

Network building in the context of Circular Economy

A case study on the organic material
stream in Hamburg, Germany

Master Thesis

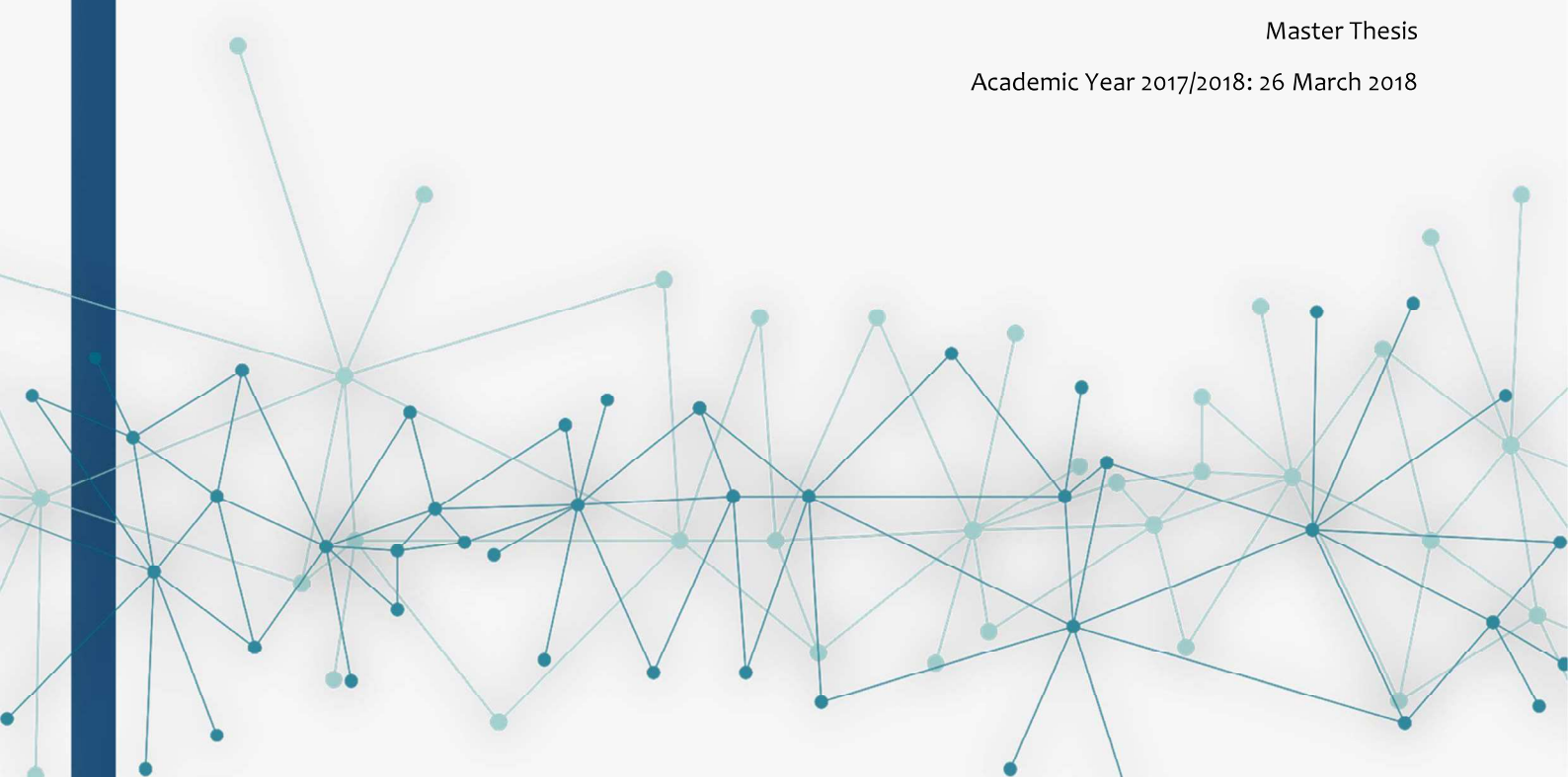
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Abstract

Several negative impacts that characterise the past development models of cities have arisen particular concern from urban policymakers in recent years, especially regarding environmental issues. These challenges are making it always more difficult for cities to remain competitive, in terms of being able to attract people, businesses, and diverse economic activities. Moreover, these are seen as at the base of a fragile socio-economic situation, faced nowadays in different cities and countries around the world. Within the context of sustainable development, in Europe, the supranational political and economic body (EU) has continuously proposed theoretical approaches and concepts: one of the latest commitments has resulted in the introduction of the Circular Economy agenda into the mainstream policy debate. This master thesis focuses on exploring this emerging concept and its potential implications for cities/regions, with Hamburg as case study. The Circular Economy topic is addressed in this work by means of public policy framework at the local level with the overall objective to explore the necessary conditions to build and maintain the network of actors capable of developing 'circular solutions' and implementing them within the organic material stream in Hamburg. Difficulties linked to the still ambiguous and evolving nature of the Circular Economy concept have required a deep analysis of theory and EU policy approach on the topic. Public policy conceptual frameworks have been applied here with regard to the identification of the relevant actors and conditions for the network capable of implementing and sustaining the claimed circularity for the chosen material stream. Barriers and factors of success related to the organic material stream are identified by means of Material Flow Analysis (MFA) method, leading also to the identification of the relevant local stakeholders. Within the identified network of stakeholders, innovative collaboration arrangements – based on a collaborative governance approach – that can arise the possibility of success in tackling the identified problems are explored, based on the empirical research and the mechanisms/methods provided by policy studies. In this context, the role of local public authority is proved to be central to initiate and direct the decision-making process, coordinating actors and overseeing the design and implementation of a public policy. Due to the complexity of the topic, one of the main settings for building the network capable of developing and implementing 'circular solutions' is the inclusion of politics, industry, research and civil society actors with reference to the Quadruple Helix model. Results from the case study of Hamburg, have targeted the cluster policy at place as a framework for maintaining the network of actors and thus guarantee a platform for further dealing with problems in the future concerning the organic material stream management. Lessons learnt from the case of organic material stream can be further developed into a framework for similar projects of other cross-cutting policies in the future under the overall topic of Circular Economy as emerging policy from EU governmental body.

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Donald and Alessandro

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Abbreviations

BdB	<i>Bund deutscher Baumschulen</i> (Tree nursery association)
BioAbfVO	<i>BioAbfallverordnung</i> (Organic waste act)
BJV	<i>Bundesministerium der Justiz und für Verbraucherschutz</i> (Federal Ministry of Justice and Consumerism)
BKWB	<i>Biogas- und Kompostwerk Bützberg</i> (Biogas and compost plant Bützberg)
BMUB	<i>Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit</i> (Federal Ministry for the Environment, natural protection, construction and nuclear security)
BSW	<i>Behörde für Stadtentwicklung und Wohnen</i> (Ministry of Urban Development and Housing)
BUE	<i>Behörde für Umwelt und Energie</i> (Ministry for Environment and Energy)
BUND	<i>Bund für Umwelt und Naturschutz Deutschlands</i> (German Federation for Environment and Nature conservation)
BWFG	<i>Behörde für Wissenschaft, Forschung und Gleichstellung</i> (Ministry for Science, Research and Equality)
BWVI	<i>Behörde für Wirtschaft, Verkehr und Innovation</i> (Ministry for Economy, Transport and Innovation)
C2C	Cradle-to-Cradle
CE	Circular Economy
CEN	Circular Economy Network
EC	European Commission
EEA	European Environmental Agency
EMF	Ellen MacArthur Foundation
ENH	Entsorgungsverband des Norddeutschen Handwerks (North German Handicraft)
EPR	Extended Producer Responsibility
ESA	Environmental Service Association
EU	European Union
FHH	<i>Freie und Hansestadt Hamburg</i> (Free and Hanseatic City of Hamburg)
GewAbfV	<i>Gewerbeabfallverordnung</i> (Commercial waste act)
HmbAbfG	<i>Hamburgisches Abfallwirtschaftsgesetz</i> (Waste management law of the City of Hamburg)
HmbGVBl	<i>Hamburgische Wertstoff-Verordnung</i> (Recycling material act of the City of Hamburg)
JB	<i>Justizbehörde</i> (Federal Ministry of Justice)
KrfWG	<i>Kreislaufwirtschaftsgesetz</i> (Waste management act)
MFA	Material Flow Analysis
MSW	Municipal Solid Waste
MVB	<i>Müllverwertungsanlage Borsigstraße</i> (Incinerator of Borsigstraße)
MVR	<i>Müllverwertungsanlage Rugenberger Damm</i> (Incinerator Rugenberger Damm)
NABU	<i>Naturschutzbund</i> (Nature and Biodiversity Conservation Union)
NGO	Non-Governmental Organisation
REC	Regional Environmental Center
SH	Schleswig-Holstein
S-MFA	Stakeholder Material Flow Analysis
SRG	<i>Stadtreinigungsgesetz</i> (Stadtreinigung law)
SRH	Stadtreinigung Hamburg
STOA	Science and Technology Options Assessment
UBA	<i>Umweltbundesamt</i> (German Federal Environmental Agency)

VKN	<i>Vertriebsgesellschaft Kompostprodukte Nord GmbH</i> (Distribution Company Compost Products Nord GmbH)
WEEE	Waste Electrical and Electronic Equipment
WM	Waste Management
ZRE	<i>Zentrum für Ressourcen und Energie</i> (Centre for Resources and Energy)

*Start by doing what's necessary; then do what's possible;
and suddenly you are doing the impossible.*

(Francis of Assisi)

PART I

Introduction

This Part introduces the topic and objectives approached by the present master thesis as divided into four Chapters. Firstly, the introduction of the core topics and the case study focus of the empirical research are outlined. It follows the introduction to the focus research question, objectives and the related hypothesis. The third Chapter describes the methodology implied in approaching the core topics and the empirical research. Finally, the last Chapter provides an overview on the structure of the present master thesis.

1. Relevance of the topic and state of the art

Urban development is a phenomenon intrinsic of human nature, but it has created incontrovertible effects to the planet. As a matter of fact, cities occupy nowadays 2% of the world's land surface and, however, they use over three-quarters of the world's harvested resources (Baccini 1997; Dinarès 2014). The trend cannot continue with the same intensity and this has become clear to the majority, not only among scholars but also at political level and within the business sector: the second, in particular, has already started to realise that the market would encounter an impasse in the immediate future and that this would result in a considerable reduction in profit. Moreover, the current model of production and consumption is based on a linear principle starting from material extraction, production of goods, and arriving to waste generation (Wilts 2016).

Production patterns (but not only) have consequences on the physical organisation of the city and it is here that urban planners can have a say. City transformation itself involves huge quantity and variety of resources which take part in material flows. In the recent years, it has been assisted to the commitment of many which aims to achieve the so called sustainable development, defined for the first time in 1978 by the Brundtland Commission. This approach to development becomes fundamental nowadays, especially after 2008, the year when, officially, the people resident in cities surpassed the number of inhabitants of rural areas (Körner 2013). In general terms, it implies the achievement of a balance between economic growth, social equality and environmental protection. This concept has been broadened and deepened in the latest years: a city following these ideals is 1) based only on renewable resources; 2) does not reduce biological resources; and 3) does not lead to systems that reduce the freedom of future generations (Baccini 1997: p.28). These range of issues are considered today as crucial by the political agenda in a global scale.

By now, several initiatives (more local than national) have been introduced trying to achieve a balance between the need of producing and the collateral generation of scrap materials: these include, for instance, eco-design, by which it is tried to limit waste since the industrial process starting from innovative design of packaging, but also more intangible aspects which point to raise citizens' awareness on environmental topics (Accenture 2014).

Within the sustainable development paradigm, in Europe, the supranational policy body (EU) has continuously proposed approaches and concepts by means of policy, until the latest attempt known as Circular Economy (CE).

Literature offers plenty of definitions regarding this concept, all discussed in this work later on (see Chapter 1, Part II). In its essence, CE, beyond the present model of production and consumption, claims to help optimizing the natural resource use through efficiency increase towards a transition from open to closed cycles of materials and energy and to less wasteful industrial processes (Frosch 1992; Ehrenfeld & Gertler 1997; Chiu & Yong 2004; Andersen 2007). This concept poses itself in clear antithesis with the current economic system, which is currently characterised by a linear trend (EMF 2013; Wilts 2016). The CE pursues a new way of seeing materials and energy as a part of broader cycle which does not stop with the end-of-life of products, but promotes alternatives uses of such resulting materials instead, refusing the whole notion of waste and nullify the concept of end-of-life of products (EMF 2013). Such virtuous initiatives aim to "reduce resource consumption and/or increase resource efficiency" recalling the 3Rs principle Reduce, Reuse and Recycle (Wilts 2016: p.6). Hence, the attempt of Circular Economy is to try to transform this linear process in a circular loop by adopting the rules recalled from different fields - e.g. engineering and ecology - with a constant view on the efficiency (Winkler 2011; Romero & Molina 2012). Furthermore, Circular Economy prevents the loss of valuable materials as suggested by Mirabella et al. (2014) and supports the concepts put forward by Park & Chertow (2014) and Zaman & Lehmann (2013) of waste as a potential resource.

Due to its interdisciplinary dimension, CE occurs and impacts on different levels: micro, meso and macro (Geng 2008; Ghisellini et al. 2016). Those levels are to be intended in a geographical manner and to implement CE principles, several approaches have been described for each level. The micro level refers to internal policies taken at business scale regarding the single firms and their actions. These implicate mainly physical and technical changes within the activity the policy refers to, such as a modification in the production chain. The implementation of CE at meso level implies modifications within a chain which embrace more than one industry; therefore, this level can be related to

the concept of Industrial Ecology with the consequent development of the so-called Eco Industrial Parks (EIPs) initiatives (Frosch 1992; Chiu & Geng 2004). As the reader has certainly noticed, these two levels are related to the production part of a material cycle. The CE at macro level, on the other hand, refers to the entire cycle, from extraction to disposal, with the difference that, according to CE principles, extraction of virgin materials should be avoided in favour of reusing and recycling materials saved from disposal. All these activities are distributed - more or less equally - all over the city territory and even beyond, depending on the material. To this level belong actions which imply integration and redesign of 1) industrial system, 2) infrastructure system 3) cultural framework and 4) social system (Ness 2008; Preston 2012): linked especially to the last two points, environmental impact awareness and social cohesion are the main elements to work on (see Chapter 1.2, Part II). For this level, several approaches can be mentioned. The collaborative approach models are recognized as one of the best available options on consumer side to shift from the present business-as-usual model to CE, based on a shared ownership among multiple consumers (Ness 2008; Preston 2012).

It was in 2015 when the European Commission adopted an ambitious Circular Economy Package, which included revised legislative proposals on waste to stimulate Europe's transition towards a Circular Economy which is claimed to “boost global competitiveness, foster sustainable economic growth and generate new jobs” (EC 2017). Hence, EU is currently intentioned to promote a policy on Circular Economy – as related to other commitments (e.g. Green Growth EU policy, United Nations SDGs, etc.) – in the following years which will afterwards oblige Member States to adopt it. From this perspective, based on the objectives and principles it claims, Circular Economy is considered by the EU as the current effort and potentially future development model in the frame of the sustainable development paradigm. Part II has the aim to review the topic of CE and policy to create a solid theoretical background, Part III gives an overview of the understanding of CE in the European context from a policy perspective and in Part IV the authors present the results of such analysis in a critical way.

The study of cities never achieved such complexity and, according to several authors (see for instance Batty 2007; Marshall 2012), there was therefore the necessity to define new ways and tools capable of describing and understanding these new realities that cities have become. At the same time, making policies has become much more complex than ever before due to new topics brought at the stake with the sustainable development, as mentioned previously. As Dente (2014) argues, decision-making processes have nowadays become 1) more complex, due to “a growth of the decisional networks” on the vertical and horizontal axis; 2) more uncertain, because taking decisions has become a matter of choosing among the less risky alternative; 3) and more conflictual “among social groups, among political actors and between citizens and public authorities” (Dente 2014: pp.10-12).

In the context of this master thesis the case of Hamburg has been chosen for the empirical analysis. Germany is active in the environmental policies since the early 90s as one of the first country in the European Union to have introduced the Extended Producer Responsibility (INSEAD). A sign of its commitment towards sustainability subjects is confirmed by the national law on Circular Economy drafted in 2012 (Bundesrat 2012). The city of Hamburg, in the wake of the national trend, has begun to deal with the principles of CE as the biggest and most important city in the north of Germany. Indeed, Hamburg has been selected for participating in two European funded projects aiming to test the circularity in the framework of Horizon 2020 program. The two projects are known with the acronyms REPAiR and FORCE: core objective of the first project is to provide local and regional authorities with an innovative trans-disciplinary and open source GeoDesign Decision Support Environment for pursuing initiatives on the territory with a focus on organic waste for the case of Hamburg; the second project focuses on exploring the ‘value chain partnership’ as an innovative model of collaboration between public and private actors in closing the WEEE material loop in the case of Hamburg.

It is exactly from these two projects where the idea for this thesis has been developed from. Deriving the concepts from theory and taking advantage of the inner knowledge that the authors have on the current situation, the project idea object of this work consists in the proposal of a new cycle of organic material stream which tries to respect the principles of the CE.

2. Research question, objectives and hypothesis

The approach to the Circular Economy issue in this work concerns the local level as the dimension where partially or entirely production and consumption patterns take place, by involving public policy mechanisms as a comprehensive line to deal with such multidisciplinary issue and because ‘closing the material loops’ involves overall, among many other different aspects, different actors to be engaged and coordinated along the steps of the cycle. Beyond the personal interest on the topic of Circular Economy as a new concept claiming to frame the future development model of our societies, it is of the author’s duty to argue the choice of the approach and how does urban planning discipline relate to it.

The territorial (local) level, defined as the macro level by Geng & Doberstein (2008) and Ghisellini et al. (2016), among the other levels (micro and meso) represents the only level which implies the complete system of the city. From another perspective, the high density of businesses (especially retailers) and consumers makes cities concentrators of flows and also at the same time the hotbed of innovation, therefore as EMF (2015: p.35) advocates, city governments can generally move faster than their national counterparts towards the transition to the Circular Economy. The urban planner works with the city scale and he is able to bring different aspects together, namely, the industrial, infrastructural, cultural, political and social dimensions. On those elements, the CE acts and often implies and produces spatial effects on the territory, effects, which planners might have the possibility and responsibility to tackle due to their knowledge of the city’s systems and their ability to connect different elements: this is due to their goal to study the city as a complex network of interconnected functions and actors, with the orientation to manage interdisciplinary researches and interventions.

The standard definition of public policy defines that it is a set of actions connected to the solution of a policy problem, i.e. of an unrealised value, need or opportunity which, once identified, may be obtained through public action (Dunn 1981). But public policy, as Dente (1995: p.5) states, should not be restricted only to the conscious attempts by governmental institutions to tackle specific issues. Market mechanisms or simple mutual adaptation by the relevant actors can, under given conditions, work equally well towards solving the problem. From our view, CE as a policy perspective involves several collective problems which are not simply related to a given context (Hamburg in this case), but they concern a nature of problems which Dente (1995) calls as “the global character of environmental problems”. This nature of problem, especially in the case of CE, calls for public policies to maintain the attention at this problem and to develop problem solving activities with the aim to address such multidisciplinary and complex (plurality of actors) issue. This is carried aiming at achieving the desired goal (in our case claimed by EU) which is related to the solution of a range of problems of global character, which are at the same time local (e.g. waste management, scarcity of resources and non-efficient energy sector are firstly local problems).

