After the appointment was confirmed, an email was sent with more information about this research and the topics discussed during the focus group discussion. In appendix I the names and professions are displayed of the two participants of the semi-structured interviews. Due to anonymity and confidential considerations pseudonyms are used instead of real names.

During the semi-structured interviews an interview guide is followed (Appendix II). In the introduction the goal of this research and the semi-structured interview is explained. The interviewee is informed on the confidentiality of the results and permission is asked to record the interview (Hennink et al., 2010). The interviewee is asked about his or her profession and the emphasis towards circular economy. This way it is made clear that the participants are selected for their experience with the research topic. The main results from both focus group discussions are then presented for each topic. A clear distinction is made between the results of the focus group discussion with the municipality and the focus group discussion with the business representatives. This is necessary to answer the second sub-question of this research. Similarities and differences between the results from the private and public actors are presented to collect more information on the interaction between private and public actors in implementing circular economic policies. After each topic three questions were asked. What do you think about these results? Did you expect these results? Do you agree with these results? In the concluding remarks the interviewees are thanked for their participation and invited to join a session in which the outcomes of this research are presented. In the final question the interviewees are asked if there are any remaining remarks.

3.4 Data storage

Both the focus group discussions and the semi-structured interviews are recorded. This method of recording is preferred over taking notes during the sessions. The focus group discussions are recorded using a videotape and audio recorder. In a focus group discussion, it is difficult to keep track of what all participants are saying when taking notes. With a video recording one can listen to the discussion and check who is saying exactly what. When the researcher sees who is saying what it is also possible to analyse if certain participants dominate the discussion or follow the group (Bryman, 2012). Recordings can also allow the researcher to study nuances in the discussion. It is not only interesting to study what participants are saying but also how they say it (Bryman, 2012). The audio recordings serve as a backup when the videorecorder is missing parts of the conversation.

The semi-structured interviews are recorded with an audio recorder. Taking notes during the interview can make it hard for the researcher to focus on the interaction with the interviewee (Longhurst, 2003). When the results are recorded it is also easier to catch the nuances (Longhurst, 2003).

After the recordings are stored on the researcher's computer, the results are transcribed by the researcher. For the transcription of the focus group discussions it was noted which participant said what. The recordings are stored in the RUG repository for five years. After this period the recordings are destroyed.

3.5 Data analysis

The transcripts are systematically analysed with ATLAS.ti. This is a qualitative research software programme that can be used to analyse large sets of data (Appendix III). Thematic coding is used to analyse the data based on a coding sheet that is constructed upfront (Fereday & Muir-Cochrane, 2006). The thematic codes are based on the main concepts found in the theoretical framework. From analysing the results of the focus group discussions and the interviews new codes are added concerning new topics. Furthermore, the codes are grouped into relevant themes.

The data is further analysed with axial coding. The goal of axial coding is to find linkages between the themes and codes (Fereday & Muir-Cochrane, 2006). With open coding the data is

broken up which is followed by axial coding where the data is brought together by finding connections between codes and themes. A part of the coding sheet that was used for this research is found in Appendix IV. This method of open and axial coding is useful because it orders and gains an overview of the data. It is a flexible and transparent method and important concepts, patterns and ideas stay intact from the original data (Vaismoridi et al., 2013).

3.6 Ethical considerations

During the research process ethical considerations are followed to protect the participants. Before the participant takes part in the research it is important that permission is sought. The people participating in a research should do this on a voluntary basis (Hennick et al., 2010). In the invitation of the focus group discussion and the semi-structured interview people were asked via email if they would like to participate.

During the focus group discussions, it important to protect participants from any social harm (Hennink et al., 2010). In the beginning of the sessions it is mentioned that all opinions matter and that participants must not interrupt each other. It is the role of the moderator to invite participants to share their perspective when they are not active in the discussion or ask participants to be silent when they interrupt other participants.

Another ethical issue is to ensure anonymity to the participants. This way the privacy of the participants cannot be harmed (Hennink et al., 2010). In this research this ethical issue is handled by using pseudonyms instead of real names in the transcript and in the results (Appendix I). Participants are informed about this at the end of the focus group discussions and the interviews.

Confidentiality of the collected data is another ethical issue. Especially to the focus group discussions representatives releasing confidential information can be a problem. Not only the researcher is privy to confidential information, but also the participants in the discussion (Longhurst, 2003). In the beginning of the focus group discussions and interviews it is announced by the moderator that all recordings and transcripts would be securely stored and not published in public. The data are shared with the supervisor and second reviewer of the thesis to assess the data. Furthermore, the data is stored in the RUG repository for five years. To secure the confidentiality the data will be destroyed after five years.

3.7 Validity and reliability

Validity estimates how well the research tools are measuring the topic of this study. There are three types of validity assessed for this research. Internal validity concerns whether the researcher is concluding a causal relationship or that a causality is not possible due to systematic errors (Yin, 1984). The internal validity of this research is strengthened by focusing on creating an environment for participants to speak openly during the focus group discussions and interviews (Nakkeeran & Zadpey, 2012). During the focus group discussion with the businesses no representative of the municipality was present. This could harm the internal validity during the session because it could withhold participants to speak openly. Stressing out the anonymity and confidentiality consideration is useful to ensure honesty from the participants.

The external validity is concerned to which extent the findings of a study can be generalised to other situations (Bryman, 2012). Shenton (2004) explains that it is hard for qualitative research to prove that the findings are applicable to other cases. Often findings are specific and relate to a small number of cases. According to Gibbert et al. (2008) a case study should be explained as explicitly as possible for the assessment of external validity. For this research the case of the municipality of Groningen is studied explicitly through collecting results from representatives of important municipal departments and a broad range of businesses. Furthermore, interviews are conducted that reflect on the results from the focus group discussions. Therefore, the data becomes saturated. The results are later presented to all participants of this research to assess for member validation (Bryman, 2012).

The reliability concerns the consistent outcomes of the research (Bryman, 2012). The objective is that if another researcher repeats the study with the same research model, the same conclusions will be generated (Bryman, 2012). A stable group response is required for a focus group discussion to be reliable. Participants must represent the target population and should not feel threatened by social harm during the discussion. Furthermore, the skills of the moderator are important because often responses lay beneath the surface of the focus group discussion (Stewart & Shamdasani, 2014). There are several measures used in this research that contribute to a consistent measurement of the data. For the focus group discussion with the municipality policy officers from different departments were present. This is needed to represent the target group of the municipality. For the focus group discussion with the representatives of the business sector in Groningen participants were selected that are active in different work fields. To reduce the bias, actions are taken to prevent participants from social harm. During the focus group discussions and interviews a set of structured questions was used. Also, according to Gray (2013) the bias can be reduced through assigning the same moderator for the focus group discussions and interviews conducted in a research. Results become less reliable when different people with different techniques are moderating in a single research. The same researcher had the role of moderator during the focus group discussions and interviews. On the other hand, a potential weakness concerning the reliability is that the interviews and focus group discussions were semi-structured. The outcomes of follow-up questions or follow-up discussion points can deviate in other studies.

On the other hand, the reliability is limited because this research is applying purposive sampling methods to selected respondents. This means that respondents are selected with the research goals in mind. Therefore, respondents are not randomly selected which causes that outcomes cannot by generalized to a wider population. In addition, the reliability of this research is limited by the limited number of focus groups studied. Because of practical limitations it was not possible to perform more focus group discussions than two. Future research might gain more reliable data with more focus group discussions studied.

4. Results

This research is aiming to investigate which new circular economic policies could be implemented within the existing institutional policies of the municipality of Groningen to contribute to the transition towards the circular economy. Obstacles and opportunities are detected through a study of interactions between private and public actors. The results are obtained from two focus group discussions and two semi-structured interviews. In the first focus group discussion the municipality of Groningen was represented by five employees of the municipality. Four of them are policy officers active in the field of energy transition, sustainable construction, sustainable procurement and environmental development. There was one project leader in urban management and waste management present. In the focus group discussion with the representatives of businesses, two participants are active in the construction sector, one in the hospitality sector and one in processing waste. One participant was the founder of a start-up active in the engineering sector. Following from the focus group discussions, two interviews were conducted with representatives of the municipality of Groningen. In the three tables below the participants are listed in further detail. To indicate which person says what in the results, names are noted next to a statement or quote of the participant.

Name (Pseudonym)	Sex	Profession	Themes active
Jan	Male	Policy officer	Ground program, bio-based economy, circular economy
Anton	Male	Policy officer	Urban development
Sander	Male	Policy officer	Ethics program, energy transition
Trudy	Female	Policy officer	Sustainable city building, sustainable procurement
Carin	Female	Project manager	City management, waste management

Table 2: Participants focus group discussion with policy officers of the municipality of Groningen

Name (Pseudonym)	Sex	Profession	Business sector
Nina	Female	Project developer	Construction sector
Martin	Male	Board of a business association	Hospitality and retail sector
Maria	Female	Manager circularity	Construction sector
Justin	Male	Architect	Construction sector
Ruben	Male	Waste services manager	Waste management sector
Boudewijn	Male	Founder and managing director	Engineering sector, recycling

Table 3: Participants focus group discussion with representatives of businesses active in Groningen

Name (Pseudonym)	Sex	Profession	Themes active
Anna	Female	Policy officer	Economic affairs, transition circular economy
Ernst	Male	Municipal councillor	Transition circular economy

Table 4: Participants semi-structured interviews

4.1 Results from the focus group discussions and interviews

The outcomes from this research are presented following the setup of the focus group discussions. First the results of the focus group discussions will be presented. Following from this the results of the interviews are presented which reflect on the results of the focus group discussions. The quotes that are presented in the results are translated from Dutch. In Appendix V the Dutch quotations are listed next to the translation in English.