The cycle of a particular material described above is a general figure of the steps on which CE prescriptions act. To each of them corresponds one or more actors in charge of the functioning of that specific step. The object of this investigation regards therefore those actors and all that dynamics that occur between them aiming to reaching the goal of “closing the loop”. Not only the network of actors has to be installed, built, composed, but it must be kept during time. Therefore, the thesis embraces the concept of governance, by which is intended that process of establishing policies and monitoring continuously its proper implementation.

To conclude, CE appears to embrace several disciplines and it calls for the involvement of several actors of different nature in closing the material loops. Moreover, as it is claimed by several authors, CE calls especially for innovative actors: due to the complexity of the sustainable development vision that CE embraces, most often its implementation needs to be supported by innovation designers and intermediaries who provide services and designs towards appropriate radical changes in both practices, policies and decision-making tools (Golinska et al. 2015; Küçüksayraç et al. 2015). From this perspective, the role of the urban planner as an expert in mediating public policies involving actors of different nature and calling for innovative models dealing with a collective problem comes in the front line.

This way, going back to Hamburg case study, the research question of this work is the following:

Which are the necessary conditions to build and maintain a network of actors capable of developing ‘circular solutions’ and implementing them within the organic material stream in Hamburg?

To answer to the research question, the following objectives are identified:

- Critical review of the concept of Circular Economy from the available literature. The scope is to acquire a general overview with the aim of understanding pros and cons of the CE concept applicability at the local scale.
- Identify contents and approach included Circular Economy Package (EU) - to be explored in the case study.
- Understand the public policy processes and identify the actors to be mobilized with the aim to realize a Circular Economy Strategy in a specific site (role of actors, resources needed, etc.)
- Identify the barriers and the factors of success from theory and policy perspective. Use the results to build an analysis framework for the case study of Hamburg.
- Propose innovative collaboration model for improving the circularity of the organic material stream in Hamburg.

The following hypotheses represent the assumptions to be verified or denied by the case study in answering to the research question:

- Circular Economy is a local issue which requires actions occurring at and generating impacts on the local level (i.e. city scale). In the case of Hamburg, local and regional scale coincide.
- To address the goals of Circular Economy the role of local public authority is not only central but also *sine qua non* to initiate and direct the decision-making process, coordinating actors and overseeing the design and implementation of a public policy.
- Public policy outcomes should aim at constituting (establishing) new organisations (e.g. public agency) able to guide Circular Economy practices and to address the expected outcomes.
- Planners as experts on urban issues have a role in bridging the gaps between the plurality of disciplines involved in a Circular Economy strategy for the local level.

3. Project sources and methodology

The approach of the current work demanded for a deep understanding of two main topics, Circular Economy and Public Policy, where especially the first one - as a relatively new concept - required a further elaboration from the authors perspective. This resulted in a literature review (theoretical background) conducted and based on scientific literature for both topics, and especially for the Circular Economy publications from organisations promoting Circular Economy paradigm (e.g. EMF) were as well considered. The theoretical background is followed by an overview on the development of Circular Economy as a policy issue within the European Union. Here a special focus lied on the policy action areas and means of implementation foreseen for the transition to a Circular Economy and the actors involved, with the aim of clarifying the understanding of Circular Economy from the political perspective. This Part III involved a qualitative document analysis of several communicative documents provided in the context of a policy proposal on Circular Economy by the European Commission and other European agencies.

The case study of the current work originated from one of the two above-mentioned ongoing European funded projects (i.e. REPAiR): it involves two separate local projects focused on organic material stream, each aiming on put into effect the Circular Economy principles by facing concrete/real problems. Through this master thesis, a new project design combining these two initially separate projects and exploring the entire organic material cycle in Hamburg. This project is further considered as the case study to answer the proposed research question, i.e. to investigate the necessary conditions to build and maintain the network of actors capable of developing 'circular solutions' and implementing them within the organic material stream. To do so, the first step consisted on grasping the national and local perspectives of Circular Economy practices and other innovation policies by means of a qualitative documents analysis of the policy framework in place. Although the analysis for Hamburg goes beyond the waste management phase by exploring its relations as well with production and consumption side, this phase was considered strategic for the analysis of the case study. Next step consisted on identifying within the waste management stage barriers and factors of success related to the organic material stream as well as the implication

of the other phases (production, consumption) on these problematics. The understanding of the status quo of the chosen material stream and potential changes that the improvements of this would cause was performed by means of Material Flow Analysis (MFA) method: the data were provided from the waste management documents analysis and from the experts' interviews. Further, the MFA performed within the waste management area allowed also the identification of the relevant stakeholders within the material stream management activities. Within the identified network of stakeholders, innovative collaboration arrangements – based on collaborative governance approach – that can arise the possibility of success in tackling the identified problems were explored, based on the empirical research and the mechanisms/methods provided by policy studies.

4. Report organisation

The present work is organised into further six Parts. For a better understanding of the two main background topics of this project - Circular Economy and Public Policy - a theoretical overview is offered in the second Part. The third Part presents an overview on the development of Circular Economy as a policy issue within the European Union. This is followed by the author's interpretation of the Circular Economy as a city level policy issue and the development of the analytical framework for the case study as the fourth Part. In the fifth Part, the case study is presented, with the analysis of the governance background, the material flow analysis and the results from the interviews. The project proposal is developed in the sixth Part. Further in this Part VI, the results from the previous Part V are interpreted and strategies are provided, together with the instruments recommendations for implementing the project proposal. Finally, conclusions and considerations together with the answer to the research question are articulated in the seventh and last Part.

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Rational behavior requires theory.

(Edwards Deming)

PART II

Theoretical Background

The second Part of this thesis has the aim of providing a solid theoretical background of the two main topics protagonists in this work, namely Circular Economy and Policy making, described in the first and the second Chapter respectively. In both cases, main aspects, principles and critiques are presented and finally conclusions are driven. Due to the complexity of both topics, the draft of this Part has revealed itself to be extremely relevant as grounds for the empirical research.

1. Circular Economy – First steps into the concept

Since its entry on the political sciences, CE has benefit of a multitude of researches which have aimed to create the fundament of the concept. Those definitions are briefly presented in the first section with the aim of providing a first but comprehensive picture of the topic. Analysing in a detailed and technical way the concept is not imperative for the scope of the present work: other authors have already accomplished this task (cf. Sakai et al. 2011; Ghisellini et al. 2016). The aim of this chapter is to highlight the ways in which CE can be applied physically at the several scales of territory (micro, meso, macro) and give an overview of all the approaches linked somehow to this concept. CE is also understood slightly differently around the world and many critiques have been moved against its principles.

1.1 Definitions and basic principles

Since the theorisation of the concept of Circular Economy in the beginning of the 90s (Pearce & Turner 1989), a plethora of literature has been produced on the topic with the aim of diffusing the approach in more professional fields as possible. Scope is “to provide a better alternative to the dominant economic development model” (Ghisellini et al. 2016: p.11). The origin of the concept can be traced back in the 60s of the past century in the famous work entitled “The Economics of the Coming Spaceship Earth”, where Boulding envisioned a possible link between economic growth and sustainability (cf. Boulding 1966): the idea reached immediately great success and it came in use in the business world few years after. The word Circular Economy was firstly mentioned in the 90s, as previously mentioned. However, it seems that businesses - e.g. industries, markets, etc. - have been the main actors of the ‘going-to-be’ CE approach for a long time, giving birth to approaches like industrial ecology or Cradle-to-Cradle (C2C) in the 80s. It was after the report entitled ‘The limits of growth’ drafted by the Club of Rome held in 1972 that the notion of economy and sustainability started to be applied also in other fields becoming part of cities agenda. This headed to the famous Brundtland report in 1987 (Geldron 2013) and escalated in 90s with the environment movements: in this period was pointed out that the traditional open-ended economy was thought without any tendency to recycle, treating the environment as a “waste reservoir” (Su et al. 2013:215). This trend intensified in the 00s when the Japan government published a report by which the worldwide famous 3R initiative - Reduce, Reuse, Recycle - started (Geldron 2013). Few years later, governments started understanding the enormous potential of such attitude and engaged themselves in the effort to create a solid base to incentive such virtuous behaviours: this is the case of China where the EIP approach has been extensively adopted and developed (cf. Su et al. 2013); most famous examples come from America with the Ellen MacArthur Foundation (EMF), to which is ascribable the most comprehensive definition of CE, so far (cf. EMF 2013a; 2013b).

Literature is plenty of definitions for CE concept. Without dating back years - avoiding a tedious and mere compilation of says - the authors of this work repute the description of Romero & Molina (2012) relatively adequate and comprehensive to start the discussion on the topic. In their paper, these authors state that “Circular Economy (CE), also called ‘material close economy’ or ‘lifecycle economy’, is an alternative model to the one-way model of economic activities characterised by linear flows of resources → products → wastes. [On the other hand] CE aims a “sustainable economy”, a closed-loop model of economic activities creating feedback cycles of resources → products → renewable resources, following the 3R principles [...] in the processes of production, logistics and consumption” (Romero & Molina 2012: p.427). Later they argue that such approach aims to sustainable production and consumption with the goal of finding a balance between economic development and environmental protection: this should happen through a series of approaches such as Cleaner Production (CP), industrial ecology, life cycle management/assessment (Romero & Molina 2012), Cradle-to-Cradle (C2C) and others. Some of these approaches and others will be discussed in the following section 1.2.2 of the present Chapter.

Moving forward, one of the first official definitions available is attributed to the Ellen MacArthur Foundation (EMF): created in 2010, the EMF is a think tank whose sole mission is to spread the widest possible use of CE. The EMF views CE as “an industrial system that is restorative or regenerative by intention and design. It replaces the ‘end-of-life’ concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems,

and, within this, business models.” (EMF 2013a: p.7). Principles of CE are few and simple. Firstly, it should aim to the elimination of the concept of waste: “waste does not exist” (EMF 2013a: p.7). Secondly, products in the future should be composed largely by biological ingredients - nutrients – non-toxic and digestible by the environment. Lastly, the cycle should function by means of renewable energies to guarantee resilience and reduce dependency. Moreover, the interface between products and consumer is modified, referring to users: this change entails a “new contract between business and their customers” by which is intended that products are rented, landed and shared, no more subject to the current market’s rules (EMF 2013a: p.7).

The report of Ellen MacArthur Foundation (2013a) drives these principles to the definition of four attitudes aiming to a higher value creation through a system that works under such principles, called ‘powers’. Briefly, those three elements refer to a) reduction of the material cycle - the smaller the cycle, the faster the product comes back to the market and the lesser is changed - b) increment of the number of times that a product can be reused, c) facilitation of a product to be used across different value chains¹, and d) the ability of allowing the different materials of a product as much as possible uncontaminated - the components are easy to reuse and re-insert in the market. This definition is worldwide considered as the ground zero of CE. Its aim does not therefore regard just the waste prevention and promotion of recycling activities, but it goes beyond by inspiring “technological, organisational and social innovation within value chains” (EC 2014: p.IV).

The definition of Circular Economy given by the Ellen MacArthur Foundation and accepted in the academic world is: “restorative and regenerative by design. In a Circular Economy, there are two kinds of material cycles: biological, capable of being reintegrated into the biosphere, and technical, destined to be re-valorized without entering the biosphere” (EMF 2017). Therefore, the Circular Economy is a constantly-evolving economic model of great complexity.

The French Agence de l'environnement et de la maîtrise de l'énergie (ADEME) defines CE as “an exchange and production based economic system that, at all stages of the product or service lifecycle (goods and services), aims to increase the efficiency of resource use and reduce the impact on the environment while developing the wellbeing of individuals” (Geldron 2013: p.4). The Environnement, développement durable et économie circulaire (EDDEC) Institute in Montreal follows the ADEME definition but adds to it the aspiration that CE can be a coherent framework for initiatives and strategies. It also has a strong aim to mobilize actors through new technologies and business models (EDDEC 2014). The European Environment Agency (EEA) confirms the basic idea of ADEME providing a definition at European level: CE fosters a “production and consumption system that generates as little loss as possible” (EEA 2014: p.12). The Institut de Préparation à l'Administration et à la Gestion (IPAG) Business School introduces the social dimension to Circular Economy, defining it as an innovative management style that integrates social, economic and environmental dimensions in their business approach (cf. the work of Fernandez et al. 2014).

Due to its connection with the concept of sustainability (see above), for the transitive property CE embeds the same principles. Those are known to be the following:

- A CE aims to ‘design out’ waste, this concept is completely refused;
- A CE points to substitute components in products with more biological parts and nutrients as possible, to reduce toxicity and can safely return to the biosphere;
- The cycles within CE are fuelled by renewable resources (EMF 2013a).

Therefrom, the concept is linked in most literature to what Ghisellini et al. (2016) calls ‘actions’, which correspond to the so called 3R's Principles: Reduction, Reuse and Recycle. It is also common thought that the principles of 3R and waste management policies “form the basis of developing a material cycles society [...]: driven by global environmental problems and the depletion of natural resources, the major focus of waste management policies changed during the late twentieth and early twenty-first centuries [...]; policies have shifted to pursue the concept of sustainability by introducing and promoting 3R policies” (Sakai et al. 2011: p.87). The works of Sakai et al. (2011) reports the 3R principles as the base of the policies on CE in China, Vietnam, Korea and Japan. Some authors state

¹ The value chain is described as all those steps through which a material undergoes, namely design and production, consumption, and recycling and recovery (EC 2014: p.11).

² “Système économique d'échange et de production qui, à tous les stades du cycle de vie des produits (biens et services), vise à augmenter l'efficacité de l'utilisation des ressources et à diminuer l'impact sur l'environnement”.

that problems faced by CE can be overcome if refers to 3R: especially, this principle “may reduce the stress on the different global resources considerably” (Reh 2013: p.122). Moreover, the City European Network inserted the 3R as part of the definition of CE, contributing informally to guide toward this new economic model in Europe (CEN 2015: p.4). The 3R principle result in imposition of waste management targets³ in the policies which can be considered equivalent between the countries but there are also unique approaches within them (Sakai et al. 2011).

Ghisellini et al. (2016) propose a short description for each R and the effects that they entail. “The Reduction principle has the aim to minimize the input of primary energy, raw materials and waste through the improvement of efficiency in production [...] and consumption processes” (Ghisellini et al. 2016: p.15). Part of this topic are Eco-efficiency and “resource efficiency” approaches, which however denote two slightly different concepts. The Zero Emission Strategy⁴ is considered by the Ghisellini et al. (2016) as the strategic translation of the reduction principle (see the work of Schnitzer & Ulgiati 2007 for a more detailed view on zero emission strategies). The Reuse principle refers to “any operation by which products or components that are not waste are used again for the same purpose for which they were conceived” (European Parliament and the Council 2008: Section 3, Number 13): in terms of products, it implies less use of energy, raw material and cuts several industrial processes, which contributes in avoiding noxious substances emissions (Castellani et al. 2015). The main approach is the Extended Producers’ Responsibility (EPR): proposed in Germany for the first time in the 90s, is considered the ‘modern version’ of the polluter pays principle, “that aims to enhance the circularity of products and materials [...] acting on the producers’ side” (Ghisellini et al. 2016: p.16). The Recycle principle refers to “any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes” (European Parliament and the Council 2008: Section 3, Number 17). It must be underlined that this may be the least sustainable solution compared to the other CE’s principles (Reduction and Reuse) in terms of resource efficiency and profitability (Stahel 2013; 2014). However, the transition towards CE seems more concerned with recycling rather than reuse (cf. Stahel 2014). Reuse could contribute to reduce the environmental impacts as well as to revitalize the competitiveness of local economies and improve the wellbeing of segments of population (Stahel 2013; Castellani et al. 2015). Finally, Ghisellini et al. (2016) assert that “reuse, repair and remanufacturing have a local or regional dimension and are able to avoid or reduce packaging, transport costs and transaction costs through the maintenance of ownership, while recycling has a global dimension” (Ghisellini et al. 2016: p.16). However, the authors are convinced that “recycling activities should be promoted on a more local dimension compared to global, to avoid the loss of key resources in industry sector, while CE and policies should focus on each recycled material” (Ghisellini et al. 2016: p.25).

1.2 Scale and approaches

As it can be derived from the previous Section 1.1, Circular Economy is a rather broad topic which touches different dimensions, aspects and realms such as technology, micro/macro-economics, public/private policy, mindset/culture and the list can be much longer. Processes and projects related to CE can also be very different, with examples of Top Down and Bottom Up approaches (China and EU respectively). This interdisciplinary dimension makes Circular Economy a tricky topic to deal with and of particular interest for the urban planner. Due to these peculiarities, Geng & Doberstein (2008) and Ghisellini et al. (2016) state that CE initiatives occur and impact on different levels or circles: micro, meso and macro.

1.2.1 Circular Economy and its scale

The micro level refers to internal policies taken at business scale regarding the single firms and their actions: being in this level implies that a company carries out different strategies with the aim of achieving circularity of its production system also by seeking cooperation with other companies (Winkler 2011). These refer usually in physical and technical changes within the company itself in order to become a Green Enterprise (Romero & Molina 2012). At micro level the transition towards CE implies the adoption of cleaner production and eco-design, which both

³ “Waste management targets serve as the progress benchmarks of 3R policies, and the targets are determined at the same time as the waste management hierarchy. The targets for reduction of overall wastes have the highest priority, followed by the targets for specific recycled items and targets for specific waste management measures” (Sakai et al. 2011: p.94).

⁴ The term ‘zero emissions’ has different meanings and refers to a group of strategies and technologies. Schnitzer and Ulgiati (2007) speak about mosaic.

referred to the ability of designing a “product, service or system with the aim of minimising the overall impact on the environment” (Sherwin and Evans 2000:112): it is important to notice that those approaches are a corollary of the CE, which might entail some basic differences (cf. Prendeville et al. 2014: p.5). However, it is opinion of Ghisellini et al. (2016) and of the authors of this work as well that those concepts, namely cleaner production and eco-design, can be considered important strategies to pursue at the microscale to move in the direction of the CE. According to Geng & Doberstein (2008) and Bilitewsky (2012) Cleaner Production (CP) is considered to most successful approach, especially in China: he underlines the necessity as well of creating bodies at all levels to promote this kind of approach in order to rise the overall effectiveness, moving beyond levels boundaries (Geng & Doberstein 2008: p.233).

The implementation of CE at meso level is generally referred in the literature to the concept of Industrial Ecology⁵ with the consequent development of the so-called Eco Industrial Parks (EIPs) initiatives, which are a system of industries that start to work together trying to get profit each from the other by optimising the use of resources and re-using waste (Chiu & Yong 2004). Another similar initiative is known as Green Virtual Enterprises (GVEs) but with regard to short-term collaboration to solve a specific issue (Romero & Molina 2012). Among the main goals of an EIP is the realisation of closed loops, the minimisation of waste and overall eco-efficiency improvements “by applying the principles of cleaner production, industrial ecology and Circular Economy” with the final scope of turning waste into reusable resources and again new products (Geng et al. 2008: p.16; Ghisellini et al. 2016). This ‘symbiosis’ refers to inter-firm relationships which involve physical exchanges. Such activities can occur by means of both top down and bottom up strategies “on the base of the fact that the former are the result of a preventive planning and design while the latter derive from spontaneous agreements among the participant companies” (Ghisellini et al. 2016: p.20). In China, in order to carry on EIP projects, national guidelines have been released, which consider also the realisation of residential parts in the park for hosting the workers (Geng & Doberstein 2008).

CE at macro level represents the most interesting sphere for the urban planner and hence focus of this thesis work, as amply argued in Chapter 2, Part I. It implies integration and redesign of 1) Industrial system, 2) Infrastructure system 3) Cultural framework 4) Social system (Ghisellini et al. 2016). For this level, several approaches can be mentioned. Literature agrees on enumerating the eco-city and eco-provinces as the main attempt to reach circularity at city level and beyond. At this level, both production and consumption patterns are tackled, with the so-called regional eco-industrial networks. These are then connected to the so-called ‘scavenger’ and ‘decomposer’ companies on the on the waste management side, and to the “creation of a conservation-oriented society, seeking to reduce both total consumption and waste production” on the consumption one (Geng & Doberstein 2008: p.234). In Japan the eco-towns Governmental program of 1997 has involved urban and industrial centres in symbiosis projects with the aim of reaching zero emissions, which implies the complete reuse of generated waste: as a matter of fact, economic benefits have been achieved and the program resulted in the realisation of 26 eco-towns (Ghisellini et al. 2016). The reasons of such great success is “due to legal, social, economic and technological factors, such as the evolving legislative framework towards the adoption of a recycling oriented society, the shared responsibility of society over the need for environmental protection, the reduction of enterprise’s risks and capital expenditure by means of subsidies, the diversification of enterprise's activities, and the improvement of technological capacity within particular industrial sectors”, as Ghisellini et al. (2016: p.22) report. Eco-cities are to be found also in China (Geng & Doberstein 2008) and in Europe, with Germany, Sweden and UK in first positions (Ghisellini et al. 2016). The second group of initiatives toward circularity at city level has to be found in collaborative approach models, which “are recognized as one of the best available options on consumer side to shift from the present business-as-usual model to CE, based on a shared ownership among multiple consumers” (Ghisellini et al. 2016: p.23). Such models are known with the names such ‘collaborative consumption’ or ‘sharing economy’: those concepts are based on the idea that conventional ownership must be replaced in some parts with sharing, lending, trading and similar actions (Preston 2012). This implies a rather radical alteration in the relationship between producer and consumer favouring alternative ways of consumption of products: this trend is also facilitated by digitalisation, which allows new forms of work - e.g. teleworking - and consumption - websites like eBay and Amazon (Preston 2012). Such scheme requires what Ness (2008) calls an ‘integrated infrastructure system’: in his work he argues that reaching sustainability

⁵ See Frosch (1992) for an exhaustive description of industrial ecology. See also Geng et al. (2008) for an assessment of EIPs in China.

targets involves “viewing infrastructure as ‘a system to facilitate the delivery of services’ to support social and economic development in an integrated, eco- or resource-efficient, cost-effective and socially inclusive manner” (Ness 2008: p.288). As for the other levels, to the macro level corresponds certain principles, namely environmental impact awareness and social cohesion (Ghisellini et al. 2016). Therefore, critical role is given to uses of resources and the production of waste which has given birth to initiatives such as the zero waste programs, present both in Europe (Zerowaste Europe 2014) and China (Song et al. 2015).

1.2.2 Framework approaches

As already mentioned previously, it is possible to find in the literature various approaches that can be related to, insert within or considered as framework of CE. Those are all different theoretical approaches and each of them attributes slightly different meaning to CE by featuring small or great deviances from the main concept and contributes to enrich its comprehension and utilisation. Those approaches are presented below, and they have been organised in three categories: approaches can be found within the concept of CE, in other words those which are useful to pursue circularity; on the other hand, there are approaches which have been derived from CE but deviate slightly from it, named aside CE approaches; finally, in the literature are present framework approaches within CE takes place.

Within CE – Eco-design

There are couple of definitions of eco-design. Some of them are rather weak and create confusion with the ones related to Cleaner Production (see below). According to Prendeville et al. (2014), “ecodesign is a strategic design management approach to reducing environmental impacts across the whole product life cycle” (Prendeville et al. 2014: p.5); or again “ecodesign is the design of a product, service or system with the aim of minimising the overall impact on the environment”, as stated by Scherwin & Evans (2000: p.112), represents still a too general description. A better definition, according to who writes, is presented by Woolman & Veshagh (2006) where they investigate the phenomena of Eco-Design and Cleaner Production in SMEs in UK as two distinctive approaches: eco-design, or environmental conscious design, is intended as the attempt “to maintain all other aspects of performance while reducing the environmental impacts of a product at each stage of its life-cycle” (Woolman & Veshagh 2006: p.282). Following this idea, it might be the case that Eco-design is considered a specification of Cleaner Production in the sense that the focus is posed only and specifically on the product. However, Woolman & Veshagh (2006) are the only ones among the contributions considered and found in this research which divide the two concepts: all other authors tend to name or CP either eco-design.

To strengthen the opinion of the authors of this work, literature has deepened the comprehension of eco-design as a systematic approach, which is characterised by a 4-step model consisting of the four R, namely re-fine, re-pair, redesign, and re-think⁶ proposed in the Charter model (Scherwin & Evans 2000). To conclude, eco-design can be considered an ‘eco product development’ which considered the integration of environmental concerns at all production stages, meaning that the process of designing is just one part of the chain (Scherwin & Evans 2000).

Within CE – Cleaner Production (CP)

As already discussed above, literature reports the approach named Cleaner Production (CP) as one of the approach that can be circumscribable under the umbrella of Circular Economy: “Cleaner Production’ is a concept that aims at preventing the production of waste, while increasing efficiencies in the uses of energy, water, resources, and human capital” (JoCP 2017). It refers to “the continuous application of an integrated, preventative environmental strategy to processes, products and services to increase eco-efficiency and reduce risks to humans and the environment” (Romero & Molina 2012: p.438).

This approach acts on three different levels, namely process, product and service. In the first case, CP pursues the idea of conserving raw materials, water and energy and at the same time aims to eliminate toxic and dangerous matters while reducing the quantity of emissions and wastes as well as their toxicity. On the products side, environmental, health and safety impacts over the product’s entire lifecycle is aimed to be reduced, from extraction to disposal. Environment should be of concerns when it comes to design and delivery of services (Romero & Molina 2012).

⁶ See Scherwin & Evans (2000: p.113) for the description of each phase.

As already cited in the previous section, CP is considered the best approach to deal with CE at the micro scale in China (Geng & Doberstein 2012). At the same level, in Germany waste pollution prevention is the most urgent goal to be achieved to go in the direction of circularity and according to Bilitewsky (2012: p.1) “a change of technology to cleaner production” is imperative.

Within CE – Lifecycle management

A rather new concept is known as Lifecycle Management (LM). It is linked to the idea of managing the entire process of a product from its conception to disposal, but it introduces an instrument that should be used parallel, i.e. Life Cycle Assessment (LCA): this is indicated as a method for assessing impacts on the environment of such processes (Romero & Molina 2012).

Within CE – Industrial ecology

Eco-design, CP and LM can be considered the micro and meso level of the industrial ecology approach. As a matter of fact, industrial ecology aims to create a network of industries in within which the flows of material and energy remain inside without generating waste. “The idea of an industrial ecology is based upon a straightforward analogy with natural ecological systems. In nature an ecological system operates through a web of connections in which organisms live and consume each other and each other's waste” (Frosch 1992: p.800).

From this ecological metaphor derives the idea of waste as resource for the surrounding environment, i.e. for the other industries adhering the network: “we need to think of wastes not only as outputs to be prevented [...] but also as part of the industrial process product stream that is to be designed” (Frosch 1992: p.800). The attempt to shift from linear (open-loop) systems to a closed-loop one: this process entails optimisation of resources usage, minimisation of emissions, dematerialisation of activities and reduction and elimination of dependency on non-renewable sources (Ehrenfeld & Gertler 1997; Romero & Molina 2012). In this sense, the reference to CE is at this point rather clear (Geng et al. 2008; Geng & Doberstein 2008; Romero & Molina 2012).

Brief conclusions: the order in which the approaches have been described follows a particular-to-general logic. Industrial Ecology can be indeed considered an umbrella for the others.

Aside CE – Cradle-to-Cradle (C2C)

The Cradle-to-Cradle (C2C) concept is considered one of the approaches from which CE has been developed - the others are Industrial Ecology, Regenerative Design, Performance Economy and Biomimicry (EMF 2013a). The concept was developed by the German chemist Braungart together with the American architect McDonough: all industrial and commercial processes are to be understood as nutrients, technical and biological. The C2C approach focuses on the design step with the aim of reducing negative impacts: its attempt is to develop a “technical metabolisms flow of industrial materials” (EMF 2013a: p.27). Three principles are followed: ‘Waste equals food’, for which everything is a nutrient for something else; ‘Use current solar income’, guiding to usage of renewable energy, especially the solar one; ‘Celebrate diversity’, which chases the idea of strength, health and healing environment in contrast with the monoculture weakness, deeply dependent on the concept of ecosystem as result of relationship between species (van de Westerlo 2011).

The alternative that C2C offers to the design step is based on the concept of eco-effectiveness which attempts to bring into consideration social, economic and environmental benefit at once: “eco-effectiveness moves beyond zero emission approaches by focusing on the development of products and industrial systems that maintain or enhance the quality and productivity of materials through subsequent life cycles” (Braungart et al. 2006).

Aside CE – Blue Economy

Other approaches take their steps from CE. One of those is the Blue Economy (BE), which sees the its main theorist in the figure of Gunter Pauli (Pauli 2010a). The idea of BE is to find best nature-inspired technologies affecting the economies of the world and at the same time providing basic human needs. Central principle it the idea of cascading nutrients and energy exactly in the way ecosystems do: the author makes the metaphor of the waterfall to describe the cascade effect, effect which does not require power to work but it flows naturally.

Cascading leads to a concept of process which is sustainable in the extent that inputs in the system are reduced or even eliminated as well as for waste: “in ecosystems there is no waste because the by-products of one process are inputs to another process” (Pauli 2010b: p.1).

The technologies above mentioned should have the aim of producing the best and cheapest products in order to stimulate entrepreneurship. This wants to be an alternative to the policies of big corporations, which are “based on greed and domination” (Alexandru & Taşnadi 2014: p.199). The main idea is to change this mentality from doing business for profit to doing business for people. BE model is also oriented towards opportunities⁷ which are seen as the possibility of changing the current situation approaching the problem from a different perspective and searching for its possible solution(s): the model stimulate innovation (Alexandru & Taşnadi 2014). What BE differs from CE in, is its open and direct relation with ecology, borrowing notions, such as Biomimicry, as paradigms to follow: nature is the model to look at and to imitate (Alexandru & Taşnadi 2014).

Aside CE – Zero waste

Not really an approach, zero waste is considered among authors a strategy and a way of living (ed. Mauch 2016; Song et al. 2015). It is a recent phenomenon created in “reaction to an enormous rise in waste that set in about a hundred years ago” (ed. Mauch 2016: p.5). Paul Palmer funded the Zero Waste Institute in the 1970s in Vancaville, California, but his interests were mainly scientific and profit oriented rather than ecological. Today, zero waste is more a slogan or a vision (ed. Mauch 2016), from which CE granted some ideals. Moreover, it represents an easy to understand tool that can be applied to businesses, communities, industrial sectors, schools and homes for pursuing innovation in their field (Song et al. 2015). Zero waste, thanks to its versatility, represents a good tool for tackling at the same time environmental, technological and socio-economic and political aspects: the intertwining of these different fields allows the creation of complex cluster of stakeholders that are in need of working jointly to reach the same goal.

Brief Conclusion: although these approaches are derived from or have contributed to the creation of the CE concept, is opinion of the authors of this work that CE still remain a step above them thanks to its holistic perspective on all the different points of the chain.

Above CE – Sustainable development

After the Brundtland Report in 1987 the sustainable development has become part and parcel of the development agenda worldwide: “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987).

As described by Baccini (1997), it refers to the idea of achieving balance between economic growth, social equality and environmental protection. This concept has been broadened and deepened in the latest years: a city following these ideals is 1) based only on renewable resources; 2) does not reduce biological resources; and 3) does not lead to systems that reduce the freedom of future generations (Baccini 1997: p.28). The basic goal is to stop the aggressive development of cities for environmental protection without renouncing to economic growth. Change the mindset of people and improve their relationship with the nature and within people themselves is also part of the game (Hopwood et al. 2005).

Authors generally agree to consider Sustainable Development as a framework to CE. Tendentially, Europe and China vision follows this principle. Even for the few which advocate the opposite, it is said that the two concepts, despite their differences, share two main ideas: the “over-arching objective of addressing environmental problems [and] trans-disciplinary research” (Sauvé et al. 2016: p.48). According to the EU vision of CE and its conception of sustainable development, it is this second that drives the principles of the first (EC 2015). The same thought is shared in Chinese’s experiences (Geng & Doberstein 2008: p.232; Su et al. 2013: p.215).

Above CE – Urban Metabolism (UM)

Urban Metabolism (UM) is a theory by which a city can be represented through flows of energy and materials making parallelisms with a living organism: as a living element, cities need energy and products to assimilate in order to allow the entire urban system to work; energy and resources are used inside the system to generate products which are then or directly consumed inside the system’s borders or exported. UM provides a framework to describe the city following the organic school of thought and it proposes a way to address sustainability (Dinarès 2014).

⁷ This idea of ‘opportunity for innovation’ fits with the concept of ‘window of opportunity’ advocated by Dente (2014) as a prerequisite for developing an innovative policy.

Dinarès (2014) links UM with sustainability as a tool to understand the inner mechanisms of the city. Other authors conceive the theory of UM even with more enthusiasm, considering it fundamental to developing more sustainable cities (Kennedy et al. 2011). Following their work, UM consists in a methodology which can provide the ‘big picture’ of quantified “inputs, outputs and storage of energy, water, nutrients, materials and wastes for an urban region” (Kennedy et al. 2011: p.1965). With Kennedy, the cities start to be considered ecosystems, i.e. sets of living organisms which “are generally energy selfsufficient, or are subsidized by sustainable inputs, and often approximately conserve mass, through recycling by detritivores” (Kennedy et al. 2011: p.1965). Ultimately, cities can be understood as socio-ecological systems, i.e. what Golubiewski (2012) defines as ‘urban ecosystem’: she argues that UM is not enough to explain how a city works, but it is necessary to add the notion of ecosystem (Golubiewski 2012: p.751). As every ecosystem, cities are characterised by complexity, dynamicity and relationship within its borders and the other ecosystems - above all the environment, according to sustainability aspects. In this respect, UM is used by scholars to analyse “links between urbanisation, economic growth and resource consumption” with particular attention to the impacts on the environment (Dinarès 2014: p.559).

However, the theory is still linked to the description of the current economic model, which is characterised by a linear flow of materials and energy. The concept of CE is strictly related to the notion of flows. Therefore, the idea is to define CE as an approach able to transform UM of cities from a linear to a circular process: hence, UM is intended in this document as a framework within the CE can move (Kalmykova & Rosado 2015). Another topic other than sustainability that links CE to UM is the relationship between ecosystems: due to these linkages, an ecosystem is most likely forced to rely on areas beyond its boundaries, creating incoming and outgoing flows (Dinarès 2014).

Finally, “it can be suggested that the underlying key concept for Circular Economy design relies on the application of strategies that induce changes in the system, towards reducing the needs for materials from outside the technosystem in question” (Kalmykova & Rosado 2015: p.5). For these reasons, when it comes to the policy field, strategies involving CE should not exclude the precepts of UM and it lays the foundation for the work in this thesis (see Chapter 2, Part II, and Part III).

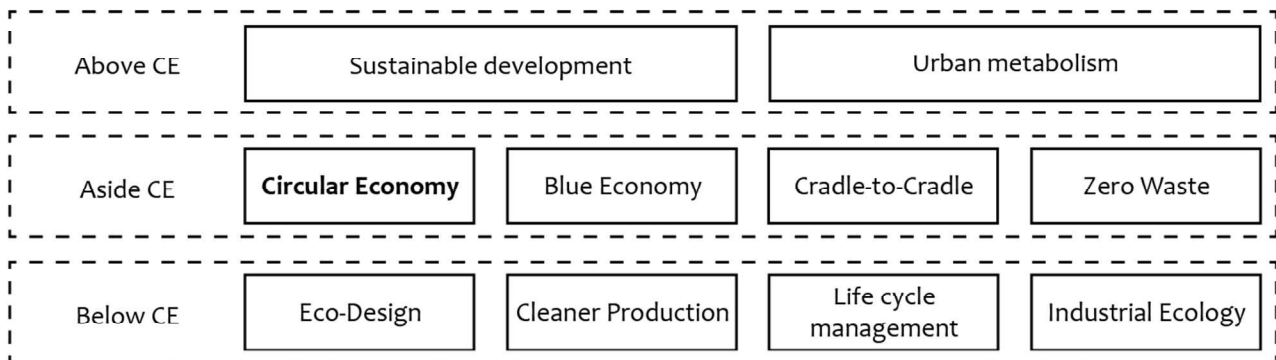


Figure II.1.1 - Various approaches in comparison with Circular Economy concept (Own 2018).

1.3 Circular Economy conceptualisation in the international context

Not only the concept of Circular Economy changes according to the scale, but also to the region of the world in which it is applied. This Section presents the four cases which have become famous with substantial differences between them.

1.3.1 China – State-driven sustainable development

Rather than an incrementally improved environment management policy, CE in China is understood as a “new development model to [...] leapfrog into a more sustainable economic structure” (Su et al. 2013: p.215). Other than waste problems, energy and material conservation, measures for land management and soil protection and integrated water management are also of concern. In China, CE is strictly linked to business and in particular to the Industrial Ecology approach (see Chapter 1.2, Part II) but also is strongly state driven (Geng & Doberstein 2008). To

implement the principles of CE, initiatives at every level (micro, meso and macro) have been systematically carried out: the “Cleaner Production Promotion Law” in 2003 has brought the Cleaner Production approach in the industrial sector; the State Environmental Protection Administration has delivered guidelines for implementing Industrial Ecology principles; Eco-City theory is then followed as overall strategy (Geng & Doberstein 2008; Geng et al. 2012; Su et al. 2013). All those measures have led to the Circular Economy Promotion Law in 2008 based on the challenges that China is going to face, such as lack of resources and insufficient use of recycled materials (Sakai et al. 2011).

According to Chinese researchers, “governments should play a leading role in promoting the concept by reforming existing laws, enacting new regulations, promoting the application of new environmental technologies, and organising public education” (Geng & Doberstein 2008: p.233). As a matter of fact, in this country initiatives linked to CE are financed partly by companies and by the State itself (Geng & Doberstein 2008). This is due to the fact that barriers to CE implementation in China are to be found in the existing regulation, in the technologies currently available and in the lack of participation, all fields where the government can contribute extensively.