4.1.1 The contribution of municipalities towards the circular economy

The participants were asked how they view the contribution of municipalities towards the circular economy next to the national government and private actors. In the focus group discussion with the policy officers of the municipality all participants view the role of the municipality as important. Two participants (Jan & Anton) note that the role of the municipality should be to stimulate small and medium businesses to adopt circular economic principles in their activities. This is because it is the responsibility of municipalities to look after the development of the local economy. One way to achieve this is to organise meetings with businesses active in Groningen to better understand what they expect from the municipality. Bringing businesses together to form partnerships can be another goal of such meetings. This way the municipality can stimulate businesses to work together to create initiatives on circular economy.

One of the participants (Carin) noted that the contribution of the municipality can be restricted because of regulations that are controlled by the national government. For example, regulations on deposit fees on plastic bottles. Another participant (Sander) reacted by saying that the Dutch government want to pursue a cooperation with different tiers of government to face challenges around the topic of climate adaptation, energy transition and circular economy. Therefore, the intergovernmental programme (IBP) was started. This way the municipality can have influence on regulations controlled by the national government.

It was stressed by two participants (Anton & Sander) that the role of the municipality of Groningen is also to stimulate surrounding municipalities to implement circular economic policies. The city of Groningen has big influence on the other 23 municipalities in the province of Groningen because it is the largest urban area. In November 2018 the municipalities of Haren and Ten Boer will merge with the municipality of Groningen. This will increase the resources and facilities of the municipality of Groningen to implement circular economic policies. Therefore, the influence on the other municipalities will grow.

In the focus group discussion with representatives of businesses the participants acknowledge the role of the municipality in informing citizens and firms in the first place. Often there is a lack of knowledge on what circular economy is and how it can be implemented in the community. It was stressed by three participants (Ruben, Boudewijn & Martin) that the municipality must inform citizens and businesses. According to these participants governments active on a local scale have better access to the citizens and businesses within the region then a national government. Two participants (Nina & Maria) stated that the role of the municipality should be to stimulate businesses and citizens to work with circular economy principles. The municipality has a lot of influence on stimulating tenders that deliver goods to the municipality. Furthermore, the municipality can reward businesses that want to work with circular economy principles by facilitating space to experiment. According to these participants (Nina & Maria) the municipality should not create more regulations to stimulate businesses to work with circular economy. This can counterwork on the development of circular business models. For example, the rules on warranty and quality in the construction sector hampers the development of circular construction practices.

In the interviews the representatives of the municipality (Ernst & Anna) agreed that municipalities are the point of contact for firms and citizens. Therefore, the contribution of municipalities should be to inform and stimulate businesses and citizens. However, both interviewees mention that the role of the national government should not be underestimated. To

stimulate businesses to implement circular economic principles within their business model, rules and regulation need to be created and implemented by the national government. Businesses in the hospitality sector do not think about ways to separate their organic waste because it costs money and time. With regulations these businesses are forced to find ways to separate their waste. One interviewee (Anna) acknowledged that municipalities are often not in the position to create regulations. This role should be played by the national government. However, she also noted that municipalities can have a facilitating role. For example, facilitating waste containers for businesses in the hospitality sector to separate their waste. Within the transition towards the circular economy it is important that multiple tiers of government cooperate.

"It is an interaction between various governments. I can imagine that businesses do not think about that in such a way." Anna – participant interview – (Table 4)

4.1.2 Circular procurement

In the discussion about what policies the municipality of Groningen must apply on the topic of circular economy, circular procurement was the first theme addressed. In the focus group discussion with the policy officers of the municipality one policy officer active in procurement (Trudy) explained how circular economy is already implemented in the process. Policy officers of the municipality of Groningen have set circular economy, sustainability and health as the three pillars which receive special attention in the procurement process. Criteria around circular economy are already set for the energy supply in some neighbourhoods within the municipality. Also, the tender for toiletries in municipal buildings is selected for its profession to recycle paper waste into toiletries. During the selection process the municipality encouraged a dialogue with tenders and experts to gain knowledge in new developments. It was stressed by this policy officer that with more knowledge about what is possible the municipality can create better criteria for tenders.

The participant (Trudy) also mentioned several new measures that can be implemented to increase the influence of circular economy in the procurement process. Before the municipality considers purchasing new goods it should wonder more often if this is necessary. This was regarded by one of the participants as an important issue. She acknowledged that employees of the municipality should shift their way of thinking more towards the circular economy. Take one step back and think about what you really need to buy. All other participants agreed with this statement. From this statement questions were raised by one other participant (Jan) about what has happened to the furniture that was no longer needed. He came up with the idea that these products can also be reused somewhere else.

When new goods need to be purchased, there are several measures mentioned to make the procurement process more circular. One policy officer (Carin) acknowledges that there is a lack of knowledge and courage within the municipality to work with circular procurement. The same policy officer continues by saying that without knowledge, criteria for tenders will not be as accurate. Every procurement is different. No set of standard criteria can be applied to all tenders. To strive for circular procurement, a change in mindset within the municipality is another topic mentioned. More employees need to work in the municipality that can push forward to implement circular economy principles in the municipalities. Employees must be motivated to select tenders with circular business modes instead of selecting the cheapest tender.

"In fact, we have all the control to do something around circular procurement if the municipality has influence. In my opinion there is an absence of knowledge and courage. (…) I can imagine that sharp criteria to select tenders are hard to formulate when there is a lack of knowledge. To be fair, we are an organisation where the workers are used to select the best quality or price. We also have to change our mindset." Carin – participant focus group municipality (Table 2)

Another participant (Trudy) acknowledged that defining a sharp vision within the procurement policy on what the municipality sees as circular is an important issue. For tenders

to understand where to comply with, more focus is needed as well as a clear-cut definition in policy documents.

"Tenders are asking: "what do you mean with sustainability?" (…) It is a broad concept, but the focus should be on connecting it to the policy of the municipality. Circularity is a theme we are currently (…) working on." Trudy – participant focus group municipality (Table 2)

During the focus group discussion with the representatives of the businesses, criticism was expressed by most of the participants on the current procurement policy. One of the participants (Boudewijn) stressed that it is often the case that the people responsible for the municipal procurement do not want to step out of their comfort-zone. These people have the experience and knowledge to select tenders that can deliver the highest quality for a low price. However, employees working on procurements have little knowledge and experience with selecting tenders following circular economic criteria. These employees do not want to risk spending taxpayer's money on the wrong tender. To increase the experience and knowledge with minimal risks, employees need to experiment with implementing circular economy principles into small procurement projects. Take risks and learn from experience.

The discussion continues with a further explanation on why circular procurement has not yet been established in the municipality of Groningen. Several participants (Nina, Martin, Ruben) state that municipal procurement processes tend to be financially driven. It was stressed that the municipality apparently is committed to select the cheapest tender. Most participants agreed that the right mindset should be to acknowledge the financial benefits from circular procurement. One participant (Justin) noted that financial benefits of circular economy are often only visible on the long run. The municipality of Groningen should investigate what kind of financial benefits are created from selecting tenders that have the required circular criteria.

"Do not select on price but look at what the benefits are on the long term. What is the value that you get?" Justin – participant focus group businesses (Table 3)

Furthermore, it was stressed by one of the participants (Justin) that the municipality should start a dialogue with businesses to understand how circular economic principles can be implemented in the procurement process. For the procurement of a specific product the municipality of Groningen should talk with the suppliers of the product and other businesses throughout the production chain. In the circular economy partnerships must be created between businesses in a production chain to produce a final product in the most circular way. The participant (Justin) continued by saying that the municipality of Groningen can create these partnerships. The municipality can sit around the same table about circular economic principles with suppliers and other businesses in the production chain of products it might purchase.

In one of the interviews the representative of the municipality (Anna) does not agree with the criticism of the business representatives. The interviewee relates to the ambition of the municipality of Groningen to set criteria on sustainability, circular economy and health in the procurement process. However, two reasons are noted why businesses might miss this. Fully implementing these criteria is time-consuming because of bureaucracy and contracts with current tenders. Furthermore, the municipality of Groningen has little promotion and communication activities towards businesses and citizens on the things it does around the circular economy. According to the interviewee (Anna) this is because the employees of the municipality of Groningen are too modest too show off. According to her, this is part of the culture in the north of the Netherlands.

In the other interview the representative of the municipality (Ernst) state that it is difficult to implement circular economy principles into the procurement process. It is often the case that procurements that follow circular criteria are more expensive compared to alternatives. The procurements are payed with taxpayer's money and the municipality of Groningen wants to minimize the risks on spending this money on the wrong procurement.

4.1.3 Circular construction

The second theme that was brought up in the discussion of circular economic policies was circular construction. From the focus group discussion with the policy officers of the municipality , the first thing that was mentioned about this theme is that the municipality must facilitate space for firms to experiment with circular construction. Firms active in construction will be stimulated to work with recycled materials. This was regarded by most of the participants as an important role. An area where the municipality of Groningen facilitates space to experiment with circular construction is the Suikerunieterrein. One participant (Anton) noted that the municipality of Groningen can stimulate and enforce circular construction initiatives by project developers. If the municipality decides to invest in a system that collects rainwater, it is interesting to project developers to create houses where this water can be reused.