1.3.2 Japan – Industrial Park beyond the boundaries

In Japan the waste management system is based on two independent acts, one on waste management and the other on material recycling (Sakai et al. 2011): the Waste Disposal and Public Cleansing Law (2010) and the Law for the Promotion of Effective Utilization of Resources (2001) respectively. Those have set forth a more efficient way of performing incineration activities by using mainly MSW for energy generation and focusing more on material recycling (Geng et al. 2010). Most Japanese cities have now “established well-designed source separation systems [for what concerns] MSW” for fulfilling the law’s expectations (Geng et al. 2010: p.994).

Like in China, Industrial Ecology has been chosen as the main approach at meso-level because of the “benefits from exchange of byproducts between firms and between industries and some municipalities” (Geng et al. 2010: p.994). A difference from the Chinese situation is that such exchanges can occur also beyond the boundaries of the industrial park zone, coming closer to the conception of industrial symbiosis, a term which refers to the usage of alternative raw materials for industrial operation (Geng et al. 2010).

1.3.3 Europe – Rejection of the notion of waste

Part III will discuss extensively the European Union context. To be thorough, what follows is a brief overview. CE policies and actions are mainly identified within waste area as they emerged in response to the increasing problem of waste management (Ren 2007; Geng et al. 2010). The Circular Economy has the aim to help the transition from open to closed cycles of materials and energy and to less wasteful industrial processes (Andersen 2007; EMF 2013a). The Ellen MacArthur Foundation rejects the concept itself of waste. For this to happen, their use at the end of life cycle should be planned in the design phase (EMF 2013a). Another aspect implies that Circular Economy requires producers and consumers to become more active participants in the recycling or reuse of products (Shah 2014).

1.3.4 United States – Recycling targets for CDW and plastic reduction

For what concerns the United States, there is still no formal policy objective at the federal level. However, several actions at State and local levels have been undertaken: this is the case of Madison (Wisconsin) where the ‘Construction Recycling Ordinance’ commits “the new constructions and remodelling above a certain cost to reduce the amount of waste sent to landfill and has a 70% target for recycling concrete and steel” (EC 2014: p.30). Similar is the case of Chicago, Boulder (Colorado) and Jose (California), with different targets concerning CDW. New York City is committed with the reduction of plastic material in food and drink containers sold in restaurants and fast food stores (EC 2014).

1.4 Limits of the concept

1.4.1 Theoretical Critiques

Literature has been produced both to highlight the limits of Circular Economy concept and to provide alternative to this model: these are basically linked to the concept of De-Growth (Latouche 2004; Schneider et al. 2010; Charonis 2012) and Steady State (Daly 2009; Charonis 2012). Those two models pose themselves in direct contrast with the idea of endless economic growth and business-oriented mentality, which is the path that EU is pursuing right now.

De-Growth model is rather broad and for sure more space for describing it is needed. However, this is an attempt to provide basic information to the reader to grasp this model. First of all, Latouche (2004) reports that De-Growth is not a concept but rather a keyword: it advocates for a shift of the current profit-and-growth-oriented mindset to an idea of downscaling, an economic contraction. However, more than a model, the growth wants to be “a way to provoke thought about alternatives” because it calls for the abandon of an “orthodoxy, a religion”, alike the current system is conceived (Latouche 2004: p.1-2). This idea poses itself clearly against the concept of globalisation asking for cities which are entirely self-sufficient and do not have to depend on any external help - which is similar to the CE idea, although growth oriented.

Beside this radical vision, theorists have started to develop a similar concept, known as sustainable De-Growth: it refers to “an equitable downscaling of production and consumption that increases human well-being and enhances ecological conditions at the local and global level, in the short and long term” (Schneider et al. 2010: p.512). The idea is to aim for an end-state where everything is environmentally and socially beneficial through a transition/transformation process (Schneider et al. 2010). It poses itself against the idea of unsustainable De-Growth by which is meant a period of economic recession or depression with repercussion on social conditions: GDP will have to decrease, but this should not affect ecosystem and social equity (Schneider et al. 2010). In this sense, also progress should not be stopped but rather deviate to better instead of more. Moreover, Schneider et al. (2010: p.513) see De-Growth “as a social choice, not imposed”.

Meanwhile Latouche (2006: p.4) sees the current system as “a disease and a drug” and he calls for De-Growth ideals, sustainable De-Growth wants to be a more moderate alternative with multi-dimensional aspects characterised by diversity of interpretations and proposals (Schneider et al. 2010): the first is an anti-religion, the second a non-religion.

For what concerns its relations with CE, sustainable De-Growth proposes similar policies, like waste reduction and more social equity for what concerns income (Charonis 2012). For a deeper discussion on this topic, see Flipo & Schneider (2008) and Garegnani (2015).

Steady State model shows another alternative which is radically different from De-Growth because it does not imply any dynamism in the sense that it advocates for a system which neither grows nor regresses (Kerschner 2008; Daly 2009). It is considered the most “clearly, concretely and extensively developed alternative discourse to economic growth, both in terms of volume of academic literature [...] and in terms of suggested policy proposals” (Charonis 2012: p.9).

Despite this basic difference, principles of Steady State model are similar to those of De-Growth. But Steady State starts from the idea that the ‘growth economy’ has failed in two ways, both in a) positive growth becomes uneconomic and b) negative growth will be soon self-destructive (Daly 2009), refusing the idea of De-Growth as a valid alternative. In his works, Daly points the finger against economic growth considered like a panacea, the answer to all problems of the world (Daly 2007; 2009). Moreover, he advocates for a stabilisation, if not a De-Growth, of the economy of industrialised countries which at the same time should help the developing ones to grow: in doing so, these nations should pursue a “less materialistic development” (Daly 2009: p.11).

Interesting is the research done by Odum & Odum (2001; 2006) in which they describe an alternative model composed by four main stages through which the society should undergo, called ‘pulsing cycle’: namely (1) growth on abundant resources, with population and assets increase, low-efficiency and high-competition; (2) climax and steady-state, when the system reaches the maximum size allowed by the available resources and increases efficiency in order to take maximum advantage from them; (3) descent, with less resources available, population decrease, more recycling patterns and much higher efficiency; (4) low-energy restoration, with no-growth, consumption smaller than accumulation, and storage of resources for a new cycle ahead. In this view, CE may rather be considered the ‘way of life’ of such cycle, i.e. a way to design an economic pattern aimed at increased efficiency of production (and consumption), by means of appropriate use, reuse and exchange of resources, and do more with less.

One could argue that CE conceptualisation as described in the previous sections of this Chapter focuses itself only on the production step, leaving outside the rest of the cycle: this element results indeed critical and contradictory for a concept which calls for closing material stream loops (see the approaches of Industrial Ecology and CP of

Section 1.2.2). Consumption patterns are extremely important for the aim of fostering circularity because they are related to the civil society, i.e. in regard to lifestyles of citizens and provision systems of goods (Williams 2018). Therefrom the critique blames CE for its disregard of the social dimension: they claim that an effective way to foster circularity in cities is to work on the citizens' behaviours when it comes to buy and consume products and services, aiming to the creation of a circular society (Murray et al. 2017).

Due to these aforementioned elements, it can be argued that CE concept results inadequate to deal with complex urban system, as cities are: they are composed by sub-systems (Lenhart et al. 2015) which interact in unstable and unpredictable ways (Roelich et al. 2015). CE does not insist enough on uniting the several loops, which is considered as primary (Smith 2007).

Another critique can be done in relation to the scale to which CE refers, which can be said to be too large: of course, material flows act globally, but some could be localised, thanks to principles that CE calls for, and this action is not pursued enough. As a matter of fact, considering more local loops rises the awareness of their positive and, especially, negative externalities on the territory, increases the pressure to deal with their physical effects and allows a more closer view on the social aspect (Williams 2018). All these elements seem to be of primary importance for CE but not at best tackled by its conceptualisation as well.

1.4.2 Technical Critiques

Moving to more technical aspects, some authors argue the physical impossibility to reach the goal of zero-waste, considering Utopian the dictations of Circular Economy (Bjørn & Strandesen 2011; ed. Mauch 2016; de Man & Friege 2016; Wilts 2016: p.8). In particular, de Man & Friege (2016) have inquired this strategy, by posing two questions:

- Is the message of CE that promises to enable continued economic growth while radically reducing the level of waste production scientifically correct?
- Does the Commission do what it promises?

It is in the belief of European Union CE concept that “optimal design of closed material loops would not only result in a radical reduction of waste, but also in an increased creation of economic value” (de Man & Friege 2016: p.93). Two assumptions are at the base of this statement: I) circular solutions will lead to sustainable outcomes; II) these solutions are available. The two researchers state that both are wrong. The basic idea of CE is that all industrial processes can be designed in a way that the associated material flows are fully consistent with natural cycles. Hence, they should be fully closed or designed in order that each ‘waste’ coming from the process becomes nutrients. In this optic, there is no reason to minimise throughput.

Other than this soft critique - which, in the opinion of who write, does not represent a contradiction - de Man & Friege (2016) identify three fundamental problems: I) production processes lead to downgrading materials and to create economic value from those we need energy; II) natural nutrients produced that can feed the ecosphere are not always good nutrients, it depends on quantity; III) we can have unexpected waste flows from new technology, we don't have knowledge yet. Similar critiques have been arisen also by other authors, in particular in relation to the violation of the laws of thermodynamics (Bjørn & Strandesen 2011; Reijnders 2008).

Furthermore, when it comes to the praxis, some practical problems arise as well: material loops require a rigid coupling of diverse processes of material conversion that embrace different companies and even countries. They argue that such partnerships are now too difficult to establish. These kinds of actions require also a project over time. They also state that “Experience shows that products designed on the basis of Circular Economy principles are not necessarily leading to minimum environmental impact” (de Man & Friege 2016: p.94).

To stem these problems, multiple strategies are needed for creating sustainable production systems: “efficiency strategy (doing more with less), consistency strategies (feeding back materials, in a way that is optimally consistent with natural substance flows), and sufficiency strategies (reducing the need for products and services)” (de Man & Friege 2016: p.94). They argue that is necessary to concentrate the efforts on increasing energy and material efficiency with the aim of decoupling growth in waste generation, energy use, and pollution from growth in economic activities. It is impossible to focus just on solar incomes - as C2C advocates.

Judgment on EU operations is also heavy: they argue the general inability of the EU to control and fine the operations of the member states, stating that the existing regulations are too mild. Policies should focus on

instruments that can influence the market with the aim of reduce consumption of scarce materials and to increase the level of material and energy recovery (de Man & Friege 2016).

There are some authors who argue the relative importance of CE, meaning that more fundamental challenges are more imperative at the current stake: problems linked to the impossibility of a continuous growth are considered much serious (Predenville et al. 2014). This idea leads also to what is known as Jevons Paradox, by which is intended that resource efficiency leads to more production and therefore an increase in consumption: “resource efficient products have been shown to lead to increases in consumption [...] and therefore greater cumulative environmental impacts” (Predenville et al. 2014: p.11). To this situation a possible solution is the De-Growth model, as discussed previously.

Finally, in the interesting work of Wilts et al. (2016), in which they investigate different cases in Europe, pose important questions to be present in mind when it comes to policy designing: “where does it make sense to prevent waste? In which regions and countries are technical waste management infrastructures of such a high quality that recycling might be an even better solution from a resource efficiency perspective?” (Wilts et al. 2016: p.14). They state that such attitude is imperative to formulate successful policy instruments and calls for an integrated and consistent policy mix.

Moreover, it has been argued that CE conceptualisation as it is now cannot be applied to the complexity of urban environment. As a matter of fact, one can argue that CE ignores completely the concept of land use. In cities, land is a high valuable resource to which several functions are attributed: in ecological terms, it is extremely important for resource management and restoration of urban ecosystem (Williams 2005). Several studies confirm that cities need land for the production of their own energy, especially for the transportation and construction sector (see for instance Folke et al. 1997).

Infrastructure dimension is also not considered, even though it is of common agreement that it consists the primary mediator of urban resources flows (Hodson et al. 2012). Tackling infrastructure system can help to solve problems related to urban waste stream (Jonsson 2000) in the extent that an integrated infrastructural system can help minimize the usage of resources and, therefore, the waste generation: moreover, waste can be used for creating energy, reducing consumption of conventional finite energy sources.

Generally, the alternative models discussed briefly in the first Part of this section differ from CE concept for what concern the background environment within they are developed, i.e. a growing economy. On the other side, the critiques to CE presented above attack the concepts on small and secondary problematics, which concern not CE itself but rather the current production system. Despite the fact that these arguments could be right, Circular Economy, especially in the European Union perspective, is considered a holistic concept closer to an ideology than a scientific method that could not be adopted one-to-one.

2. Policy decision-making and implementation in the “sustainability era”

This chapter contains an overview of the policy processes and their constituent elements with a particular focus on decision-making and implementation stages, considered as a relevant framework with regard to the identification of the relevant policy actors and on building and maintaining the network capable of implementing and sustaining the claimed circularity for the chosen material stream. Therefore, in this second Chapter the focus lies in understanding how public policy decisions are taken, based on the analysis of decision-making processes, i.e. the elements that characterize them (actors, stake, patterns of interaction, decisional context, etc.) and the relation among these elements in defining the outcomes of such processes. Further, the implementation stage aims on providing an overview of these processes with regard to the actors involved, their activities and the range of instruments available for reaching the policy goals. Hence, the overall objective here is to understand public policy processes and those variables which can influence the results, in order to increase the possibility for a policy decision to be reached and secondly to implement it for a Circular Economy programme in a given local context.

2.1 Public policy – Part of the solution

In this Section the objective is to explain why to address the so-called ‘collective problems’ by means of public policy and how public policy contributes towards the solution of the problem. Moreover, an introduction of some of the main concepts concerning the public policy is offered, through the definition of the public policy, the policy cycle and other relevant constituent features of it, brought in this Section as necessary background in outlining the importance of public policy as part of the solution of a collective problem.

2.1.1 Public policy defined

Numerous definitions consider public policy as both a technical and political process of articulating and matching actors’ goals and means (Howett et al. 2009; Howlett & Cashore 2014). Probably the most known and at the same time simplistic definition, has been offered by Thomas Dye (1972: p.2; cited in Howlett & Cashore 2014) as “anything a government chooses to do or not to do”. The definition provided by Dye highlights the government as the main actor concerning policy-making rather than other social actors. Even though these last actors can be relevant with regard to policy processes, e.g. by influencing the decisions, Howlett & Cashore (2014) argue on this definition that governments enjoy a special status in public policy-making due to “their unique ability to make authoritative decisions in behalf of citizens”. Another aspect on Dye’s definition pointed by the same authors involves the faculty of choice left to the government to do something or to do nothing with respect to a problem and that this decision is made by government officials or by their elected bodies. As a result, also a ‘non-decision’ is considered as much as a policy decision if a result of an intentional choice, and not of an inability to decide. Additionally, Dye’s view also highlights the fact that a public policy is a conscious choice of a government and that very often involves also unintended consequences, which are not public policy but just its unexpected by-products, which can be sometimes beneficial and sometimes not (Howlett & Cashore 2014).

Other authors have contributed to the definition of the concept of public policy focusing on different aspects. William Jenkins (1978: p.15; cited in Howlett & Cashore 2014) definition of public policy focuses on how decisions are reached and/or implemented. Here the public policy is defined as “a set of interrelated decisions taken by a political actor or group of actors concerning the selection of goals and the means of achieving them within a specified situation where those decisions should, in principle, be within the power of those actors to achieve”. This definition adds to the first one the dynamic dimension: public policy is a dynamic process, and further recognizes that public policy is usually the result of “a set of interrelated decisions: public policies involve a series of decisions contributing to an outcome. These decisions are often made by different individuals and agencies within the government” (Howlett et al. 2009: p.6). Another relevant aspect derived by Jenkins definition and highlighted by Howlett et al. (2009) involves the idea that a government’s capacity on implementing its decisions is an important element of public policy, and that its limitations can contribute to the success or lack of success of policy-making efforts.

Another standard definition is brought by Dunn (1981) who defines public policy as a set of actions connected to the solution of a policy problem, i.e. of an unrealised value, need or opportunity which, once identified, may be obtained through public action. But public policy, as Dente (1995) states, should not be restricted only to the conscious attempts by governmental institutions to tackle specific issues. Other configurations such as market mechanisms or simple mutual adaptation by the relevant actors can, under given conditions, work equally well towards solving the problem. Therefore, based on the level of complexity of the policy field, other solutions exist which can prove equal or even higher effectiveness.

Therefore, towards implementing the Circular Economy at the local level, the role of the public authorities is an aspect to be clarified and verified as part of the objectives of this work.

2.1.2 Policy cycle framework

For analytical purposes the complex process of public policy-making has been simplified and thought as a process involving a set of interrelated stages where policy issues and deliberations flow in a sequential order starting from problems (inputs) to policies (outputs) (Howlett et al. 2009). This is known in the public policy analysis as the policy cycle framework and is brought in this work with the objective to describe in an abstract way, as also the framework itself claims, the stages of public policy-making processes. In studying the public policy, the policy cycle framework has generally served as a basic template able to systematize and compare debates, approaches, and models and to assess the individual contribution of the respective approaches to the discipline (Jann & Wegrich 2007).

The idea of modelling the policy process into stages was first put forward by Harold Laswell (1956) where he identified seven stages, which described not only how public policies were actually made but also how they should be made: 1) intelligence, 2) promotion, 3) prescription, 4) invocation, 5) application, 6) termination, 7) appraisal. Laswell's formulation formed the basis for many other models of several authors (Lyden et al. 1968; Simmons et al. 1974; cited in Howlett et al. 2009). A simpler version of the policy cycle was developed by Gary Brewer (1974; cited in Howlett et al. 2009), comprising only six stages: 1) invention/initiation, 2) estimation, 3) selection, 4) implementation, 5) evaluation, and 6) termination. Brewer's version of the policy process brought forward the policy cycle version of Laswell by exploring how problems are recognized, by clarifying the terminology of the stages, and on introducing the notion of policy process as an ongoing cycle (Howlett et al. 2009). Furthermore, his version recognized that most policies do not have a fixed life cycle, which goes from birth to death, but rather seem to recur, in slightly different guises, as one policy succeeds another with minor or major modification (Brewer & DeLeon 1983; cited in Howlett et al. 2009).

Today, the conventional policy cycle providing a descriptive chronology of a policy process differentiates between agenda-setting, policy formulation, decision making, implementation, and evaluation (eventually leading to termination) (Jann & Wegrich 2007). In this model, "*agenda-setting* refers to the process by which problems come to the attention of governments; *policy formulation* refers to how policy options are formulated within the government; *decision-making* is the process by which governments adopt a particular course of action or non-action; *policy implementation* relates to how governments put policies into effect; and *policy evaluation* refers to the process by which the results of policy are monitored by both state and societal actors, the outcome of which may be reconceptualization of policy problems and solutions" (Howlett et al. 2009: p.12). According to the behavioural theory of decision-making (i.e. empirical studies of decision-making and planning in organizations) the real-world decision-making usually does not follow this sequence of chronological stages, but the stages perspective counts at least as an ideal-type of rational planning and decision-making (Jann & Wegrich 2007) useful for analytical purposes.

Another relevant aspect that the policy cycle model helps to clarify, beyond the separation of tasks conducted in the process of public policy-making, lays on the roles played in the process by policy actors, institutions and ideas (Howlett et al. 2009). Beyond the roles, interactions between actors represent another relevant aspect. Different individuals, interest groups, bureaus, offices, departments, and ministries are involved in policy cycles through cooperation, competition and conflict (Dunn 1981). With regard to this view on the actors, Howlett et al. (2009) has described the different stages of the policy cycle as related to the policy subsystems (i.e. actors and institutions) involved.