A second point that was regarded as important is the platform for material passports of buildings in Groningen. This is called Madaster. The platform can be used to better understand what materials are used in buildings, and which elements can be reused or recycled. However, it was noted by one of the participants (Carin) that the municipality is currently not working with this platform. She mentioned several opportunities for policies to stimulate actors to work with Madaster were acknowledged. The municipality can register its own buildings in Madaster or formulate regulations on registering new buildings in Madaster. Furthermore, circular construction experiments can be bound to Madaster.

A final thought in this discussion was on how the municipality of Groningen can stimulate circular construction with facilitating hubs to collect and process construction waste. However, one participant (Carin) noted that an obstacle for this development is the contract with the current waste processor that expires in 2021. This can delay the implementation of these hubs. Now that the municipality sees the potential of construction waste, it wants to create its own construction waste hubs together with start-ups and knowledge institutes. Start-ups and knowledge institutes can help to process the waste as efficient as possible and to generate more value from it than in the current system.

During the discussion on this topic, one of the participants (Sander) came up with a dilemma on implementing circular construction in new buildings.

"At that moment you notice that a group of people is concerned about circularity and climate. But there is also a group that is concerned with building, building, building because there is a shortage in housing. This can collide. If you want to build, build, build you want to create as many houses as possible and you do not think about the energy transition or circularity. People need shelter. (…) You have short-term and long-term problems and the short-term problems always receive the attention of the newspaper." Sander – participant focus group municipality (Table 2)

The discussion continued by a participant (Jan) stating that circular construction can also create an opportunity for this problem. It was stressed by another participant (Anton) that more international students are coming to Groningen than last year. These students often need temporary housing and circular construction could be a solution for this challenge. In the final word on this theme one participant (Sander) questions whether temporary houses are circular at all. He stressed that when building these temporary houses, it should be considered that the materials in the building must be easy to remove and to reuse of recycle. This must be considered in the designing phase of the temporary houses.

In the focus group discussion with the representatives of the businesses, three participants (Nina, Maria & Justin) acknowledged several challenges the construction sector is facing with circular construction. It was stressed by these participants that it is difficult to design buildings with used and recycled products. It is unclear whether these materials have the same quality as new ones, because there is a lack of information about who produced the materials and when they were produced. Who is responsible for the quality and warranty of the reused products? These participants (Nina, Maria & Justin) propose a systematic change in the sector. For example, the project developer should not be the one responsible for the quality of building products but the

producer or supplier. When a building is demolished the producer should be responsible for the reusability of the product. This is often not thought of by municipalities who want to implement circular construction.

From the focus group discussion most participants agreed that there are two important roles of the municipality regarding the transition towards to a circular construction system in the sector. The municipality must lead by example. The municipality can create its own circular city hall and learn from the construction process. This can also stimulate other project developers to work with circular construction. Furthermore, innovations in circular construction are currently held back in large construction projects because of regulations stated in the zoning plan. Losing these regulations would increase innovation in the construction sector.

"*Of course, the safety rules must be followed. We must not diverge from that. But you do see that, now that we are free from building regulations on the Suikeruniterrein, you can accelerate in development. That is also what is demanded. Only recently more rules are invented. The government is formulating new rules around circularity, while we are actually in a phase where there is a lot of innovation and testing. With all these rules a lot of start-ups won't get a chance.*" Maria – participant focus group businesses (Table 3)

In one of the interviews the representative of the municipality (Ernst) agrees that environmental and zoning plan regulations can obstruct each other. The municipality can stimulate circular construction with implementing circular economy principles in the zoning plan. Central to this is negotiating with businesses active in the construction sector is important to better understand what is possible

In the other interview the representative of the municipality (Anna) does not fully agree with the statements from the focus group discussion with the business representatives. The challenges noted in the focus group discussion is not something that the municipality must face. The municipality should not interfere with the construction sector, but it is up to the market to develop successful business models. The municipality can facilitate for example locations for businesses to experiment with circular construction and pioneer in the development of circular business models in the construction sector. Furthermore, the municipality can lobby for new regulations on quality and warranties in the construction sector with the national government to. This way a systematic change in the construction sector can be stimulated.

4.1.4 Organic waste

In the discussion about which circular economic policies are most beneficial for the municipality of Groningen to apply, the next theme is organic waste. The first thing mentioned by the policy officer responsible for the waste program (Carin) was to reduce the level of food waste produced by households and the hospitality sector in Groningen. The municipality of Groningen is starting campaigns to create more awareness on food waste levels and give tips to reduce the level of organic waste. It has been found important to reach citizens from various levels of society with these campaigns. For example, the municipality can inform about how reducing food waste can have financial benefits. This way the campaigns are interesting for citizens with lower incomes.

The following dilemma was portrayed by one of the participants (Sander). The other participants agreed that this is an important dilemma, but no solutions were noted.

"Of course, the two aspects remain opposites. Students often live alone and if you live alone you need smaller portions. This while a lot of products are offered cheaper in larger portions. I can imagine that you select larger portions over smaller portions when you are doing groceries. On the other hand, if you look at the packaging, smaller portions are bothersome. If you want to decrease the level of packaging, you need to buy larger packages." Sander – participant focus group municipality (Table 2)

All participants agreed that when organic waste is produced it should be distributed correctly to recover more value. The first step is to increase the level of organic waste that is separated from non-organic waste. However, opinions were divided on how waste should be separated in the city centre of Groningen. A challenge was raised by one of the participants (Carin). People living in high rise buildings do not have room for an organic garbage container. In response another participant (Jan) explained that this is not needed because waste is separated at the waste processing firm. In fact, 60% of the waste is separated by the waste processor company Aterro. Nevertheless, this must be 100% in 2025. A third participant (Sander) came up with a solution. A measure to stimulate separating is to create a large organic waste container where waste is collected from all households in a housing block. However, a point of critique raised by one of the participants (Jan) was that this measure can increase CO_2 emissions from garbage trucks. Two underground containers, one with organic waste and the other with non-organic waste, means that two garbage trucks need to be deployed. The use of two garbage trucks results in twice the level of CO_2 of transporting waste. In response to this a participant said the following:

"You do see that the infrastructure is arranged in such a way that waste is collected in one place in a street. You do not have a waste container at your own house. This is pleasant for the people who want to dump their garbage at any time. (…) This structure is very simple and the picking up system is easy as well. you don't have to drive your car around the streets to pick up the waste." Sander – participant focus group municipality (Table 2)

The final word on this theme was from the policy officer responsible for the waste program (Carin). She noted that experimenting with different models of collecting waste is the next step in the development. This way the municipality of Groningen can investigate efficient methods to increase the level of organic waste that is separated from non-organic waste. Therefore, more value can be recovered from organic waste.

In the focus group discussion with the representatives of the businesses, all participants agreed that food waste from the hospitality sector is an important challenge. However, unanimous results came forward from the discussion on how the municipality should deal with this challenge. The participant active in the hospitality sector (Martin) initiated the that the municipality must set a quota on the number of restaurants in the city centre of Groningen. According to this participant a quota on the number of restaurants is much easier to regulate then to force restaurants to work with their waste in a responsible fashion. Three participants (Maria, Nina & Boudewijn) did not agree with this measure. Instead two participants (Nina & Maria) came up with the idea to stimulate restaurants to limit their menu or create a menu from the left overs of the day before. Furthermore, a quota could discourage innovative sustainable restaurants to open in Groningen. Regulations are needed to push the hospitality sector to separate their waste.

The second statement comes from one participant (Nina)who expressed criticism on the food waste from the food market in Groningen that is not separated. According to this participant this doesn't only happen for waste from the market. One third of all organic waste ends up between non-organic waste. The participant stated that the municipality should provide amenities to separate the organic waste. Therefore, more value can be extracted in the form of energy and compost. Furthermore, the representative of the firm that processes the waste in Groningen state:

"If waste arises it is best processed when it is as clean as possible. Keep it separated from other waste flows otherwise pollution is inevitable. That is what is happening with compost. There is a suspicion that there are microplastics in it. (…) If the compost is spread over the fields it will end up in the ditch and eventually in the ocean. (…) What you can do about it is ensuring that waste doesn't arise. If it arises, keep it separated." Ruben – participant focus group businesses (Table 3)

The last statement in the discussion on this topic was on stimulating citizens to separate organic waste from non-organic waste in the city of Groningen. The municipality of Groningen can place large containers where a whole neighbourhood can throw away their organic waste. One of the participants (Nina) noted that when she is mowing her garden she doesn't have a container to throw away the grass. Underground containers could be the solution. She states that a municipality should facilitate one large container in which a whole street can depose their organic waste. More organic waste will be collected and therefore more value can be recovered

In one of the interviews the representative of the municipality (Anna) sees opportunities for the municipality in creating measures that forces businesses in the hospitality sector to reduce and separate organic waste. However, these measures can create barriers for the hospitality sector in Groningen. The municipality must consider how far it is willing to go in forcing businesses to take measures while not distorting the economic environment. Furthermore, the interviewee (Anna) explained that the municipality sees opportunities in profits from separating waste. In cooperation with knowledge institutes new business models are created around profits from circular economy. The interviewee sees a challenge in separating waste for the food market in Groningen. Many small businesses owners are stationed at the food market. The municipality must organise a cooperation to stimulate businesses to separate waste at the food market. Large organisations, like the Gasunie and UMCG are already developing initiatives around separating waste.

In the other interview the representative (Ernst) explains that there is a lot of discussion on which method of separation works best. Some people think a second garbage container is the best method. Other people think that separating at the waste processing firm is the best method. The interviewee notes that both experimenting with both methods is needed to investigate which method suits best in circular economic policies.

4.1.5 Non-organic waste

The last theme is non-organic waste in the discussion around circular economic policies that are most beneficial for the municipality of Groningen to apply. The discussion with the policy officers of the municipality starts with the statement that 60% of the waste that is collected is separated. The materials that are collected are reused or recycled. To reach 100% new initiatives have the be developed. One of these initiatives will start at the time the contract with the current waste processing company expires in 2021. The municipality of Groningen wants to create hubs where citizens can bring products that have no more value for them. Around these hubs, thrift shops can be stationed to sell reused products. Furthermore, the idea came up that start-ups and students can work around these hubs on making new products from waste. These can again be sold in the thrift shops.

The final topic in this theme is about facilitating start-ups that have created business models focused on reducing non-organic waste or that have created products from recycled materials. Several ideas came up. For example, the municipality can be a launching customer for these start-ups. This means that the municipality is investing in a start-up by buying the product the start-up is producing. However, currently there is no monetary fund reserved for circular economic initiatives from businesses.

In the focus group discussion with the representatives of the businesses most of the participants agreed that when speaking of non-organic waste, especially plastics are hard to recycle. One participant (Boudewijn) explained that plastics need to be 95% to 98% of the same material to be able to recycle. When different types of plastics are glued together, it is no longer possible to recycle. One participant (Nina) noted that the municipality should no longer buy furniture that is glued together. For example, office desks and chairs. She continues by stating that the best idea would be to buy no furniture at all. Another participant (Maria) reacted by saying that the municipality should set the right example and think about what happens to the furniture that is replaced.

Another participant (Maria) came up with the idea to link social work with recycling products.

"The municipality can facilitate in social workshops where you can go to let your stuff be repaired. I know there are repair cafes of some kind. (…) Moreover, employment is created by the municipality."
Maria – participant focus group businesses (Table 3)

In one of the interviews the representative of the municipality (Anna) agrees that an important role of the municipality lays in procurement. Also, for the topic of non-organic waste the municipality can set the right example by thinking about recycling and reusing products.

In the other interview the representative of the municipality (Ernst) also agrees with the important role of implementing circular economy principles in the procurement process of the municipality.

4.2 Interpreting the results

In the previous paragraph the results from the focus group discussions were summarised. In this paragraph these results have been analysed and interpreted using thematic and axial coding (Appendix IV). The results are interpreted with the help of four perspectives as explained in the conceptual model shown in paragraph 2.4. First, there are several roles discussed that municipalities can play in the transition towards the circular economy. These roles are categorized between roles that would fit in the pioneering phase and roles that would fit in the mainstreaming phase of the transition. Second, differences and similarities between the results of the focus group with the representatives of the businesses and the focus group with the policy officers of the municipality are analysed. This way the interaction between public and private actors in the transition is discussed. Third, the results of the suggested circular economic policies are analysed. Opportunities and obstacles came forward, linked to the social-cultural and economic characteristics of the region of Groningen and the institution of the municipality of Groningen. These opportunities and obstacles can have an effect on the applicability of the circular economic principles implemented within the existing policies of the municipality of Groningen. Finally, the suggested policies have to contribute to the transition towards the circular economy. Therefore, these policies must be linked to circular economic principles.

4.2.1 The role of the municipality in the transition

From the results several roles can be acknowledged that the municipality can play in the transition towards the circular economy. From this a distinction can be made between roles that would fit in the pioneering phase and roles that would fit in the mainstreaming phase of the transition.

Throughout the focus group discussions, it was made clear that municipalities have an important role in the pioneering phase of the transition. Both the representatives of the municipality and businesses acknowledge the role of municipalities in informing and stimulating businesses to work with circular economy principles in their business activities. Municipalities are responsible for looking after the development of the local economy. Furthermore, municipalities are active on a local scale and therefore have better access to the citizens and businesses within the region then the national government has.

The municipality can inform about the opportunities of the circular economy or stimulate businesses to start partnerships to come up with new circular economic business models. Facilitating businesses to innovate with circular economy is also a role given to the municipality by both groups. In the focus group discussion with the policy officers of the municipality, it came forward that the role of the municipality is to create space for firms to experiment with the design of regenerative and distributive structures. Currently the municipality of Groningen has created space at the Suikerunieterrein, where firms can experiment with circular economy innovations. At the Suikeruniterrein businesses are experimenting with circular construction and start-ups are working on creating products out of recycled materials. The municipality of Groningen facilitated this place for firms to experiment without construction regulations or zoning plan.

The role of municipalities in the mainstreaming phase came forward from the results. According to the representatives of the municipality, rules and regulations are needed for businesses to make the step towards the circular economy. Regulations are often created by the national government. From the results it came forwards that the role of the municipality can be to inform businesses and citizens about these regulations. Municipalities can also lobby for new regulations towards the national government. From the focus group discussion with the representatives of the businesses it was acknowledged that the construction sector suffers from dilemmas around the warranty and quality of reused building materials. Where regulation is needed municipalities can lobby for new regulations at the national government.

One opinion that was shared by all participants, was that it is important to understand which phase the municipality is currently in to determine which roles it should focus on. Since stimulating businesses to work with circular economy and innovation on circular business models are important topics discussed in this research, the pioneering phase is more relevant than the mainstreaming phase in the current time. Policies relevant to the mainstreaming phase were mentioned in the results. For example, regulations that force businesses to apply circular construction in construction project. However, it was also stressed that regulations can work against innovation regarding circular economy.

4.2.2 Interaction public and private actors

The representatives of the businesses and the policy officers of the municipality of Groningen both acknowledge that the municipality and businesses active in the region should interact with each other. Both group of actors view the role of the municipality in stimulating businesses to implement circularity and facilitate circular initiatives. Furthermore, the municipality can bring firms together to stimulate cooperation. However, the policy officers of the municipality of Groningen do state in the focus group discussion and the interviews that an important role of the municipality is to cooperate with other governments. Private actors might forget that there is an interaction between different tiers of government. It was expressed by the policy officers of the municipality of Groningen that it is important that the national government and municipalities cooperate in the transition towards the circular economy. Furthermore, smaller municipalities in the province of Groningen can be stimulated to implement circular economy by the municipality of Groningen. The representatives of the businesses mainly discuss the opportunities of municipalities in implementing circular economic policies compared to the national government. This points at different views between public and private actors on the issue of interaction between different levels of government in the transition towards the circular economy.

Another theme on which both group of actors see things differently is circular procurement. The representatives of the municipality noted that the municipality have implemented circular criteria in the procurement process. The procurement department is currently searching for pilot projects to test these criteria. However, the representatives of the businesses are sceptical about implementing circular economy principles in the procurement process. They do not think it is possible because of the lack of motivation for a cultural change within the municipality. Employees should change their mindset on choosing the cheapest tender and acknowledge financial benefits from circular procurement. According to the private actors this cultural change is needed to fully implement circular economic principles in the procurement process of the municipality. This shows that opinions differ between private and public actors on the feasibility of implementing circular economy policie in the procurement process of the municipality of Groningen.

Both the representatives of the businesses and the policy officers of the municipality of Groningen acknowledge that experimenting with circular construction is key in the development. However, the groups of private and public actors disagree on measures to stimulate businesses active in the construction sector to implement circular economy principles. The policy officers suggest that the municipality should create a pull and push effect to stimulate the construction sector to implement circular economy. The municipality should facilitate space to attract firms to innovate with designing regenerative and distributive structures. On the other hand, a

municipality can force project developers to apply circular construction with decisions made in the zoning plan. The representatives of the businesses acknowledge that guidelines from the zoning plan make it a challenge to apply these innovations on a larger scale. More guidelines in the zoning plan on stimulating circular construction could make it more challenging.

Both the public and private actors studied in this research acknowledge that separating organic waste from non-organic waste is important. This to increase the value that can be recovered from organic waste. In the focus group discussion with the representatives of the businesses it was shortly mention the use of large underground containers to dump organic waste in a neighbourhood. This idea is validated by the municipal policy officers as they had a discussion on two underground containers. One with organic waste and the other with non-organic waste.

On the topic of non-organic waste, the policy officers of the municipality mainly discussed policies to stimulate citizens and businesses to recycle and reuse products. Measures like creating hubs and facilitate thrift shops can create a higher demand and supply for reused and recycled goods. The representatives of the businesses see things differently and state that the municipality must set the example and focus on reusing and recycling its own products. From this citizens and businesses can be inspired to follow. This points at similar views between public and private actors on the issue of what should be the goal of circular economic policies on the topic of non-organic waste. However, ideas differ about what the municipality of Groningen should do to achieve them.

4.2.3 Opportunities and barriers

The outcomes of the focus group discussion show several opportunities and obstacles linked to the institutional characteristics of the municipality of Groningen. Implementing circular economic principles in the procurement process of the municipality of Groningen can be an opportunity to set a trend for other organisations. Citizens and businesses can be inspired by the initiatives of the municipality of Groningen. Firstly, the municipality can have influence on businesses that deliver goods and services to the municipality of Groningen. A clear vision must be set for tenders to understand what is meant with circularity in the procurement process. Furthermore, aggregate circular selection criteria should be created and implemented in the procurement process. By selecting tenders from this vision and selection criteria, businesses that deliver goods and services to the municipality of Groningen are stimulated to implement circular economic principles in their business activities.