In this view, *agenda-setting* is the stage where any policy actor can be involved in framing the problems and demanding government action. These policy actors, as Howlett et al. (2009) claims, can be defined as the *policy universe* (i.e. all possible international, state, and social actors and institutions that directly or indirectly affect a policy area). At the following stage, *policy formulation* involves only a subset of the policy universe, known as the *policy subsystem*, in discussing options to deal with problems recognized as requiring some government action. The actors here are only those with sufficient knowledge of a problem area and which can participate in the process of developing alternatives of action for tackling the issues raised at the agenda-setting stage. In the next stage, *decision-making* or the moment where one or more, or none of the alternatives is chosen, the number of actors is reduced even further to a subset of the policy subsystem composed of only *authoritative government decision-makers*, consisting of elected officials, judges, or bureaucrats. In the *policy implementation* stage, the number of actors increases to the relevant *policy subsystem*. Finally, in the *policy evaluation* stage, with the evaluation of the results of the implementation, the domain of the actors involved increases once again to encompass the entire *policy universe* (Howlett et al. 2009) (see Table II.2.1).

Stages of the Policy Cycle	Key Actors Involved
1. Agenda-Setting	1. Policy Universe
2. Policy Formulation	2. Policy Subsystem

3. Decision-Making	3. Government Decision-Makers
4. Policy Implementation	4. Policy Subsystem
5. Policy Evaluation	5. Policy Universe

Table II.2.1 - The Policy Cycle - Actor Hourglass (reproduced from source: Howlett et al. 2009: p.13).

Howlett et al. (2009) show both advantages and disadvantages of the model of policy cycle as a framework for analysis of public processes. Some of the main advantages brought here include that this model facilitates an understanding of a multi-dimensional process by disaggregating the complexity of the process into any number of stages and substages. Further, this approach can be used at all socio-legal or spatial levels of policy-making, from that of local governments to those operating in the international sphere (Fowler & Siegel 2002; Bogason 2000; and Billings & Hermann 1998; cited in Howlett et al. 2009). The last advantage is that this model permits the examination of the intertwined role of all actors, ideas, and institutions involved in policy creation. On the other side, disadvantages include that the cycle can be misinterpreted as suggesting that policy-makers go about solving public problems in a very systematic and more or less linear fashion (Jenkins-Smith & Sabatier 1993; Howard 2005; cited in Howlett et al. 2009) when in practice the stages are often compressed or skipped, or are followed in an order unlike to the one specified by the model (Timmermans & Bleiklie, 1999; cited in Howlett et al. 2009). Moreover, the cycle should not be considered as only one iterative loop but rather as a series of smaller loops, in which, for example, results of past implementation decisions may have a major impact on future policy formulation, regardless of the specifics of the agenda-setting process in the case concerned. It can also happen that policy formulation can sometimes precede agenda-setting as ‘solutions seek problems’ to which they can be applied (Kingdon, 1984; Salamon & Lund, 1989; cited in Howlett et al. 2009). In short, Howlett et al. (2009) conclude that often there is no linear progression of policy-making as implied by the model. Additionally, new policies develop and are adopted in a crowded policy context that leaves little space for policy innovation (Hogwood & Peters 1983; cited in Jann & Wegrich 2007) and they modify, change or supplement older policies, and in other cases compete with them or contradict each other (Jann & Wegrich 2007).

2.1.3 Contemporary public policy and their typical elements

Starting from public policy origins, some main features of the contemporary public policies are considered as relevant and brought here from Dente (2014) with the aim of better understanding the nature of these processes and the related results. Historically, the nature of policy problems has changed, and they have determined also the ways in which they are addressed, in other words the structure and the processes of the state and the public administrations. Over the last 250 years it has been possible to witness the development of public policies, which allow for a distinction between three main ages and the main characters of public policies: the liberal state, the welfare state and the contemporary state (Dente 2014).

The first model is represented by the liberal state, where the starting point is considered the American and French revolutions during the second half of the XVI century. This age represents also the birth of some of the basic features of the modern public administrations, some still present also nowadays (Dente 2014). The main challenges of the liberal State were to ensure public order, securing the maximum possible freedom to the citizens. During this period, the overarching value considered is represented by the rule of law, definition that can be summarized as follows: “public authorities can only do what is prescribed, should do everything that is prescribed, and they must act only in the way prescribed by the laws approved by the bodies that have legislative power” (Dente 2014: pp.8-9). Additionally, the instruments used by the liberal state are essentially of regulative nature (Dente 2014).

Things had deeply changed with the welfare state, where the enlargement of the tasks of public authorities was one of the main changes. Here the main focus of public policies was to find solutions to the so-called market failures in the provision of public goods, where special focus was paid to guarantee economic and social development, and the reduction of citizens’ uncertainties through health and social security systems. The overarching value here is represented by the policy effectiveness in delivering public goods and services. Moreover, the instruments at the basis of the public action during this period were mostly directed towards the provision of public services. The public programmes became ‘goal programmes’, where the objectives to be reached were clearly established (Dente 2014).

In the end of the XX century the welfare state model entered a crisis leaving space to another model, the contemporary state, which has probably not come to an end yet. This was related mainly due to the modification of collective problems and as a result of the tasks assigned to public administrations (Dente 2014). Some of the problems that the public administration face in the contemporary state include the weakening of the tools which governments could use previously to manage the economy and the society, this due to the globalization phenomena (i.e. the enlargement of the markets and the migration flows). Another problem is represented by the sustainable development imperative, in other words the growing interdependencies between industrial development and environmental transformations, which poses very difficult and urgent challenges for governments (Dente 2014). Further, Dente (2014) points out three fundamental features of contemporary processes: 1) decisional complexity; 2) uncertainty; and 3) conflicts.

The first feature, the decisional complexity, is explained as the result of the growth of decisional networks through the involvement of new types of actors, such as new independent administrative authorities, Non-Governmental Organisations (NGOs), Civil Society Organisations (CSOs) and so on which are added to the previous types of actors. Another reason for the decisional complexity is explained by the multi-level governance as the result of the sum of the two trends towards globalization and territorial decentralization in the vertical axis (different geographical axis). This last results in decisions made by different subjects operating at different scales, such as global, continental (e.g. European Union), national states, regional authorities, local communities, etc. (Dente 2014).

The second feature of public policies in the contemporary age is the increase of uncertainty, which concerns the fact that governments often do not have the certainty that their decision will solve the collective problem or will make it worse. There are many factors which determine this growing uncertainty in the contemporary state, such as the increasing of the decisional complexity, the acceleration of globalization processes consisting of unpredictable social and economic trends, and the development of knowledge in identifying problems but we still lack capacity to tackle them (Dente 2014).

The third and the last feature that Dente recognizes in the contemporary public policies is an increase in conflicts among social groups, among political actors and between citizens and public authorities. This is considered to be a cyclical phenomenon (i.e. periods of shared choices are followed by conflicts ones), which can be assumed as a structural phenomenon as it concerns the relationship between citizens and public authorities. Another evidence is the increasing role of the courts, quite novel in the sector of public policies, called to solve conflicts between different actors (e.g. social groups and public bodies) (Dente 2014).

These typical features (complexity, uncertainty and conflict) of the contemporary policy-making processes are seen in a large range of issues and levels, from the approval of a European directive, a national law, until the construction of a parking area in an urban area (Dente 2014).

2.1.4 Governance as collaboration

Another topic with which political sciences occupies itself is governance, which represents another aspect of the complexity features of the contemporary era policy-making. Yet, this term is a broad and often confusing one because in the literature it is used in many different ways (Bressers & Kuks 2003). As a matter of fact, "there are almost as many [definitions] of governance as there are researchers in the field" (Bjork & Johansson 2000: p.1).

One good definition available in the literature explains that governance "in the encompassing sense [...] implies every mode of political steering involving public and private actors, including traditional modes of government and different types of steering from hierarchical imposition to sheer information measures" (Héritier 2002: p.1). This definition is important in the extent that both public and private actors are considered to be part of the governance environment.

Usually, "the term governance is associated with a change in the nature of the state" (Treib et al. 2007:3): this means that governance indicates a process of governing which deviates from the traditional model where decisions are taken by elected representatives. Governance regards a change in the "actor constellation, both during the implementation of policies and in the method of political steering" (Treib et al. 2007: p.3), indicating a process of coordination within networks (Kooiman 2003; Jordan & Schout 2006). Governance can be understood in three different ways according to the field of study: politics, polity and policy.

- 1) If the focus is put on the actor constellation and the power relation between them, governance relates to politics dimension. In this field, governance describes those processes of policy formulation in which public and private actors work together (Rhodes 1997).
- 2) It is Mayntz (2004) that defines governance with an institutional perspective. He explains that governance typologies in the field of polity can be located along a spectrum which sees at its opposing the deals of market and hierarchy. Between these two, other modes can be identified, but empirically, modes of governance are the results of a mixture between two or more typologies.
- 3) The work of Hérítier defines governance as “mode of political steering” (Hérítier 2002: p.1). In this sense, governance refers to policy dimension in the extent in which it produces steering instruments with the aim of define particular goals to achieve (Windhoff-Hérítier 1987: p.27). The state can then apply different types of instruments characterised by more or less binding goals to achieve certain outcomes (Treib et al. 2007).

According the literature review of Bressers & Kuks (2003), the elements of governance are the following:

- 1) Levels, because of the multilevel character of policy implementation
- 2) Actors and their networks, based on the multi actor character
- 3) Perception of the problem and objectives, due to the multifaceted character of those.
- 4) Strategies and instruments, because of the multi-instrumental character.
- 5) Resources and organisation of implementation, due to the complex multiresource basis.

These five elements are used to describe the “governance pattern of a certain policy field in a specific place and time” (Bressers & Kuks 2003: p.71).

As previously mentioned (sub-section 2.1.3) the challenges (i.e. complexity, uncertainty, conflicts and fragmentation) characterize the contemporary public policy as well as governance (Innes & Booher 2010; Dente 2014), and thus these have often led to failures to deliver the expected outcomes. In addition, as also Baines & O'Brien (2012) argue, traditional command-and-control and prescriptive approaches of governance are failing to generate solutions to ‘wicked’ intractable problems faced nowadays. As a result, in the recent years, scholars and practitioners have been searching for new ways of dealing with these issues, by turning their attention to policy-making processes that build more on collaboration, negotiation and deliberation among several actors (e.g. experts, government officials and the wider community). These actors of different nature “engage in face-to-face dialogue, bringing their various perspectives to the table to deliberate on the problems they face together” (Innes & Booher 2010: p.6) and “through an informed consensus-building process then jointly seek to develop public and private solutions to improve their situation” (Baines & O'Brien 2012: p.5). To stress this argument, Ansell & Gash (2008: p.1) point in their meta-analytical study of the existing literature on collaborative governance, that a new form of governance has emerged over the past few decades which “brings public and private stakeholders together in collective forums with public agencies to engage in consensus oriented decision-making”.

As for the governance concept, also for this approach or pattern of governance a large range of definitions is offered by the literature. Even though considered as a restrictive or limited definition - as Nabatchi et al. (2011) argue - Ansell & Gash (2008: p.2) provide one of the most widespread definitions in the literature of the concept of the collaborative governance as “a governing arrangement where one or more public agencies directly engage non-state stakeholders in a collective decision-making process that is formal, consensus oriented, and deliberative and that aims to make or implement public policy or manage public programs or assets”. In other words, the authors stress the fact that this approach consists on a formally organised forum which meets regularly, is initiated by public agency, includes non-state stakeholders who are not simply consulted but directly involved in decision-making, works towards achieving decisions through consensus (even if consensus is not always fully achieved in practice) and involves the governance of public affairs.

To the contrary, Nabatchi et al. (2011) offer a much more general definition which according the authors does not limit collaborative governance to only formal state-initiated arrangements and to the involvement of one type of relation “government - non-governmental stakeholders”. Nabatchi et al. (2011: p.3) define collaborative governance as “the processes and structures of public policy decision making and management that engage people constructively across the boundaries of public agencies, levels of government, and/or the public, private and civic spheres in order to carry out a public purpose that could not otherwise be accomplished”. The authors claim that

this definition allows for an enlargement in the applicability of the concept as with regard to the previous definition by Ansell & Gash (2008), thus stressing once again the differences among scholars in defining the same concept.

Further, Ansell & Gash (2008) argue the emergence of this new governance model as an alternative to adversarial and managerial modes of policy making and implementation. The first pattern (i.e. adversarial) refers more to a “winner-take-all” form of interest by the stakeholders. It may involve also collaborative alliances, but which are ad hoc and where there is no explicit intention to transform conflict into cooperation. On the other side, managerial modes of governance involve a more central role of the public agencies in taking decisions unilaterally or through closed decision processes (typically by involving experts to make decisions) (Futrell 2003; Williams & Matheny 1995; cited in Ansell & Gash 2008). Finally, another relevant factor contributing to this trend of governance, as the authors argue, involves an increasingly specialization and distribution of knowledge and a growth of complexity and interdependence within the institutional structures.

2.1.5 Part of the solution

To conclude this first Section, the attempt here is to provide evidences to support the affirmation that public policy represents part of the solution when one decides to tackle a collective problem by taking advantages of the elements derived from the theory presented in the previous sections. Due to the complexity of the CE as practical intervention, a public policy is needed to:

- crystallizing a definition of the problem, useful to reduce complexity and develop CE solutions;
- reducing uncertainty, connecting different actors and the needed resources (know-how, etc);
- reducing conflicts, through cooperation interactions, *ad hoc* instruments, etc.

First, the essence of a collective problem must be understood. Problem structuring is indeed an important phase of the policy process: once understood, the type of policy and instruments that can be used to solve it can be determined; in other words, the identification and the problem and its definition “affects the success of all other phases of” the policy processes (Dunn 2016: p.67; Howlett et al. 2009). Moreover, Dente argues that the outlines of a collective problem “are inevitably subject to an interpretative activity by the analyst” even if he/she must consider how other actors part of the network define the same problem (Dente 2014: p.7).

Of course, defining if the problem to tackle is a collective one is not an easy task, although sometimes taken for granted: “some demands for government resolution [...] come from international and domestic actors [...] whereas others are initiated by governments themselves” (Howlett et al. 2009: p.92). Moreover, the entire process of problem recognition is linked to the ways in which a problem comes to the attention of the government (Howlett et al. 2009).

Nevertheless, such problems share some common characteristics, namely interdependency, subjectivity, artificiality, and instability (Dunn 2016). Interdependency refers to the fact that collective problems exists rarely *per se*, but they are frequently interconnected with other problems; therefore, sometimes is better “to solve ten [interrelated] problems simultaneously than to solve one by itself” (Brown 1971: pp.18-19) demanding for a holistic approach. With subjectivity is intended the process by which objective data can be interpreted in different ways, i.e. the analyst defines the problem through a process of abstraction, attributing to the collective problem the aspect of a subjective construct. This points to the artificiality of the collective problem, because they do not exist *per se* until they are individuated by human judgment. Finally, there may be different solutions to the same problem according to how many interpretations of the same problem have been drawn, origin of the instability character of the problem: “problems and solutions are in constant flux [...]. Solutions to problems become obsolete even if the problems to which they are addressed do not” (Ackoff 1974: p.21).

Furthermore, “problems are not discrete mechanical entities, but they are purposeful systems in which no two members are identical in all or even any of their properties or behaviours”: this means that collective problems “cannot be decomposed into independent subsets without running the risk of producing the right solution to the wrong problem”; in other words, the whole is greater than the mere sum of its parts (Dunn 2016: p.70).

Starting from these contributions, it is possible at this point to draw arguments for the matter of public policy as solution to a collective problem. Given its characteristics, it appears clear that an instrument able to tackle complex, uncertain and conflictual situations is needed, which is the case of public policies (Dente 2014). Moreover, the matter

of instability calls for a dynamic dimension, feature of this kind of policies, as claimed by Jenkins (1978). Always Jenkins poses the government as the main actor in possession of the capacity of implementing decision, sustained by Dunn (1981) and Howlett et al. (2009): governments are responsible to administrate the *res publica*, the collective, which makes the perfect agent to deal with collective problems⁸. Finally, Dunn (1981) - and Dente (2014) supports his contribution – states clearly that a public policy is connected to the solution of a collective problem⁹ (Dente 2014: p.7).

2.2 Public policy analysis – Decision-making and implementation processes

Studying the decision-making and implementation processes in the context of public policy is brought here as a relevant analysis, useful for identifying the main elements composing these processes, among others also the actors, their constellations, resources, behaviours and the means (i.e. instruments and tools) they bring in towards the attempt to solve policy problems. This analysis will help the objective of understanding these elements needed to develop a CE policy at the local level. The importance of studying the decision-making is explained here through the introduction of a conceptual framework developed by Dente (2014) in the policy analysis context. Further, understanding implementation processes is considered as relevant with regard to the actors involved and the policy implementation means availability and their selection. This last point is proposed by the literature review on the topic by Howlett et al. (2009).

2.2.1 Policy decision-making

Before introducing the conceptual framework helpful in studying the policy decisions, it is relevant to understand what a policy decision involves. Dente (2014) in his book “Understanding Policy Decisions” considers the policy decision as the most visible and interesting part of the governing activity for citizens. The author further defines a policy decision as the process of choice between alternative ways to solve a collective problem (Dente 2014).

The conceptual framework suggested by Dente (2014) aims to be used both as a tool in understanding how public policy decisions are taken and for designing strategies able to overcome obstacles that make policy change difficult. But here in this Chapter 2, the focus is only in the first objective of the framework (i.e. understanding how public policy decisions are taken). In understanding policy decisions, the conceptual model proposed from the author does not say anything regarding the content of the policy itself, instead it aims to clarify the decisional dynamics in the public policy realm. The author calls for a more realistic decisional model in understanding policy processes than the previous ones (i.e. rational, bounded rationality, incremental and “Garbage Can” models). In this context, his model, starting and adopting the incremental model as the most realistic one, advocates and brings in several features of the previous models, such as from the bounded rationality model it adopts the view on the ‘purposive’ actors (i.e. actors follow their own goals) and the time dimension from the ‘Garbage Can’ model (i.e. the passing of time is not irrelevant, since it can make the connection between problem and solution either possible or impossible). The model that Dente proposes can be summarized as, and claims overall that “the outcomes of a public policy decisional process depend on the interaction of different types of actors with different goals and roles who, within a network that can have different characteristics, exchange resources using different patterns of interaction, to obtain a stake, within a given decisional context” (Dente 2014: p.25). These elements (i.e. actors, network, resources, patterns of interaction, stake and the decisional context), further explained, are identified from the author as to understand what specific combinations of these variables make non-incremental policy decisions possible, from the innovator’s point of view, considering that in administrative and political systems actors have important cognitive limits and generally need to reach an agreement (Dente 2014). Additionally, the author states that in an explanatory view, the model or the analysis of the decisional processes itself is needed to identify those elements that explain how a non-incremental policy decision is reached. In the context of understanding policy decision-making processes, these elements identified also by Dente (2014) are briefly described in the following paragraphs.

Actors, goal(s), resources, types, roles and decisional networks

This paragraph states which are the actors involved in decision-making policy processes and by the presentation of the goals actors can pursue. Further the types of resources mobilised in the interaction are described which leads

⁸ As Dente (2014) claims, governments are not the only actors with such capabilities, but in this case, this does not constitute an argument against what has been discussed.

⁹ In the works of Dunn, the collective problem is named policy problem (Dunn 1981; 2016).

to a classification of the actors into five groups. Afterwards, the roles that the actors can play within decision-making processes are described followed by the introduction of the decisional networks and their properties.

Actors

Who are the actors involved in public policy making processes? Within this framework, actors are identified as whatever individual or organisation that acts in a purposive way. Therefore, the actors are only those who act in a purposive way and those who are absent cannot be considered actors (Dente 2014). Beyond the individual actor, other arrangements such as a collective body can be considered an actor in the process. For a collective body to be considered an actor, three fundamental conditions should be fulfilled:

- 1) there must be a form of self-interest at the level of the major unit, meaning the conditions for its survival, autonomy and development must be clear;
- 2) those who act on behalf of the collective actor must be aware of and respect any formal or informal rules;
- 3) there must be a minimum collective identity shared by the members and this will make it easier to define the preferences of collective actors in a decisional process. (Scharpf 1997:60–66; cited in Dente 2014: p.31)

Goal(s)

Another relevant aspect concerning the actors is the goal(s), which as mentioned also above are generally purposive in the sense that actors take actions with the aim of reaching an objective related to their interests, which can be to earn money, improve their reputation, or to implement values that contribute to the definition of their identity (Dente 2014). Hence, the goal(s) of an actor can be content related or process related. The actors involved in the decisions have preferences and goals as regards the problem itself and/or the solution to adopt. These are known as content-related goals. The other type of goal(s) of the actors is the so-called process-related goals, which concern not the problem neither the solution, but they are essentially linked to the actors' relations with the other actors (Dente 2014).

Resources

The interaction between the actors is known as the political exchange, defined as “the ability of actor A, who can control outcome X, which is of interest to actor B, to influence the latter, who can in turn control outcome Y, which is of interest to actor A” (Coleman 1964: Chap. 6; cited in Dente 2014). This interaction involves the resources which is whatever good that the recipient values. These actors' resources are substitutable, meaning that not having a certain good in a sufficient quantity can be solved by replacing it with something else. The author highlights four types of resources that are easy to distinguish and are the most common in public policy processes: 1) political resources, 2) economic resources, 3) legal resources and 4) cognitive resources.

1. Political resources:

are the ability an actor has to mobilize consensus. The consensus can be related to the general population or specific social groups involved in public policies. The consensus can derive from an infinity of factors, such as charisma or personal reputation, ideological belief, cognitive capacity, etc. Another relevant aspect with regard to the consensus nowadays is the control of the media (Dente 2014).

2. Economic resources:

are the ability to mobilize money or any form of wealth in order to modify other actors' behaviour. The influence towards the other actors' behaviour can be of two forms: direct and indirect. Direct influence concerns the transfer of money to influence the behaviour of other actors whose consensus is useful in reaching the desired decision. On the other side, indirect influence involves investing more money in a better project proposal (Dente 2014).

3. Legal resources:

are the “advantages” that the law grants to some actors. Here it is important to underline the fact the law does not “describe” what happens in the real world, nor defines completely the boundaries of the system. Instead the law is a resource to be exchanged and substituted by other resources (Dente 2014).

4. Cognitive resources:

are the data or the models relevant in order to take the decision. The author distinguishes between three groups of cognitive resources: a) data and information; b) theories and models; and c) knowledge about the decisional process

(strategic resource). Data and information are considered as relevant resources inside a decisional process which increases the influence of the actors who possess them. Theories and models are other relevant resources useful in interpreting the data and information resources. The third and last set of cognitive resources, the knowledge about decisional processes - known also as a strategic resource - is considered essential especially for the policy innovator as it allows him to correctly conceptualize the ways through which it is possible to achieve the modification of a public policy, by identifying the actors who participate in the interaction and their specific characteristics, and in general understanding their dynamics and forecasting the possible outcomes (Dente 2014).

Types

Based on the nature of the legitimacy the actors claim (i.e. the reason why their opinions/actions should be considered for the solution of a given problem), the actors can be divided into five basic types. This legitimacy is important because it defines the rationality of an actor, the ways in which is likely to define the problem as well as the type of resources is most likely to appreciate. The classification into five categories is should not be considered as rigid, where the same actor can belong to more than one category. These categories are: 1) political actors, 2) bureaucratic actors, 3) special interests, 4) general interests and 5) experts (Dente 2014).

1. Political actors: Political actors are those actors that base the legitimacy of their intervention in decision-making on the fact of representing citizens. Because they base their legitimacy on consensus, they are likely to respond to the use of political resources. This type of actors would more probably choose the alternative which maximizes the consensus. The decisional style of these actors gives huge importance to communication, to the ability to publicly prove the importance of the actor's role during the process (Dente 2014).

2. Bureaucratic actors: Bureaucratic actors are those actors that base their legitimacy on the fact that the law entrusts them with power to intervene in the policy process. Therefore, these actors would tend to define the problem in terms of "who is entitled to..." and to react to legal arguments. But this is not fully their role in the contemporary state, where it is very close to the manager, or more similar to a professional or to an expert who works with different logics of action. Finally, they are more likely to make use of legal resources (Dente 2014).

3. Special interest actors: Special interest actors are those actors that base the legitimacy of their intervention on the fact that they are directly affected by the policy decision. This means that they will conceptualise the problem in terms of maximising the cost/benefit ratio from their specific point of view. In this case there is no bi-univocal connection between the type of actor and type of resource mobilised by the actor, special interest actors can indifferently use all types of resources (Dente 2014).

4. General interest actors: General interest actors are those actors that base their legitimacy of their intervention on the fact that the interest they represent are general in nature (e.g. environmentalists, animal rights organisations, consumers protection organisations, NGOs, etc.). This group is a spreading phenomenon in contemporary societies and generally all the issues they claim have in common the fact that they are matters of low interest for politicians, due to the long-term solution that they involve which is difficult to be translated into immediate electoral consensus. The general interest groups have an approach similar to the special interest groups and sometimes they are able to mobilise relevant knowledge, but they usually base their action strategies on the use of political resources. There are also cases when they mobilize legal resources with the goal to influence the public opinion, essentially with the aim to generate a loss of consensus for public authorities, when they do not meet their requests (Dente 2014).

5. Experts: Experts are those actors that base their legitimacy of their intervention on the fact that they have the knowledge needed to structure the collective problem and/or to find the most appropriate alternatives to solve it. Their legitimacy is such that must be based on peer recognition and therefore they must take into account the dissenting opinions of other experts. Finally, the experts would generally mobilise their knowledge as a resource within policy processes, which often happens with the aim of increasing the political resources of who proposes (or opposes) a policy innovation. Due to the resources that experts possess, they are often involved to justify decisions which are already taken rather than contributing on their formulation. Therefore, it is doubtful the fact if they have different goals from their client's, and therefore if they are real actors and not simply a resource of other actors. But this is not always the case and it requires a close analysis of the specific decisional process for defining it (Dente 2014).

To conclude, the formal nature of an actor does not affect the classification brought here. In other words, the same actor can be a politician in one case and a bureaucrat in another one. Therefore, the nature of an actor does not affect the type of resources he/she is able to mobilise in policy processes. Additionally, it can be said that the complexity of contemporary public policies consists of the plurality of the points of view represented within a policy making process (Dente 2014). Another factor that contributes to the complexity of decisional processes is the scale of the interests involved. This means that the actors, also if they belong to the same category, can act at different levels which influence their interests and goals. This dimension of interests varies from a local to a global scale and it can have important consequences on the solution of collective problems. But as the author states, this complexity is not only unavoidable, but it can also represent an advantage from the policy innovator's point of view. This because the complexity in a decisional process increases also the number of possible alternatives (solutions) to the collective problem or to the decisional procedures and it is often an important asset (Dente 2014).

Roles

The roles can be defined as the function that the actors play in decisional processes with regard to the problem and other actors and that implies limits to its behaviour and that of the other actors. Within the decisional process the actors can play different roles, some considered as necessary while other appear only in some decision processes. These recognizable roles are: 1) promoter, 2) director, 3) opposer, 4) ally, 5) mediator, 6) gatekeeper, 7) filter (Dente 2014) and 8) broker (Busetti & Vecchi 2018).

1. The Promoter: This is considered a necessary role and the central actor in the policy formulation phase. This actor is the one who raises the problem, activates the other actors and often formulates the solution. There are two main features of this actor to be mentioned: a) he/she has content related goals and b) determination is mostly a vital condition. The combination of these two elements together with the almost obsessive focus on the proposal, is a common feature of public policy transformation and most probably one of the shared characteristics between the public policy innovator and the private entrepreneur (Dente 2014).

2. The Director: The Director, considered also a necessary role, is the actor more interested to facilitate the interaction in reaching decisional success by overcoming decisional hurdles and unintentional consequences. He is always one of the core actors and he can have content related or process related goals. When the complexity of the process is high, it is essential for this role to be able to mobilise strategic resources. Often, the role of the director matches the one of the promoter and this is known as the policy entrepreneur (Dente 2014).

3. The Opposer: The Opposer is the actor who does not agree with the definition of the problem and/or the choice of the solution and he/she would probably mobilise his/her resources for this objective. This role can have content related or process related goals, or possibly both (Dente 2014).

4. The Ally: The Ally is an actor who shares with the promoter and/or director the interest to the solution of a specific problem. He/she can have content related or process related goals, or both, and he/she would mobilise his/her resources by computing some actions or simply by declaring his/her support (Dente 2014).

5. The Mediator: The Mediator is a specific type of Director who tries to reach a solution which is acceptable to everybody through the modification of the stake. The goals of this role include only process related goals because he/she has no preferences about the solution. This role exists only when there are conflicts arising during the process (Dente 2014).

6. The Gatekeeper: The Gatekeeper is an actor that even if he/she is not interested in the issue, he/she can stop the decisional process. This actor usually has legal (i.e. veto power) or cognitive resources sufficient to execute this power. Therefore, he/she has only process related goals useful to maximise his/her positional power, generally in order to avoid the Promoter from acquiring political resources (i.e. consensus) during the process. Additionally, the involvement of potential gatekeepers, able to avoid or at least to delay the process is one of the strategies opposers use the most in decisional processes (Dente 2014).

7. The Filter: The Filter is an indirect actor or a non-actor because he/she has no goals towards the process or the content but intervenes in the process on behalf of some other actor whose interests or claim he/she represents and by mobilising his/her resources. Therefore, this actor is not relevant in influencing the outcomes of the decisional process (Dente 2014).

8. Broker: This last role is an addition to the theory proposed by Dente. It refers to the relative new branch of knowledge-transfer theory, by which is intended the act of sharing of expertise among different entities, within a partnership or even abroad (Carayannis & Campbell 2011): in other words, the results achieved in a project can be abstracted and reused for a similar project in another part of the world or for even completely different purposes. Transferability is, however, not a simple task, but a continuous process, which could be laborious and time consuming, even though attempts of modelling it is present in the literature (see for instance Szulanski 2000). The role of the broker has been often associated to the figure of the bridge, because of his ability to eliminate the barriers between the actors in play and bring together actors which do not know about each other (Busetti & Vecchi 2018). In their research, they found out that the presence of this figure has “played a fundamental role” in both paving the way for the actors and maintaining the relations established in the project (Busetti & Vecchi 2018: p.23).

Network

The policy decisional network is the set of actors of a given decisional process with the evidence of the links between them. The network analysis is conducted in order to highlight the features of the network which can contribute to clarify the dynamics for the solution of the collective problems. These features are three and they include: 1) complexity, 2) density, and 3) centrality. Beyond these three properties, the size and morphology are also other features of the decisional network but considered as non-useful by the author to the analysis objective. These decisional network dimensions or characteristics can be measures and can be modified through specific decisional strategies (Dente 2014).

1. Complexity: The complexity of a network equals the number of different points of view represented by the actors in the decisional process. This depends on the heterogeneity in terms of type of actors and on the geographical dimension (territorial level) of the actors themselves (Dente 2014).

2. Density: The density of a decisional network refers to the quantity of relations that are established between the actors in a decisional process. It is given by the ratio between the actual links, between the actors and the number of theoretically possible links. Drawing the network allows to identify the core actors, i.e. those that are linked with most of other actors (Dente 2014).

3. Centrality: This property consists in the fact that the links within the network are more or less monopolised by one or few actors. It refers to a specific actor and the centrality of the network is represented by the highest centrality coefficient of all actors inside a network (Dente 2014).

To conclude, the author sums up the elements and their relations (concerning only the policy actors) within the public policy processes on his conceptual framework as:

“the real starting point is to understand that the actors are those individuals or organizations that make the actions able to influence the decisional outcomes and that do it because they pursue goals regarding the problem and its possible solution, or regarding their relations with other actors.

To carry out these actions they have to spend resources, the availability of which is a condition for their action's effectiveness, and they are constrained by their role in the process and, especially, by the nature of their claim of intervention, that tends to define their logic of action. These analytical categories are needed to simplify the analysis, as they supply useful guidelines to interpret (and forecast) the behaviours.

We finally used a concept we have already expressed, the complexity of public policy processes in contemporary societies, defining it as one of the decisional network's characteristics. We define complexity as the plurality of points of view present in the process, to be considered with the other network's characteristics like density and centrality”. (Dente 2014: pp.64-65)

As Dente (2014) continues, the proposed conceptual framework supplies a breakdown of the policy decision-making process in order to identify all the elements and modalities that compose it, with the aim of enabling the policy innovator with the necessary concepts about actors and processes towards the implementation of the desired transformation.

Content of the decision

One of the characteristics of public policy analysis is the fact that it assumes that the outcome of a decisional process depends not only from the actors and their resources, but also from the type of issue that is decided. According Dente (2014), the content of the decision can be analysed in two different ways:

- *“First of all by evaluating whether it is a zero-sum game or a non-zero-sum game in the perception of the main actors, thus identifying if and how the adoption of the final decision was (or will be) considered a victory, a partial victory or a defeat for the actors; it is certainly possible that these perceptions are mistaken, but what is also sure, is that actors’ behaviour and their interactions are determined by their own representations of the possible consequences the decision might have on their interests and goals” (Dente 2014: p.75).*
- *“Secondly, by evaluating each participant’s level of concentration of costs and benefits, by assessing the perception of the individual actor against some “objective” benchmark. It is likely in fact that even a rather rational actor does not have, and probably is not interested in acquiring, all the necessary information regarding the concentration on other participants of the costs and benefits. What he cares about is that the outcome of the decision does not burden him too much and/or that it brings him the expected benefits” (Dente 2014: p.75).*

With regard to the first step, i.e. the type of game the actors play, with the zero-sum game (i.e. when the total benefit to all players adds to zero, or in other words an actor benefits only at the expense of others) the conflict is highly probable to arise. On the other side, with the positive-sum game (i.e. when the total benefit is larger than zero, or in other words all actors have benefits) to reach an agreement is the only rational behaviour of the actors (Dente 2014).

On the second step of the analysis of the content of the decision, i.e. the concentration of costs and benefits, it is important to highlight three aspects that this concentration determines:

- The intensity of preferences would give birth to special interests and therefore lobbies,
- With the concentration of costs, the propensity to conflict will be higher,
- It changes the willingness to spend resources each actor has available (Dente 2014: pp.71-72).

Patterns of interaction

The ways in which the actors interact between themselves affect also the outcome of the decision process. The interaction can be defined by the rules (legal procedure) or can be freely decided by the actors (Dente 2014).

The legal procedures are the sequences through which a formal decision can be taken. Under the rule of the law, the procedures basically aim at securing the “due process” guaranteeing the freedom of the individuals. This happens through the distribution of the legal resources between the potential actors. In complex decision making, the procedures are almost never able to explain the outcome of the process (Dente 2014).

The second possibility of interaction between the actors, which can be freely decided by the actors, is explained through a classification into three possible alternatives: 1) confrontation, 2) bargaining, and 3) collaboration. This distinction is based on the use of the resources that actors make within the decisional process. Hence, regarding the interaction patterns, we can distinguish between:

- Confrontation when the resources are weighted in a zero-sum game and the actor who wins is the one with more resources;
- Bargaining when resources are exchanged among actors in the interest of all participants;
- Problem solving when resources are pooled together to achieve a common goal (Dente 2014: pp.86-88).

To conclude, the choice of the patterns of interaction depends from the perception of the distribution of resources, which does not necessarily represent the reality. Every individual actor has only a limited freedom in choosing the way in which to interact, which often it depends from the agreement with the other actors (Dente 2014).

Decisional context

The decisional context or decisional environment is defined as the set of factors and conditions influencing the decision-making process and outcome that cannot be modified by the actors (Dente 2014: p.89). Here, the author refers to Jänicke (2002; cited in Dente 2014) who studied the development of environmental policies in a

comparative perspective and who suggested the following division for what he calls the structural context of policy making: 1) cognitive context, 2) economic context, and 3) institutional context (Dente 2014).

- The cognitive context is represented by the conditions under which knowledge is produced, distributed, interpreted and applied. It includes: culture (values), know-how, opinion, and saliency (Dente 2014).
- The economic context is represented by the production and distribution of wealth. It includes: fixed capital, income, economic structure, monetary and financial stability, etc (Dente 2014).
- The institutional context is basically the jus i.e. the set of legal principles – both of public and private law – that characterises a given political system (Dente 2014).

To conclude, the decisional context influences the behaviour of the actors (and it is relevant if and only if this happens) (Dente 2014). The most relevant dimension in the analysis of the decisional context is the stability or transformation of the context because are the changes in the context that open “windows of opportunity”¹⁰ in which non-incremental policy change is possible (Dente 2014).

In the analysis of the decisional context, the author suggests using the following scale:

- stability - i.e. absolute immobility,
- predictable transformation - i.e. an intermediate stage in which the evolutionary trends are recognized,
- turbulent transformation - i.e. total unpredictability of possible transformations (Dente 2014: p.97).

2.2.2 Policy implementation

Actors and their activities in policy implementation

The effort, knowledge, and resources devoted to translating policy decisions into action comprise the policy’s cycle’s implementation stage, which often relies on civil servants and administrative officials in establishing and managing the necessary actions for the policy implementation. However, many other actors of different nature, such as for example non-governmental actors, with different roles in different contexts, can also be involved in implantation activities (Howlett et al. 2009). Other actors can also be important in the policy implementation stage, such as forms of quasi-governmental organizations (quangos) (Hood 1986; Koppell 2003; cited in Howlett et al. 2009) ranging from state-owned enterprises (Stanton 2002; Chandler 1983; Laux & Molot, 1988; cited in Howlett et al. 2009) to non-profit corporations and bodies (McMullen & Schnellenberg 2002; Advani & Borins 2001; cited in Howlett et al. 2009) and public-private partnerships (English & Skelern 1995; Hodge & Greve 2007; cited in Howlett et al. 2009). This does not exhaust the types of state agencies, which include organisations designed to perform specific tasks but without being directly or indirectly involved, such as various kinds of tribunals, in the form of independent regulatory commissions as involved in developing rules and regulations required for the administration (Cushman 1941; Braithwaite et al. 1987; Christensen & Laegreid 2007; cited in Howlett et al. 2009), or the administrative appeal boards and other forms of commissions and tribunals created to perform many quasi-judicial functions, including appeals concerning licensing, certification of personnel or programs, and the issuance of permits (Howlett et al. 2009). Other relevant actor playing a major role in the policy implementation process are the target groups or those groups whose behaviour is intended or expected to be altered by government action (Donovan 2001; Kiviniemi 1986; Schneider & Ingram 1993; cited in Howlett et al. 2009), whose political and economic resources are considered to have an impact on the implementation of policies (Montgomery 2000; cited in Howlett et al. 2009) or in the case of powerful groups, which through supporting or opposing a policy can influence the character of its implementation (Howlett et al. 2009).