However, several obstacles for implementing circularity within the procurement of the municipality came forward. In both groups there was agreement on the idea that employees of procurement within the municipality of Groningen have a lack of knowledge and experience on circular economy. To formulate a clear vision and selection criteria the employees of the municipality of Groningen must increase their knowledge and experience on circular procurement. Experimenting with small procurement projects can help to increase the knowledge and experience with a minimal risk of spending taxpayer's money on the wrong tender.

Another obstacle is the promotion and communication of developments around circularity within the municipality of Groningen. Based on the results from the focus group with the business representatives, it can be stated that there is a lack of promotion and communication. Public actors expressed their criticism on the lack of progressiveness within municipalities. This while the municipality of Groningen already implemented circular principles within the procurement process and has set the target on becoming more circular in the future. From the results of the interviews it was acknowledged that the unanimous experiences between public and private actors on this issue can be explained by the lack of communication and promotion of the municipality of Groningen. This obstacle can work against the opportunity of setting the right example towards businesses and citizens with implementing circular economic principles in the procurement process of the municipality of Groningen.

Furthermore, both focus groups acknowledge the importance of separating organic waste from non-organic waste. Now citizens and businesses do not have an option to deposit their organic waste in the city centre separated. An applicable policy can be to build containers in the

city centre for organic waste. However, obstacles were mentioned around the distribution of waste with two garbage containers. With two containers , two trucks are needed to pick up the waste. This results in double the level of CO_2 emissions for picking up the waste which counterworks with the goal of the municipality of Groningen to reduce CO_2 levels. One idea to deal with this challenge is to start experimenting with different models of collecting waste. Implementing two garbage containers for organic and non-organic waste is one method. However, the municipality of Groningen can investigate if other methods of collecting waste separated, are more applicable in the city of Groningen.

From the focus group discussion with the representatives of the municipality of Groningen it came forward that the contract with the current waste processing company expires in 2021. The current waste processor separates and processes waste from households and firms in the municipality of Groningen. This can be an obstacle for implementing circular economic policies regarding non-organic waste on the short-run. For example, the municipality of Groningen has the ambition to create hubs were waste is collected and separated. Around these hubs start-ups and thrift shops can be stationed that are recycling, reusing and remanufacturing materials and products.

Furthermore, several regional social-cultural and economic characteristics came forward that can be an opportunity or obstacle for implement circular economic policies. The participants from the focus group discussion with the businesses agree that a place to experiment with circular construction can produce new innovations. Currently such a place is facilitated by the municipality of Groningen at the Suikerunieterrein. This can be an opportunity for the municipality to stimulate businesses active in the construction sector to innovate with the design of regenerative and distributive structures.

But the construction sector sees obstacles in applying these innovations on a larger scale due to zoning guidelines and regulations around warranty and quality. Regulations are controlled by the national government, but the municipality can lobby for new regulations demanded by the local business sector. These results show the delicate balance between regulating and stimulating innovation around the circularity. It depends on the phase of the transition which role the municipality must play. The municipality must be aware which role is applicable in the current phase of the transition towards the circular economy.

Another obstacle for applying circular construction in the municipality of Groningen is the shortage in housing in the city of Groningen. Businesses in the construction sector are currently choosing to build fast rather than circular.

On the topic of organic and non-organic waste both focus groups agreed that that the municipality can implement circular economic principles in the waste management policies. The municipality sees an opportunity in reducing food waste from households with campaigns to increase awareness. This is because previous campaigns turned out to be successful in creating awareness.

4.2.4 Circular economic principles

The goal of implementing circular economic policies within the policies of the municipality is to contribute to the transition towards the circular economy. To do so, it is important that the principles of the circular economy are followed as explained in the conceptual model in paragraph 2.4.

For circular economic policies around the theme of municipal procurement the first principle that is acknowledged is “reduce”. Before any procurement process starts employees of the municipality of Groningen must consider if it is necessary to purchase new goods. Reduce the number of goods purchased by taking one step back and think about what you really need to buy. Selecting criteria in a procurement process can be linked to any circular economic principle. For example, a criterion on purchasing new computers can be that the tender need to deliver old computers that are refurbished.

Circular economic policies around the theme of circular construction mainly focus on closing material cycles of construction materials. In the construction sector there is a systematic change needed where businesses reuse and recycle materials from demolished buildings into new buildings. Furthermore, circular economic policies are discussed on stimulating businesses to innovate with regenerative and distributive design.

For the theme of organic waste, the circular economic principles of reducing and recovering are relevant. From the circular economic policies discussed it came forward that the first step is to create awareness on reducing the level of organic waste. When organic waste is created it is important that it is collected separate from non-organic waste. This way more value can be recovered from organic waste.

For the theme of non-organic waste, the main circular economic principles are that of reuse and recycle. Non-organic waste needs to be collected separated to make it easier to recycle. Furthermore, circular economic policies discussed explain how the municipality of Groningen can support initiatives of start-ups and thrift shops that are focussed on recycling and reusing materials.

5. Conclusion

The main goal of this study was to investigate which circular economic policies could be implemented within the existing institutional policies of the municipality of Groningen to contribute to the transition towards the circular economy. These circular economic policies are based on the suggestions of policy officers working for the municipality of Groningen and employees of businesses active in in Groningen. Two focus group discussions and one semi-structured interview were used to collect the data.

The following question was central for this research: *Which new circular economic policies, as suggested by both policy officers and businesses (active in Groningen), could be implemented within the existing institutional policies of the municipality of Groningen to contribute to the transition towards the circular economy?*

This research contributes to the literature on the role of urban municipalities in the transition towards the circular economy. Furthermore, the results can be used by the municipality of Groningen as a guideline for implementing circular economic policies within the institutional policies. From combining the results for the three sub-questions an answer can be formulated for the main question of the research.

In the first sub-question the role of the municipality in the transition towards the circular economy is questioned. It is important to understand which phase the municipality of Groningen is currently in to determine which roles it should focus on. Since stimulating businesses to work with circular economy and innovation on circular business models are important topics discussed in this research, the pioneering phase is most relevant. Policies relevant to the mainstreaming phase were also discussed. For example, regulations in the zoning plan that force construction businesses to apply circularity to newly construct buildings in Groningen. Nevertheless, it was also mentioned that regulations can work against innovation and businesses investment in circular economy. Therefore, the roles assigned to the pioneering phase are most relevant for a municipality to focus on and not the mainstreaming phase. This study found that the contribution of the municipality in the pioneering phase is to inform, stimulate and facilitate businesses to innovate. An important role of municipalities is to inform about the opportunities of the circular economy or stimulate businesses to start partnerships to come up with new circular economic business models. Municipalities have the possibility to assign areas where businesses can experiment with for example circular construction or creating products from recycled materials. This way new business models can be developed and the transition towards the circular economy is accelerated (Ellen MacArthur Foundation, 2013).

The second sub-question is concerned with how public and private actors view things similar or different from each other regarding the municipal circular economic policies that should be implemented in the existing institutional policies of the municipality of Groningen. Interesting conclusions can be drawn from comparing the results of the focus group discussion with the representatives of businesses in Groningen and the focus group discussion and interviews with the representatives of the municipality of Groningen.

From this study it can be concluded that private and public actors see things differently regarding the implementation of circular economic principles in the procurement process of the municipality of Groningen. The private actors expressed scepticism on the feasibility of fully implementing circularity in the procurement process, because of a lack of motivation for a cultural shift within the procurement department of the municipality of Groningen. The public actors in this study see things differently and explain that the municipality of Groningen has already implemented circular economic principles within the procurement process. An explanation for this difference in perception is the lack of communication and promotion of developments within the municipality of Groningen regarding circular economic policies. It can be concluded that the municipality of Groningen should promote and communicate developments around the

implementation of circular economic policies. This with the goal to increase convergence between private and public actors on the feasibility of implementing circular economic principles in the procurement process of the municipality of Groningen.

Another difference in perception is regarding circular economic policies within the construction sector. Public actors describe regulations in the zoning plan to push project developers to apply circular construction in new buildings. Private actors see these regulations as barriers for innovation in circular construction. In their view, less regulations will make space for new innovative ideas around circular construction.

The role of the municipality of Groningen in facilitating space to experiment with circular business models is something that both public and private actors agree on. They both acknowledge the importance of innovation in this phase of the transition towards the circular economy.

Another topic that both public and private actors agree on is that of separating organic waste from non-organic waste. They both consider it important that more organic waste is collected separated from non-organic waste to increase the level of compost or green gas that can be recovered from organic waste.

It can be concluded that the results of the private actors diverged from the results of the public actors on the topic of procurement, construction and non-organic waste. The collaboration between the municipality and private actors active in Groningen is therefore proven to be important in the transition towards the circular economy.

The third sub-question concerns the main obstacles and opportunities from institutional and regional characteristics that are perceived by the representatives of the municipality and businesses in Groningen regarding implementing circular economic policies. From the focus group discussions and interviews several interesting obstacles and opportunities came forward.

This study found that the municipality of Groningen can implement circular procurement within the institutional procurement process. This can create an opportunity to set a trend for other organisations and therefore stimulate businesses to work with circular economic principles. A clear vision must be set for tenders to understand what is meant with circularity in the procurement process. Furthermore, aggregate circular selection criteria should be created and implemented in the procurement process. Therewith, tenders are stimulated to implement circularity in their business activities. Furthermore, the municipality of Groningen can inspire citizens and businesses and stimulate them to follow the example of the municipality. However, the lack of experience and knowledge on circular procurement can be an obstacle. To minimize the risks of spending taxpayer's money on the wrong tender, the municipality of Groningen should experiment with implementing circularity in small procurement projects. Furthermore, this study found that there is a lack of promotion and communication of developments around circularity of the municipality of Groningen. This obstacle can work against the opportunity of setting a trend towards businesses, because businesses are not aware of initiatives taken by the municipality around circularity.

In the region of Groningen, the municipality of Groningen have created an opportunity for businesses to innovate and experiment with circular construction without barriers created by rules and regulations. Creating these areas can be an opportunity to stimulate businesses to work with circularity. An obstacle for the development of circularity in the construction sector is the rules and regulations around warranty and quality of reused and recycled construction materials. This can be an obstacle for applying innovations regarding circular construction on a larger scale. Therefore, businesses in the construction sector are discouraged to innovate in circularity. Another obstacle is the shortage of housing in the region of Groningen. Businesses in the construction sector are currently choosing to build fast rather than circular. This development makes it harder for the municipality of Groningen to stimulate businesses in the construction sector to apply circularity in newly constructed buildings.

From the results of this research the importance came forward of collecting organic waste and non-organic waste separated from each other. When more organic waste is separated from non-organic waste, more value can be recovered from organic waste. However, several obstacles

were mentioned regarding the distribution of separated waste in the city center. To deal with these obstacles the municipality should experiment with different models of collecting and distributing waste.

Finally, from the focus group discussion with the representatives of the municipality measures came forward to stimulate recycling, reusing and manufacturing non-organic waste. The municipality can help to create hubs where waste is collected, separated and processed. Around these hubs thrift shops and start-ups that work with reused materials can be stationed. However, an obstacle to realise these initiatives on the short run is the contract with the current waste processing company in Groningen. This contract expires in 2021. This situation can be an obstacle for the municipality to implement circular economic policies that stimulate and facilitate small scale initiatives to recycle and reuse waste.

6. Discussion

This study provides insights into circular economic policies that municipalities can implement in existing institutional policies to contribute to the transition towards the circular economy. From combining the results of the three sub-questions an answer can be formulated for the main question of the research.

This study found that the municipality of Groningen plays an important role in this phase of the transition towards the circular economy on a local scale. The roles that the municipality of Groningen must play are that of informing, stimulating and facilitating businesses and citizens regarding developments in circularity. To do so this study found several circular economic policies that are seen as beneficial by private and public actors active in Groningen.

First, the municipality of Groningen should implement circular procurement within the institutional procurement policy. A clear vision must be set for tenders to understand what is meant with circularity in the procurement process. Furthermore, aggregate circular selection criteria should be created and implemented in the procurement process. With implementing this circular economic policy within existing procurement policies, the municipality can create an opportunity to stimulate tenders to implement circular economic principles in their business model. Before fully implementing circularity in the procurement process, it is important that policy officers responsible for procurement gain more knowledge and experience regarding circular procurement. Which circular economic principles are followed with this policy, depends on the procurement and the circular selection criteria applied to a specific procurement.

Secondly, circular economic policies should be implemented in the waste policies of the municipality of Groningen. Regarding organic waste this study found that separated organic waste from non-organic waste is important to recover more value from organic waste. One circular economic policy that should be implemented in the waste policies is that citizens and businesses must be informed about the importance of separating waste. Another policy is that the municipality of Groningen facilitates containers in the city centre where citizens and businesses can deposit their non-organic waste and organic waste separated. Furthermore, the municipality of Groningen should investigate which method is most applicable to collect and distribute separated waste from the city centre.

Thirdly, the municipality of Groningen needs to implement circular economic policies in the institutional policies on construction. Innovation is important in this phase of the transition towards the circular economy. Therefore, the municipality of Groningen should facilitate space for construction businesses to experiment with circular construction. Forcing businesses to apply circular construction through regulations in the zoning plan is not seen as a beneficial policy. This is because regulations can work against innovation in the construction sector. Furthermore, construction businesses are too busy with dealing with the shortage in housing to fully implement circularity in their business activities. The circular economic principles related to circular construction are recycling and reusing.

This study complements the growing literature on the transition towards the circular economy. In the next paragraph the results of this research are compared with contributing findings to current studies on circular economy. Finally, the limitations of the research will be discussed, and future research suggestions will be explained.

6.1 Theoretical implications

Based on theory, expectations on the results of this study are formulated in paragraph 2.4.1. In this paragraph the expectations are compared with the results of this study. From the road map illustrated by the Ellen MacArthur Foundation (2013) it was concluded that the transition towards the circular economy consists of two phases and must start from a bottom up approach. SMO (2018) reviewed the opportunities of circular economic policies in the province of Groningen. From this study it came forward that actors in the province are taking their first steps

to accelerate the transition towards the circular economy in the region. Similar to the role of the government in the pioneering phase, SMO (2018) stated that the municipality should stimulate and facilitate businesses in their circular developments. The findings of this research on the municipality of Groningen correspond to these expectations. Stimulating businesses to work and innovate with circular economic business models is seen as an important role for the municipality. Policies relevant to the mainstreaming phase were also discussed. Nevertheless, it was also mentioned by the private actors that regulations can work against innovations towards a circular economy.

Furthermore, the topic of circular procurement was expected to yield converging views of private and public actors. Both representative of the businesses and the municipality of Groningen benefit from implementing circularity in the procurement policies. The municipality can reach goals regarding circularity and the market can enlarge for businesses that have implemented circularity (Witjes & Lozano, 2016). The expected opportunities of circular procurement are validated in this research. However, according to the private actors, it is not feasible to implement circularity in the procurement process of the municipality of Groningen. This because of the lack of motivation for a cultural change within the municipality. According to the private actors this cultural change is needed to fully implement circular economic principles in the procurement process of the municipality. Therefore, the results from the public and private actors diverge on this topic.

Nicolli et al. (2012) provided two challenges for businesses in the construction sector that want to imply circularity. Often there is a geographical gap between the supply and demand of construction materials that can be reused or recycled. Furthermore, it is often unclear what materials come from demolished structures. Municipalities can imply policies to take away the challenges, but businesses still need to be persuaded through regulations to imply circularity (TNO, 2013). The results of this study on the municipality of Groningen correspond to the expectations, but also found more challenges for businesses in the construction sector that want to implement circularity. From the results of the private actors studied it was stated that regulations need to be adjusted on the quality and warranty of reused construction materials. This study found that policies on stimulating businesses to imply circularity are not applicable when regulations on warranty and quality of construction waste are not adjusted.

Concluding, it can be stated that the results of this research correspond to the expectations that were based on theory. However, the findings of this research indicate that there should be more awareness in theory for the suggestions of private actors. Primarily results collected from private actors in this study diverge from the expectations based on theory. Furthermore, in the research of the Ellen MacArthur Foundation (2018), Witjes & Lozano (2016) and Nicolli et al. (2012) no suggestions from private actors were studied.

6.2 Practical implications

In addition, practical implications can be derived from the results of this study. Two significant obstacles came forward for the implementation of circular economic policies in the institutional policies of the municipality of Groningen. Witjes & Lozano (2016) states that a municipality that implement circularity in the procurement policy can set a trend for other organisations. Citizens and businesses can be inspired by the initiatives of the municipality of Groningen. However, this research found that communication and promotion is important on implementing circular economic policies. The results show that private actors expressed their doubt on the feasibility of implementing circular economic policies within the municipality of Groningen. This while the municipality of Groningen already implemented circular principles within the procurement process and has set the target on becoming more circular in the future. It was acknowledged that the unanimous experiences between public and private actors on this issue can be explained by the lack of communication and promotion of the municipality of Groningen. In order to inspire citizens and businesses to follow the example of the municipality of Groningen, communication and promotion is key.

Furthermore, results of the private actors diverged from the results of the public actors on the topic of procurement, construction and non-organic waste. The collaboration between the municipality and private actors active in Groningen is therefore proven to be important in the transition towards the circular economy. The municipality of Groningen should start a dialogue with the private sector before implementing circular economic policies.

6.3 Limitations

One of the limitations of this study that a single case study is investigated. A danger of using a single case study is that results can be biased towards verification. Because research with a single case study uses a small sample size, assumptions become less reliable (FLyvbjerg, 2006). Furthermore, little explanatory range is delivered to scientific development when a study is generalised on a single case (FLyvbjerg, 2006). However, multiple methods were combined in order to counteract the weakness of a single case study (Clifford et al., 2010). As such, the negative effects of a small sample size on the reliability and explanatory range of this research was minimized.

Another limitation of using focus group discussions as a research method is that the data can be difficult to analyse (Bryman, 2012). The data from focus group discussion is extensive. This because it is not only interesting what people say, but also how people interact with each other. Furthermore, data is more difficult to transcribe compared to interviews because the researcher must take into account who says what. Organising focus group discussions can also be challenging. People must agree to participate and turn up at a particular time and place (Bryman, 2012). Due to these limitations only two focus group discussions were conducted in this research. More focus group discussions could have improved the reliability of the outcomes (Bryman, 2012).