Another relevant aspect affecting the implementation stage is the change in the level of public support, where many policies face a decline in the public support after the decision is taken and therefore causing changes in the original intent of a decision (Hood 1983; 1986; cited in Howlett et al. 2009).

At various levels of government (national, state or provincial, and local) through a process known as ‘multi-level’ governance, different bureaucratic agencies are involved in policy implementation, each carrying particular interests, ambitions, and traditions that affect the implementation process and shape its outcomes (Bardach 1977; Elmore 1978; Bache & Flinders 2004; cited in Howlett et al. 2009). Furthermore, Howlett et al. (2009) argues that the implementation is often an expensive and multi-year effort, which means that funding of implementation

¹⁰ Transformations of the decisional context that allow the matching of the policy problem with a given solution (Dente 2014).

process is usually neither permanent nor guaranteed but it rather requires continual negotiation and discussions within and between the political and administrative branches of the state. Furthermore, the implementation stage is seen also as an opportunity from many actors to continue with the conflicts arisen in earlier stages, which further complicate the implementation process and shape its outcomes (Nicholson-Crotty 2005; cited in Howlett et al. 2009).

Another relevant element to be considered in the public policy implementation is the statute law (e.g. civil or common laws) which in many countries define the basic set of governing principles, by taking the form of Acts, which usually also create a series of rules to be followed in implementing particular policies and a range of offences and penalties for non-compliance with the law (Howlett et al. 2009). Through this series of legislative instruments, the statute law usually influences policy implementation in such a way, which is referred to as the 'command-and-control' regulation, where a command is given by an authorised body and the administration is charged with controlling the target group to ensure the compliance (Sinclair 1997; Kerwin 1994; 1999; Baldwin & Cave 1999; cited in Howlett et al. 2009). In recent years many efforts have been made to supplement or replace this mode of governance with others where the implementation is based more on collaboration or incentives (Freeman 1997; Armstrong & Lenihan 1999; Kernaghan 1993; cited in Howlett et al. 2009), but in the modern era such legal processes still continue to form the basis of policy implementation (Howlett et al. 2009). In this context, even with the efforts to develop more collaborative relationships with the target groups, legal authority must still be considered in guiding the administrative actions towards policy implementation (Grimshaw 2001; Klijn 2002; Phillips 2004; cited in Howlett et al. 2009).

In the end, the nature of the problem to be solved by the policy is another aspect to be taken to consideration during the implementation stage. This because, some programs can be relatively unproblematic, but this is not always true for programs designed to address long-term, chronic or ill-defined problems (e.g. eliminating compulsive gambling or improving pupils' educational achievements). These issues/problems - known as 'wicked' problems - are rooted in many causes and are particularly difficult to tackle because of their complex, novel, or interdependent nature and also because they involve not a single decision, but a series of determinations on how to carry out the government's policy (Churchman 1967; Rittel & Webber 1973; cited in Howlett et al. 2009).

Policy implementation theory

The policy implementation theory has developed only after the 1970s, where before that, the policy implementation has been considered as non-problematic issue. This theory recognises three generations or shifts of attention towards the topic, where the first generation of policy implementation theory is represented with the work from Pressman and Wildavsky (1973; cited in Howlett et al. 2009) on program implementation in the US, showing that the policy was not reaching the desired objectives because the problem was rooted in the manner they were implemented (van Meter & van Horn 1975; Bardach 1977; cited in Howlett et al. 2009). Further, in the 19980s, the second-generation policy implementation theory focused on the so-called top-down versus bottom-up debate (Barrett 2004; cited in Howlett et al. 2009).

While the first-and the second-generation theories were useful in setting out a variety of managerial and organisational design principles, focusing mainly in maximising the match between political intent and administrative intent, there was a need for a theory in explaining why tools and policy mechanisms are used in specific circumstances to carry out governmental tasks, and why implementers behave the way they do in carrying out their tasks. As a result, starting from the 1990s, these issues regarding implementation design and behaviour were the focus of the third generation of implementation studies (Howlett et al. 2009).

Here in this paragraph the focus will lay on this last generation of policy implementation theory, where, as Howlett et al. (2009) argues, with regard to the studies focused in the models of administrative behaviour, two theories come into the front line, the *game theory* and the *principal-agent theory*. The first theoretical school focused on promoting a method useful to assess how behavioural discretion influences the implementation process, while the second one focused more on the design of the administrative structures for effective implementation and on the importance of mechanisms that ensure effective oversight of administrative actors by the political actors. Furthermore, the principal-agent theory put the focus on the failure of the governments and citizens to create a better world, which has led to a greater appreciation of the difficulties faced with the policy implementation. This has also generated attempts to design better policies by offering a reasonable chance of success in implementation,

with a growing recognition of the need to take the implementation difficulties into account at earlier stages of the policy process, such as policy formulation, through a process of complex policy design (Spence 1999; cited in Howlett et al. 2009).

Instrument choices and policy mixes

Together with the focus on the significance of institutional design for effective policy design, in the 90s, another branch of the studies on the policy implementation focused on the characteristics of policy instruments and the reasons for their selection by governments. The aim here was on improving the implementation of policies through the improvement of the selection of tools and instruments (Howlett et al. 2009). Further, this ‘instrument choice’ or ‘policy design’ approach began from the observation that the policy implementation involves a range of techniques of government (i.e. policy tools or policy instruments) in the form of a policy mix (Bressers & Klock 1988; Schneider & Ingram 1990: pp.513-514; McDonnell & Elmore 1987; Elmore 1978; 1987; cited in Howlett et al. 2009).

With regard to the policy mix, when the policy makers explore different policy options, they consider also the way how to deliver the policy goals, by means of public policy (i.e. the policy tools). These tools (or policy instruments) are the actual means that government use in the implementation of public policies (Howlett et al. 2009). There is a large variety of instruments available to the policy makers, and several scholars have made attempts in identifying and classifying them into meaningful categories (Salamon & Lund 1989:32-33; Lowi 1985; Bemelmans et al. 1998; cited in Howlett et al. 2009). The starting point of such attempts was Lasswell’s insight that governments use a variety of policy instruments to achieve a relatively limited number of political ends. Lasswell (1958: p.204; cited in Howlett et al. 2009) argued that governments had developed a limited number of ‘strategies’ that involved ‘the management of value asset in order to influence the outcomes’.

For the purpose of this work, starting from a taxonomy known as ‘NATO model’ developed by Christopher Hood (1986; cited in Howlett et al. 2009), a classification of policy tools proposed by Howlett et al. (2009) is considered. Hood proposed that all the policy tools use one of the four broad categories of governing resources. Therefore, he argued that governments confront public problems through the use of the information in their possession as a central policy actor (‘nodality’), their legal powers (‘authority’), their money (‘treasure’), or the formal organisations available to them (‘organisation’) or ‘NATO’. Moreover, governments can use these resources to manipulate policy actors, for example, by making use of available information or money, or in other cases by using their coercive powers to force other actors to undertake activities they desire, or otherwise by undertaking the activity themselves using their own personnel and expertise. Starting from Hoods idea on governing resources, a basic taxonomy of instruments categories is offered by Howlett et al. (2009). Additionally, the authors focus on the principal strengths and weaknesses of each instrument.

1. Nodality or Information-based Policy Instruments:

- Public Information Campaigns
- Exhortation
- Benchmarking and Performance Indicators
- Commissions and Inquiries

2. Authority-based Policy Instruments:

- Command-and-Control Regulation
- Delegated or Self-Regulation
- Advisory Committees

3. Treasure-based Policy Instruments:

- Subsidies: Grants, Tax Incentives, and Loans
- Financial Disincentives: Taxes and User Charges
- Advocacy, Interest Group, and Think-Tank Funding

4. Organisation-based Policy Instruments:

- Direct Provision
- Public Enterprises

- Quangos
- Partnerships
- Family, Community, and Voluntary Organizations
- Market Creation
- Government (Re)organizations

Systematic analysis of instrument choices usually begins with this attempt to identify dimensions where the categories of instruments lay. As a result, Howlett et al. (2009) further suggests a distinction of the ‘NATO’ scheme proposed by Hood (1986) between their ‘substantive’ (i.e. instruments affecting the substance of policy outputs) and ‘procedural’ nature (i.e. instruments manipulating the policy processes associated with the delivery of those outputs). This is considered from Howlett et al. (2006; cited in Howlett et al. 2009) as the basic building blocks from which any policy mix is constructed (see Table II.2.2).

		Resource used			
		Nodality	Authority	Treasure	Organisation
General Principle Governing Use	Substantive	Advice Training Reporting Registration	Regulation Self-regulation Licenses Census-taking	Grants User charges Loans Tax credits Polling	Administration Public enterprises Policing Consultations Record-keeping
	Procedural	Information provision/ withdrawal	Treaties Advisory committees/ commissions	Interest group funding/ creation	Conferences Commissions of inquiry Government reorganizations

Table II.2.2 - A taxonomy of Basic Policy Instrument Components of a Policy Mix (reproduced from source: Hood (1986); Howlett (2000); cited in Howlett et al. 2009: p.169).

Furthermore, Howlett et al (2009) offers another classification of these policy instruments into two scales depending on how particular instruments relate to the degree of manipulation of market and network actors they entail (see Table II.2.3 and II.2.4).

Family & community	Voluntary organisation	Private market	Information & exhortation	Subsidy	Tax & user charges	Regulation	Public enterprise	Direct provision
Voluntary			Mixed			Compulsory		
Low								High
Level of State Activity in Goods and Service Production and Delivery								

Table II.2.3 - A spectrum of Substantive Policy Instruments (reproduced from source: Howlett (2000); cited in Howlett et al. 2009: p.170).

Network self-creation and operation	Information management and distribution	Research and interest group funding	Standings/accses and advisory committee creation	Institutional reform and government reorganization
-------------------------------------	---	-------------------------------------	--	--

Management	Restructuring
<i>Low</i>	<i>High</i>
Level of State Manipulation of Subsystem Membership and Structure	

Table II.2.4 - A spectrum of Procedural Policy Instruments (reproduced from source: Howlett (2000); cited in Howlett et al. 2009: p.170).

Another relevant topic concerning the policy instruments/tools regards the question why implementers do or should choose a particular instrument from the many available. Here the author distinguishes between two different groups (economists and political scientists), each offering a different answer to this question. The first group (i.e. economists), consider the issue of instrument choice as a pure technical exercise of matching specific attributes of different type of tools to the characteristics of job at hand, whereas, on the other side, political scientists argued that instruments are more or less substitutable on a purely technical basis (Howlett et al. 2009). The author concludes that the issue of instrument selection is “a complex activity influenced by factors such as the nature of the subsystem involved and especially its propensity to allow new actors and new ideas to penetrate into policy deliberations” (Howlett et al. 2009: p.172). Additionally, he offers some suggestions with regard to instrument selection, as “that instrument choices, to be effective, must be closely and carefully related to policy goals, and that any new goals and tools must also be carefully integrated with existing policies if implementation is to succeed. New and old goals must be coherent, in the sense of being logically related, while new and old instrument choices must be consistent, in the sense of not operating at cross-purposes” (Howlett et al. 2009: p.172).

With regard to ‘implementation styles’ (i.e. instrument preferences), Howlett et al. (2009) argues that it is the complexity (deriving from the nature of the Policy Subsystem¹¹) and the possibility of failure which lead the implementers to develop distinctive preferences for substantive and procedural instruments. These elements can further be related to the kind of problems implementers face, especially their ‘tractability’ or ease of solution, and the severity of the constraints policy-makers face. As a result, these factors are considered as relevant in defining the choice of both procedural and substantive governing instruments (Saward 1992; Rhodes 1997; Howse et al. 1990; Bennett 1992; cited in Howlett et al. 2009). With regard to the severity of the constraints and the nature of the policy subsystem, Howlett et al. (2009) offers a model which illustrates the implementation instrument preferences in relation to the above-mentioned variables (see Table II.2.5).

		Nature of the Policy Subsystem	
		<i>Complex</i>	<i>Simple</i>
Severity of Constraints on State	<i>High</i>	Focus on directive instruments (e.g. direct provision and government reorganizations)	Focus on authoritative instruments (e.g., regulation and advisory committees)
	<i>Low</i>	Focus on subsidy instruments (e.g., grants and interest group funding)	Focus on information instruments (e.g. advertising campaigns and information disclosure)

Table II.2.5 - A model of Basic Instrument Preferences (reproduced from source: Howlett et al. 2009: p.175).

¹¹ i.e. existing range of policy actors present in the policy subsystem, available resources, the nature of problem they are trying to address and the ideas on how to address it, all in the context of a policy regime (Bressers & O’Toole 1998; 2005; Bressers 1998; cited in Howlett et al. 2009).

2.3 Public policy in the “sustainability era”

The relevance of the sustainability topic has permeated all professional fields and the one of policies is not an exception. In this section, policy field is investigated with the lenses of the “sustainability era”, which demands for the so-called environmental policies.

In the history of evolution of public policies, a relevant aspect is presented by the nature of the problems, which has significantly changed, determining at the same time the way in which they are addressed. From liberal state, through the welfare state, until the contemporary state, therefore, problems and the ways to solutions vary a lot (Dente 2011).

Hence, the focus in this Section will shift towards understanding common problems that arise in policy processes in the contemporary state (i.e. complexity, uncertainty, conflicts) and how these are addressed. All these common characters of contemporary policies will be presented in relation to environmental policies (i.e. “sustainability era”) and particularly at the local level, with the aim of identifying common potential barriers to implementation of local environmental policies.

Natural resource management and economic development have arisen important and arduous challenges to the policy makers both locally and internationally. These challenges emerge in many ways and through different scale issues: “multilevel governance, governance across social scales, is a sine qua non of effective sustainability” (Hanf & O’Toole 2003: p.257). It appears clear that sustainable development demands under several aspects for societal change (Bressers & Rosenbaum 2000; cited in Bressers & Kuks 2003) and, therefore, it aims to a reshaping of the governance structure to a certain extent: that is also because it has become clear that “sectors in society are not governed on one level [...] but through interaction between these levels” (Bressers & Kuks 2003: p.65). As a matter of fact, environmental policies present nowadays a particularity, which is linked to the global character of the problem related to the sustainability concept, thanks also to the pressure on individual countries (ed. Dente 1995). Therefore, the problem of scale must be addressed by political institutions if they want to promote sustainable development: in U.S., policy makers are used to create a single institution that should be in charge of dealing with the problem in a comprehensive way, but “these efforts have rarely accomplished their goals” (Barkin & Moseley 2003: p.91). It can be argued that this comprehensiveness “has outgrown the level of institutionalisation of the policy itself”: this conflict is at the base of the demand for new instruments, which should guarantee to the main policy actors (mainly the government but not only) to be able to tackle the new problems brought by the sustainability ideal without leaving aside the old ones (ed. Dente 1995: p.4).

According to Barkin & Moseley’s work, it seems that a network of organisations, agency authorities, and jurisdictions which operate in concert represents a more successful system: indeed, the key success of such organisation is an effort to match “the scale of political solution to the scale of the environmental problems” (Barkin & Moseley 2003: p.91). It follows that building “a network of nested policy-making and implementing institutions could address the regulatory, distributive, and restorative dimensions of environmental management” (Barkin & Moseley 2003: p.92) and a coordination activity is well imperative for an effective management. A policy network is defined as “a social system in which actors develop comparatively durable patterns of interaction and communication aimed at policy problems or policy programs” (Bressers & O’Toole 1998: p.218): focuses of this definition are on the intensity of the interactions between actors’ part of the network and the ways in which the objectives are distributed within the network itself.

In order to reach those goals, instruments for the implementation of environmental policy need to be identified. Attempts to classify those instruments do not lack, but it must be said that these are characterised by a broad and open view: the reason is that is arduous to individuate a single instrument through which is possible to tackle problems so complex such environmental ones. Klok (1995) speaks about instrumental tactics, i.e. a combination of policy instruments: a vision like this one “would contribute more to the study of and discussion on policy instruments than a desperate attempt to fit complex phenomena like instruments in neatly exclusive boxes” (Klok 1995: p.34). The author proposes indeed a series of questions that the policy instrument should answer to in order to be classified as a environmental policy instrument: elements of this investigation imply a) the ability of the instrument to influence directly or indirectly the environment; b) the characteristic of having multi-layer instrumental tactics to embrace a bigger spectrum of issues; c) and finally its ability of (re)organising the actors’ network. We refer at this point to the complete series in Klok (1995: p.34).

Hanf & O’Toole describes the process of instrument selection in the EU, explaining that this choice “is likely to be shaped by structural features of the governance setting” in addition to the characteristics of target groups of the policy: they also add that implementation of such policies require often important changes, which are restricted by barriers due to the existing institutional organisation (Hanf & O’Toole 2003: p.259). In particular, instruments that are dealing with network creation are of relative importance in order to foster its interconnectedness and cohesion. Therefore, it results that instruments should entail “lack a normative appeal to targets, exhibit proportionality, add resources to the targets, leave the option of application to the targets, entail bi-/multilaterality, and involve policy makers in implementation” (Hanf & O’Toole 2003: p.260). In a multilevel system such as EU, cross-national and cross-sector networks might be preferable, but the perturbation on domestic settings are to be foreseen and accounted in order to drive to changes.

Another relevant topic concerning the policy topic is the role of the actors called for its design and implementation. Especially “during the preparation of policy documents, consultation with relevant interest groups and external experts can be intensive” and the bargain can be heavily dependent on external expertise (Lulofs et al. 2003: p.311). Due to all its characteristics, it appears obvious that the spectrum of who is involved in environmental policies formulation is broader, both in numerical and complexity terms. More precisely, when one focuses on choice of policy instruments, the interaction between the ones which are in charge of making the policy - the policy makers - and the external ones - the experts - represents a special issue. Moreover, the balance between public and private interests is of relevance. To the rose of experts can be ascribable a series of actors, namely economists, lawyers, policy analysts and administrators, and of course the policy makers (Liberatore 2003). Each of them brings at the stake their specific arguments which contribute in the complexity and flexibility of the policy product: the economist will deal with market failures, lawyers will emphasise the importance of norms, institutional resources are of interest of the policy analysts and administrators and the choice of “politically ‘safer’ options” is of concern of policy makers (Liberatore 2003: p.60). These categories are not casual: they all refer to the different arguments that a policy in environmental field has to consider, i.e. political, economic, legal, scientific and ethical.