Moreover, there were limitations regarding the methodology. During a focus group discussion, the researcher has less control over the proceedings. The participants can take over the session. This can have influence on the relevance of the results for the research (Bryman, 2012). For this study, the researcher was careful with interfering during the discussion. This way the conduct of the focus group was not influenced. However, this could be a limitation for the relevance of the results.

6.4 Future research

Future research should compare multiple cases of municipalities that want to contribute to the transition towards the circular economy. Studying multiple cases can help answering the question how the unique social-cultural and economic characteristics of a municipality can influence which circular economy policies are most beneficial to implement. Which policies can only be implemented by a single municipality and which policies are more aggregate?

Future research should focus on investigating how businesses and governments can profit from implementing circularity in their activities. If it becomes clearer where money can be earned with circular economic initiatives the transition will accelerate. One can for example study the maximum value that can be recovered from household waste. From this new business models can arise.

This study showed that it is important to separate organic waste from non-organic waste to increase the value recovered. The municipality of Groningen should investigate which method is most applicable to collect and distribute separated waste from the city centre. The goal is to encourage citizens and businesses to separate waste. Future research can study which method of collecting and distributing waste the municipality of Groningen should implement.

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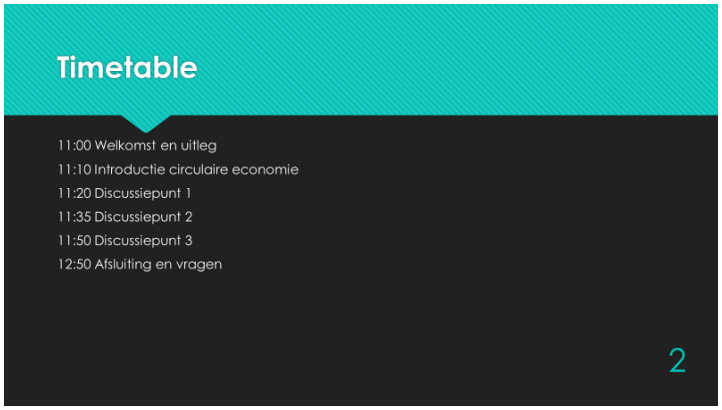
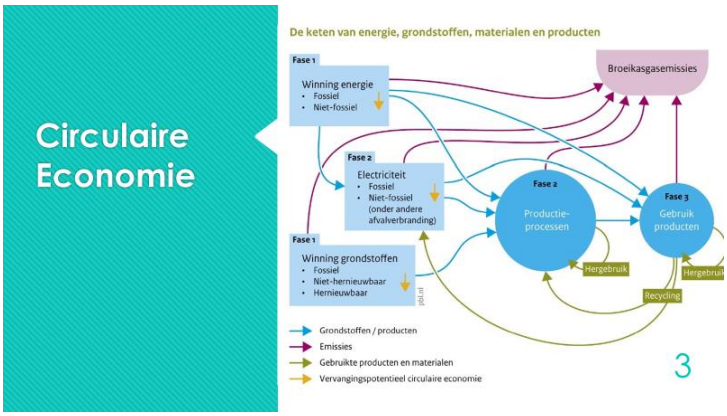
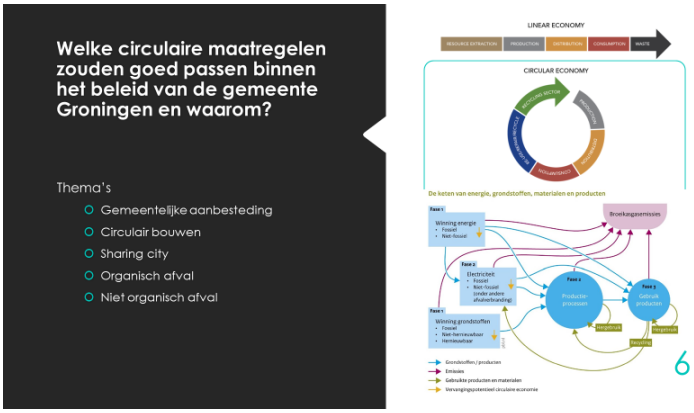
Appendices

List of appendices

Appendix I PowerPoint focus group discussion







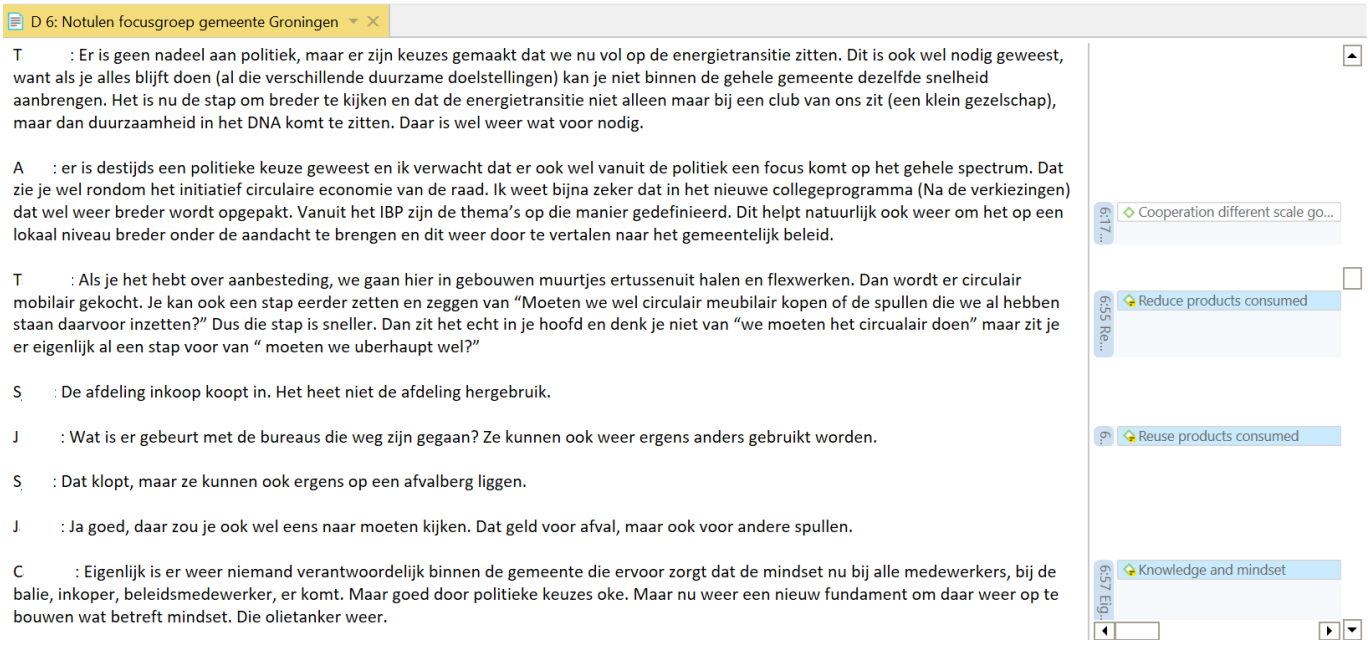
Appendix II Interview guide

Topic	Sub-topic	Questions
Introduction	Introduction Goal interview Ethical considerations	Opening: I am doing a MSc. in Economic Geography. For my master thesis I am studying which policies are applicable for municipalities that want to contribute to the transition towards the circular economy. The goal of this interview is to reflect on the results from the focus group discussions. Confidentiality: The results from this interview will only be used for the purpose of this study. Recording: Do I have your permission to record this interview using an audio recorder?
Biographical	Profession at the municipality Circular economy	What is your job within the municipality? What is your affinity with circular economy?
Role of the municipality in the transition towards the circular economy	- Influence on neighbouring regions - Informing citizens and firms	What do you think about these results? Did you expect these results? Do you agree with these results?
Circular procurement	- Change in mindset - Sharp vision - Gain knowledge from experience and set criteria - Critique business sector - Financial benefits long-run	What do you think about these results? Did you expect these results? Do you agree with these results?
Circular construction	- Madaster - Hubs: Contract waste processor - Dilemma shortage housing - Suikerunieterrein, innovation - Challenges construction sector in quality and warranty - Zoning plan	What do you think about these results? Did you expect these results? Do you agree with these results?
Sharing city	- Investment in school yards - Energy cooperation - Citizen initiatives - Big Building, Carex - Multifunctional use of space	What do you think about these results? Did you expect these results? Do you agree with these results?
Organic waste	- Campaigns reduce food waste - Separating organic and non-organic waste - Organic garbage containers - Challenge second garbage container - Quota restaurants	What do you think about these results? Did you expect these results? Do you agree with these results?
Non-organic waste	- Hubs, start-ups, thrift shops - Lead by giving the example - Procurement, different types of plastic glued together - Buy less	What do you think about these results? Did you expect these results? Do you agree with these results?

Circular economy and CO_2 neutral	- Difficult to become CO_2 neutral in all scopes - Circular procurement of windmills and solar panels	What do you think about these results? Did you expect these results? Do you agree with these results?
Close out		Do you have any questions? Thank you for participating in this interview. The answers will be handled with confidence. The results of this interview will be presented. Would you like to get an invitation for this presentation? If you have any questions or ambiguities, you can also contact me via email or telephone.

Note: In sub-topic: Green = results from the municipality; Blue = results from the businesses; Red = Results from both the businesses and the municipality.

Appendix III Example of coding an interview in ATLAS.ti



Appendix IV Coding scheme

Theme	*Code*	*Sub code*	*Definition*
Role municipality in the transition towards the circular economy	Phases in the transition	Pioneering phase Mainstreaming phase	The role of the municipality a specific phase of the transition.
	Bringing people, firms and knowledge together	Organising events Start cooperation Sharing knowledge	What municipalities can do to bring actors together in the transition.
	Cooperation different scale governments		Cooperation between different tiers of government in the transition.
	Local economy		Economic benefits of the circular economy.
	Scale of influence	National regulations Neighbouring municipalities Economic influence	What determines the amount of influence a municipality can have in the transition?
Circular procurement	Launching customer		The municipality can buy products from start-ups with circular business models.
	Circular procurement process	Vision Criteria Dialog with the market Measuring circularity	Changes in the procurement process of the municipality to implement circular economy principles.
	Reduce products consumed		The municipality can reduce products consumed.
	Reuse products consumed		The municipality can reuse their products.
	Knowledge and mindset	Experience Push factor	Internal change in mindset and knowledge about circular procurement.
Circular construction	Material passport	Madaster	A report on the materials found in buildings.
	Experimenting with circular construction	Suikerunieterrein No construction regulations	What the municipality can do to stimulate innovation in the construction sector.
	Creating hubs	Contract waste processing firm Processing construction waste Construction cluster	The municipality can facilitate storage place of construction materials.

	Circular construction vs building fast	Short term vs long term problems Tiny houses Foreign students	Dilemma between building circular and the building fast due to the shortage in housing.
Organic waste	Reduce food waste	Citizens Hospitality sector	The role of the municipality in reducing food waste.
	Distribution organic waste	Separating waste Picking up waste	Methods for separating and distributing waste.
	Process organic waste	Recycling Recover	Creating value from organic waste.
Non-organic waste	Limited influence	National regulations	For example, deposit fees cannot be controlled by the municipality.
	Citizens and non-organic waste	Create awareness to reduce non-organic waste Facilitate citizens initiatives	Stimulating citizens to reduce and recycle non-organic waste
	Stimulating firms to recycle	Thrift shops Start-ups and recycling Hubs for non-organic waste	Stimulating firms in Groningen to recycle non-organic waste
	Launching customer		The municipality can buy products from start-ups with circular business models.
	Reduce products consumed		The municipality can reduce products consumed.
	Reuse products consumed		The municipality can reuse their products.

Appendix V Quotations

Theme	*Dutch quote*	*English translation*	*Name*
The role of the municipality	Het is een wisselwerking van verschillende overheden. Maar ik kan me voorstellen dat bedrijven daar niet gelijk aan denken.	It is an interaction between various governments. I can imagine that businesses do not think about that in such a way.	Anna
Circular procurement	Feitelijk hebben we alle touwtjes in handen om inderdaad iets te doen ten aanzien van aanbesteding als we iets in de melk te brokkelen hebben. Maar volgens mij ontbreekt er een deel in kennis en lef. (…) Ik kan me wel voorstellen dat omdat we niet alle kennis hebben we niet goed scherp deze meetlat langs onze opdrachtnemers kunnen leggen. Laten we wel wezen, we zijn een organisatie met allemaal medewerkers en we zijn gewend om de beste kwaliteit of prijs te gunnen. Het is ook een verandering in mindset.	In fact, we have all the control to do something around circular procurement if the municipality has influence. In my opinion there is an absence of knowledge and courage. (…) I can imagine that sharp criteria to select tenders are hard to formulate when there is a lack of knowledge. To be fair, we are an organisation where the workers are used to select the best quality or price. We also have to change our mindset	Carin
Circular procurement	De vraag van de inkopers was: Wat verstaan jullie precies onder duurzaamheid. (…) het begrip is breed, maar we willen er meer focus aan geven en aan laten sluiten op het beleid waar we met de gemeente mee bezig zijn. Dus circulair is zo'n thema waar we nu (…) mee bezig zijn	Tenders are asking: "what do you mean with sustainability?" (…) It is a broad concept, but the focus should be on connecting it to the policy of the municipality. Circularity is a theme we are currently (…) working on	Trudy
Circular procurement	Ga niet kijken naar prijssturen maar kijk wat het oplevert op langer termijn. Wat is de waarde creatie die je dan krijgt?	Do not select on price but look at what the benefits are on the long term. What is the value that you get?	Justin
Circular construction	Dan merk je ook dat er een groep is die zich bezighoudt met circulair en klimaat. Maar er is ook een groep is zich bezighoudt met bouwen, bouwen, bouwen, want we hebben een woningtekort. En dat botst wel eens. Als je wilt bouwen, bouwen, bouwen wil je zoveel mogelijk woonruimte creëren en even niet nadenken over de energietransitie en circulair denken. Want mensen moeten een dak boven hun hoofd. (…) Je hebt korte termijn en lange termijn problemen en de korte termijn problemen vragen altijd de aandacht want die komen in de krant.	At that moment you notice that a group of people is concerned about circularity and climate. But there is also a group that is concerned with building, building, building because there is a shortage in housing. This can collide. If you want to build, build, build you want to create as many houses as possible and you do not think about the energy transition or circularity. People need shelter. (…) You have short-term and long-term problems and the short-term problems always receive the attention of the newspaper.	Sander
Circular construction	Natuurlijk moet je aan alle veiligheidsregels voldoen. Daar moeten we helemaal geen concessies aan doen. Maar je ziet wel dat, nu we op het Suikeruniterrein vrij zijn van bouwbesluitregels en wet en regelgeving omtrent de welstand, je een vlucht kan nemen in wat je kan laten zien en wat je kunt ontwikkelen. Dat is ook wel een vraag. Wat je nu wel veel ziet is dat er meer regeltjes bedacht worden. Er wordt	Of course, the safety rules must be followed. We must not diverge from that. But you do see that, now that we are free from building regulations on the Suikeruniterrein, you can accelerate in development. That is also what is demanded. Only recently more rules are invented. The government is formulating new rules around circularity, while we are actually in a phase where there is a lot of innovation	Maria

	vanuit de overheid nieuwe opgesteld qua circulariteit, terwijl we eigenlijk nog in een fase zitten waarin er nog heel veel geïnnoveerd en getest gaat worden. Met al die regeltjes zorg je dat heel veel startups geen kans krijgen.	and testing. With all these rules a lot of start-ups won't get a chance.	
Organic waste	Het blijft natuurlijk ook twee tegenstrijdige aspecten. Studenten wonen vaak alleen, en als je alleen kookt heb je kleinere porties nodig. Dit terwijl veel producten in grotere porties als goedkoper worden aangeboden. Dus ik kan me voorstellen dat je kiest tijdens het boodschappen doen, om te grote porties te kopen. Aan de andere kant, als je kijkt naar verpakking zijn kleinere porties juist heel vervelend. Dan wil je eigenlijk, als je het aantal verpakkingen terug wil brengen, grotere porties aanbieden.	Of course, the two aspects remain opposites. Students often live alone and if you live alone you need smaller portions. This while a lot of products are offered cheaper in larger portions. I can imagine that you select larger portions over smaller portions when you are doing groceries. On the other hand, if you look at the packaging, smaller portions are bothersome. If you want to decrease the level of packaging, you need to buy larger packages.	Sander
Organic waste	Je ziet nu wel dat de infrastructuur voor een groot deel is ingericht op één plek waar je al je afval kan brengen in de straat. Je hebt niet op je eigen huis een eigen afvalcontainer. Heel fijn voor mensen dat ze op elk moment hun afval kunnen wegbrengen (…). De structuur is heel simpel en het ophaal systeem is zo ook een stuk eenvoudiger. Je hoeft met je autootje niet meer door de straten om afval op te halen.	You do see that the infrastructure is arranged in such a way that waste is collected in one place in a street. You do not have a waste container at your own house. This is pleasant for the people who want to dump their garbage at any time. (…) This structure is very simple and the picking up system is easy as well. you don't have to drive your car around the streets to pick up the waste.	Sander
Organic waste	Als er afval ontstaat kan je het beste verwerken als het zo clean mogelijk is. Hou het gescheiden van andere stromen anders krijg je geheid een vervuiling. Dat zie je nu ook in compost. Er zijn verdenkingen dat er al een deel aan micro plastic in zit. (…) Als eenmaal het compost op het land komt. Het waait een keer in de sloot. En uiteindelijk in de oceaan. (…) Wat je ermee kan doen is aan het ene deel vanuit de voorkant dat het niet ontstaat. Als het wel ontstaat, hou het gescheiden.	If waste arises it is best processed when it is as clean as possible. Keep it separated from other waste flows otherwise pollution is inevitable. That is what is happening with compost. There is a suspicion that there are microplastics in it. (…) If the compost is spread over the fields iIt will end up in the ditch and eventually in the ocean. (…) What you can do about it is ensuring that waste doesn't arise. If it arises, keep it separated.	Ruben
Non-organic waste	De gemeente kan faciliteren in sociale werkplaatsen waar je naar toe kunt gaan met spullen die je kunt laten herstellen of laten repareren. Ik weet dat er wel eens zo'n repair café is ofzo. (…) Bovendien zorg je daarmee ook nog voor extra werkgelegenheid in de gemeente	The municipality can facilitate in social workshops where you can go to let your stuff be repaired. I know there are repair cafes of some kind. (…) Moreover, employment is created by the municipality.	Maria