These actors are asked to collaborate providing on the table of the discussion their own expertise and assumption in a debate which has to obey to the mechanisms of the bargain and negotiation with the final aim of selecting the most appropriate policy instruments: such debate brings with a “process of learning [...] in which new, as well as previously disregarded, knowledge and information are diffused, a common terminology is developed, self-reflection on previous experience (including previous policies) is favoured, attention is paid to aspects previously neglected and issues are re-framed accordingly” (Liberatore 2003: p.61). Of course, result of such process will not be necessarily the best option, but the alternatives will be all evaluated on the base of a broader range of “information, points of view and experience”: the reason lies in the fact that certain arguments or combination of them - e.g. power, prestige and so on - can be used to favour a certain option rather than another (Liberatore 2003: p.61). As an example, the Legal Commission in NSW established in 1986 an expert advisory body on environmental cases as a stable institution to take on environmental issues (Pain 1995).

3. Main findings

The literature review on Circular Economy performed in this Part confirms that CE concept gleans in very diverse theories with the peculiarity in the attempt of merging ecology with economy: this happens in the try of emulating the environment for redesigning production activities (Ghisellini et al. 2016).

The various definitions reported and discussed in the first section all contribute to provide a picture of the concept of Circular Economy – a constantly evolving economic model of great complexity – that this research aims to set as ‘bedrock’. CE definitions constitute an alternative, restorative or regenerative model by intention and design to the current one with a focus on sustainability aspects – such as use of renewable energy, elimination of toxic chemicals and the negation of the concept of waste – aiming to a closed-loop model of the economy which is based on the 3R principles. As such, it represents a coherent framework for initiatives and strategies at all levels of governance pointing to create goods and services aiming to the wellbeing of the citizens.

As extensively argued in the first Chapter of this Part, sustainable development and economic growth represent the background from which CE takes its principles: both contribute to identify CE as an optimistic perspective which points to a greener, healthier and richer future. Of course, this interpretation sounds certainly naive and attacks to its principles do not lack. These are put forward by those school of thoughts which follow not only the concept of steady-state, claiming for the interruption of the economic growth, but even calling for a de-growth of the current economic system: both concepts are considered as a solution to the enormous and extensive damages that humanity has caused to the planet. At the base of this offensive, the idea of the impossibility – both from arguments of philosophical and physical nature – to perform an infinite economic growth: as a matter of fact, it requires always more and more inputs that must be generated to insert in the system, burdening the production sector which is compelled to tear off materials from the nature. From here comes the idea of blocking the growth or even going further with a de-growth, as a way to reduce human needs, impacts and demands to the environment.

Moreover, it has been argued that CE theoretical conceptualisation focuses extensively on production patterns, suggesting approaches like industrial ecology and cleaner production, while living aside consumption and waste management practices.

If it is true that the definition of CE reported here above considers only one side of the problem – as the literature against it has insistently repeated – it can be argued as well that visions like steady-state and de-growth can lead to the annihilation of any effort and initiative to changes by generating defeatist attitudes. From this perspective CE is to be understood as an idea, a potential guiding paradigm, to reach the goals of sustainable development keeping in mind that its principles should be taken with a grain of salt to avoid disillusionments.

To conclude, Circular Economy is understood to embody several elements (e.g. moderating consumption, an end to a fossil economy, output utilization, emission reductions) put forward from other emerging models (e.g. green economy, de-growth economics and bio-economics) integrating them in a single holistic system. This new system is described by Bompan (2017: p.19) as embracing a set of elements of “a market-driven economy (profit), Marxism (workers’ well-being), ecology, and an overall non-linear impact”.

However, the authors of this work agree that the theoretical conceptualisation of CE as it is currently depicted underestimates the social aspect. As a matter of fact, the current perspective on CE appears to be still too linked to the business side. In the next Part III, it is shown how EU stands back from this perspective, concentrating first of all in the waste management stage – when it comes to legislative proposals – and secondly on initiatives which point to awareness rising and good practices promotion.

On the other side, as explained also in the Chapter I, CE points to address as well several tangible issues which can be considered at the same time collective problems – put forward by international (EU) and local actors – as they concern the so-called ‘global character of environmental problems’ which are at the same time local issues (e.g. waste management, scarcity of resources and non-efficient energy sector, and so on). As these fields involve several actors at different levels, both on the public and private sector, and concern several issues in the overall objective of ‘closing the loop’, it is argued here that public policy offers a hypothesis to change the status quo by defining the problem, offering solutions, implementing the chosen one and evaluating its results for further eventual adoptions. Still, public policy may not guarantee the fully implementation success that the theory of Circular Economy claims, but it offers itself as a valid mechanism towards achieving an agreement between the actors involved.

In the case of CE, not only the network of actors has to be initiated and built, but it must be kept during time, with the aim of developing and implementing solutions based on a collaborative approach of interaction between the actors involved. Hence, this objective embraces the concept of governance, or more specifically, the more recent concept in addressing the so-called ‘wicked problems’ i.e. collaborative governance: “a governing arrangement where one or more public agencies directly engage non-state stakeholders in a collective decision-making process that is formal, consensus oriented, and deliberative and that aims to make or implement public policy or manage public programs or assets” (Ansell & Gash 2008: p.2). As a result, collaborative governance can be seen as another necessary component towards dealing with the so-called ‘wicked problems’, but which does not solely guarantee the success in delivering the desired outcomes.

Finally, due to its complexity of intents and the different spheres which the CE concept involves, it is stated that to foster circular practices it is as well necessary to refer to the social environment of cities, which implies a strong

political support from the government. This point is argued in the following parts of this work as a ground for justification of CE and Policy topic to work together and the role of the planner in this framework.

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There are no rules of architecture for a castle in the clouds.

(Gilbert K. Chesterton)

PART III

Circular Economy in European Union context

The third Part focuses on providing an overview on the development of the concept of Circular Economy as policy issue within the EU institution. It focuses on describing its main elements, approach, actors, and the current and foreseen means of implementation. This analysis is conducted to grasp the perception of CE at this political level, as in contrast to the theoretical conceptualization in the previous Part.

1. From Waste Management to Circular Economy – EU policy evolution

Waste policy at EU level – seen also with the starting point of the environmental policy – was for the first time required as an answer to a number of problems and scandals related to the handling of waste arising in the 70s and 80s, and to the potential impact that poor waste management could bring to the environment and human health. Actions towards controlling and managing of waste took place firstly within the Member States, leading then the EU to the adoption in 1975 of the Waste Framework Directive and the Hazardous Waste Directive, and later to the Waste Shipment Regulation, as the basis of the regulatory structure on waste at the EU level (EC n.d.).

Over the last 30 years, EU waste policy has evolved through a series of environmental actions plans and a framework of legislation with the aim to protect the environment and human health as well as create an energy and resource-efficient economy. It was only in the turn of the 21st century when the approach to waste management in the EU level started to mark a shift away from thinking about waste as an unwanted burden to seeing it as a valued resource. This was introduced for the first time with the EU's 6th Environment Action Programme (2002-2012), which identified the topic of waste management as one of four top priorities of EU environmental policy, and further consolidated with the development of a long-term strategy on waste (i.e. the 2005 Thematic Strategy on Waste Prevention and Recycling) (EC 2010).

1.1 Current waste policy framework

From the EU perspective, the European economy is currently considered as non-efficient – as it still continues to lose a significant amount of potential secondary raw materials. Efforts at this level advocate the “turning waste into a resource” as a key to “move to a more Circular Economy where waste is eliminated, and resources are used in an efficient and sustainable way” (EC Environment 2017a). A better waste management is seen as a way to the reduction of health and environmental problems at different levels such as greenhouse gas emissions, landscape deterioration due to landfilling, local water and air pollution, as well as littering (EC Environment 2017a).

EU waste policy is built mainly upon policy strategies¹², overarching directives¹³, legal acts applying to specific waste streams¹⁴ (Bourguignon 2015a), legal acts on specific installations¹⁵, and implementing acts defining when specific materials leave the waste regime after treatment¹⁶ (Bourguignon 2015b).

The Thematic Strategy on the Prevention and Recycling of Waste adopted in 2005 sets as long-term goal for the EU to become a recycling society seeking to avoid waste and use waste as a resource, by modernizing the existing legislation and introducing an approach based on product life cycles analysis in policymaking (EC 2005). The Roadmap to a Resource Efficient Europe adopted in 2011 outlines a framework for a coherent design and implementation of future actions, introducing milestones to be reached by 2020 together with a vision for the transformation of Europe's economy into a sustainable one by 2050. Furthermore, it proposes ways to increase resource productivity and decouple economic growth from the environmental impacts (EC Environment 2016a). The

¹² “The main waste-related strategies are the 2005 Thematic strategy on waste, the 2011 Roadmap to a resource efficient Europe, and the 2013 7th Environment Action Programme” (Bourguignon 2015a: p.12).

¹³ “The legal acts setting the general framework are the 2008 Waste Framework Directive, the 1999 Landfill Directive, and the 2006 Waste Shipment Regulation” (Bourguignon 2015a: p.12).

¹⁴ Directive on packaging and packaging waste; Directive on waste electrical and electronic equipment (WEEE); Directive on batteries and accumulators and waste batteries and accumulators; Directive on end-of-life vehicles; Regulation on ship recycling; Directive on waste from extractive industries; Directive on the disposal of PCB and PCT; Directive on sewage sludge in agriculture; Directive on radioactive waste (Bourguignon 2015b: p.5).

¹⁵ “The Directive on port facilities for ship-generated waste regulates facilities where waste from ships and residues from cargo material can be transferred; The Industrial Emissions Directive sets rules applicable inter alia to waste incinerators and installations producing titanium dioxide; The Regulation on animal by-products lays down rules on the disposal of animal by-products, mainly from slaughterhouses” (Bourguignon 2015b: p.5).

¹⁶ “Under the Waste Framework Directive, implementing acts have defined end-of-waste criteria for the following materials: metal, glass and copper” (Bourguignon 2015b: p.5).

7th Environmental Action Programme (7EAP) to 2020, launched in 2014, is the current programme guiding EU environmental policy until 2020 and as a result the waste topic as well. The 7EAP identifies three general key objectives: to protect, conserve and enhance the Union's natural capital; to turn the Union into a resource-efficient, green, and competitive low-carbon economy; and, to safeguard the Union's citizens from environment-related pressures and risks to health and wellbeing. Among the priority objectives for waste policy in the EU, the 7th EAP sets the maximization of recycling and reuse, limiting the incineration and landfilling only to non-recyclable and non-recoverable materials. Moreover, it sets out a long-term vision that goes beyond 2020, to where EU wants to be by 2050¹⁷ (EC Environment 2016b). The Waste Framework Directive, the cornerstone of EU waste policy, focuses on waste prevention and defines targets which will guide EU towards its goal of becoming a recycling society. These targets include 50% recycling of the municipal waste and 70% of construction waste by 2020 for all the EU Member States (EC 2010). Furthermore, EU waste management follows a series of principles and priorities, such as the waste hierarchy, self-sufficiency, best available technique not entailing excessive cost, proximity principle, precautionary principle, producer responsibility, and polluter pays principle (REC & UBA 2008). As one of the most relevant aspects, the EU approach concerning waste management is represented by the waste hierarchy. It is a five-step approach, where prevention of waste is the best option, followed by reuse, recycling and other forms of recovery, with disposal such as landfill as the last option. Following this approach, EU waste legislation aims to move waste management up in the waste hierarchy (EC 2010). Finally, the objectives and targets of the waste management policy in EU – aiming in turning waste into a resource as key to a Circular Economy – have shown to be the key drivers towards better waste management, by encouraging recycling innovation, limiting landfilling and further incentivizing changes in the consumer behaviour (EC Environment 2017a).

1.2 European Union commitment towards a Circular Economy

As EMF (2014) points, although Europe has been traditionally a leader in delivering environmental consciousness, a range of other more recent factors (e.g. global economic crisis, soaring commodity prices, and environmental awareness) have significantly contributed towards the introduction of the Circular Economy agenda into mainstream policy debate in EU. As a result, Circular Economy measures can be found today in various environmental and economic policies and are translated to resource-related policy goals (as part of the Europe 2020 strategy) extending as far ahead as 2050. As a result, as outlined in one of the Environmental Indicator Reports in 2012 there were a total of 63 legally binding targets and 68 non-binding objectives across nine environmental policy areas (EEA 2012).

Still, it was in July 2014 when the EU launched its commitment towards the Circular Economy with the communication 'Towards a Circular Economy: a zero waste programme for Europe', leading to the adoption in December 2015 of an ambitious Circular Economy Package. The declared objective through this package is to stimulate Europe's transition towards a Circular Economy, which is claimed by the Commission to “boost global competitiveness, foster sustainable economic growth and generate new jobs” (EC Environment 2017d). European Commission (2014a) sees the transition towards a more Circular Economy as essential to deliver the resource efficiency agenda established under the Europe 2020 Strategy for smart, sustainable and inclusive growth¹⁸, and the foreseen actions as strictly tied to other EU priorities such as jobs and growth, the investment agenda, climate and energy, and the social agenda and industrial innovation (EC 2015a). In addition, the foreseen actions involve also the delivering of other global commitments on sustainable development taken by the EU and the Member States, such as the U.N. 2030 Agenda for Sustainable Development¹⁹ and the G7 Alliance on Resource Efficiency (EC 2015a).

The Circular Economy is considered by the European Commission as “a development strategy that entails economic growth without increasing consumption of resources, deeply transform production chains and consumption habits and redesign industrial systems at the system level. It relies on innovation being it technological, social and

¹⁷ "In 2050, we live well, within the planet's ecological limits. Our prosperity and healthy environment stem from an innovative, Circular Economy where nothing is wasted and where natural resources are managed sustainably, and biodiversity is protected, valued and restored in ways that enhance our society's resilience. Our low-carbon growth has long been decoupled from resource use, setting the pace for a safe and sustainable global society" (EC Environment 2016b).

¹⁸ COM (2010) 2020.

¹⁹ "This action plan will be instrumental in reaching the Sustainable Development Goals (SDGs) by 2030, in particular Goal 12 of ensuring sustainable consumption and production patterns" (EC 2015a: p.3).

organisational” (EC 2014b: p.2). Moreover, Circular Economy is seen by the Commission as those systems that keep resources within the economy and therefore the added value in products for as long as possible and where the generation of waste is minimized – as essential to deliver EU's efforts to develop a more sustainable, low carbon, resource efficient and competitive economy (EC 2015a). To achieve this, EC recognizes and calls for a long-term involvement of different actors at all levels, from Member States, regions and cities, to businesses and citizens (EC 2015a).

The Circular Economy Package (December 2015) includes (1) four legislative proposals on waste and (2) an Action Plan, together aiming to ensure that the right regulatory framework is in place for the development of the Circular Economy and give clear signals to economic operators and society on the way forward. These components of the Circular Economy Package include long-term targets (through legislative proposals) and actions (through the Action Plan) aiming – among many other objectives – to reduce landfilling, increase preparation for reuse and recycling of key waste streams, facilitate implementation, promote economic incentives and improve extended producer responsibility schemes (EC 2015a).

(1) Legislative proposals on waste, revising six pieces of EU legislation, include:

- Waste Framework Directive and Annex;
 - Packaging Directive and Annex;
 - Landfill Directive;
 - Directives on end-of-life vehicles (ELV), batteries and accumulators (B&A), and waste electrical and electronic equipment (WEEE).
- (EC Environment 2017d)

These revised legislative proposals set clear targets for reduction of waste and establish an ambitious and long-term path for waste management and recycling. Main targets include:

- A common EU target for recycling 65% of municipal waste by 2030;
 - A common EU target for recycling 75% of packaging waste by 2030;
 - A binding landfill target to reduce landfill to maximum of 10% of municipal waste by 2030;
 - A ban on landfilling of separately collected waste;
 - Promotion of economic instruments to discourage landfilling;
 - Simplified and improved definitions and harmonised calculation methods for recycling rates throughout the EU;
 - Concrete measures to promote re-use and stimulate industrial symbiosis – turning one industry's by-product into another industry's raw material;
 - Economic incentives for producers to put greener products on the market and support recovery and recycling schemes (e.g. for packaging, batteries, electric and electronic equipment, vehicles).
- (EC Environment 2017d)

(2) The Action Plan (Closing the loop – An EU action plan for the Circular Economy), launches a concrete and ambitious programme of action to be carried out before 2020 – by complementing the measures contained in the legislative proposals – with measures covering the whole cycle, from production and consumption to waste management and the market for secondary raw materials (EC Environment 2017d). Furthermore, the Action Plan identifies a series of priority sectors (or material streams), which are claimed to face specific challenges in the context of the Circular Economy and which need to be addressed in a targeted way in all the phases of the whole value chain (EC 2015a). These include: plastics, food waste, critical raw materials, construction and demolition, and biomass and organic products (see Chapter 2). Finally, the Action Plan promotes also other focus areas, such as horizontal enabling measures in areas for instance innovation and investment²⁰, and it involves monitoring of the progress towards a Circular Economy (see EC 2015a: pp.18-21).

Key actions put forward in the action plan include:

²⁰ “...a major initiative to fund innovative projects under the umbrella of the EU's Horizon 2020 research programme” (EC 2015a: p.3).

- comprehensive commitments on ecodesign involving measures to promote reparability, durability and recyclability of products (2016 onwards);
- guidance on Circular Economy for several industrial sectors (2016 onwards);
- actions to enhance Ecolabel effectiveness (2016);
- initiative on waste to energy in the framework of the Energy Union (2016);
- a new regulation on fertilising products (2016);
- development of quality standards for secondary raw materials (2016 onwards);
- strategy on plastics in the Circular Economy addressing issues of recyclability, biodegradability, the presence of hazardous substances in plastics (2017), and the Sustainable Development Goals target for significantly reducing marine litter (2015 onwards);
- actions to reduce food waste, including a common measurement methodology to achieve the global SDGs (2016);
- initiative to improve exchange of information between manufacturers and recyclers on electronic products (2016 onwards);
- development of standards for the recycling of electronic waste, waste batteries and other relevant complex end-of-life products (2016 onwards);
- development of a monitoring framework for the Circular Economy (2017); etc. (EC 2015b)

2. Circular Economy in the future of European cities – Barriers and opportunities

One of the main reasons that have pushed to the drafting of this research is that in EU the CE will enter as a mandatory part of the city agenda: this trend is confirmed by business and politicians all over Europe that have decided to dedicate a part of their agenda to this topic (EC 2014). As explained before in Chapter 1, Part II, and in the first chapter of the present Part, CE aims to overcome the today's economy mechanism based on linear processes: for what concerns EU, this approach has been chosen to pursue “economic growth while aiming to optimise the chain of consumption of biological and technical materials” (EC 2014: p.VI; EC 2015).

The famous Scoping study launched by EU in 2014 aimed to identify potential Circular Economy actions, to define priority sectors and to focus on urgent material flows and value chains: the goal was to provide a primary assessment of potentiality for Europe in the transition to Circular Economy by reviewing literature and analysing case studies (EC 2014).

This Chapter has been, therefore, subdivided into three different portions: the barriers to the implementation of CE strategies are exposed in the first section; the second section includes all the opportunity fields for EU to start from; the last one provides the expected benefits of the implementation of such strategies. The results of this chapter will feed the Chapter 2 in Part IV where the material stream that will be investigated in the context of this research will be chosen.

2.1 Barriers

Several researches have been carried out on behalf of the European Commission to determine and discuss the advantages and disadvantages of CE within the European Union development framework. In this section, the main barriers to the implementation of the CE principles individuated by these researches are presented. The table presents on the left the barriers and on the right the part of the value chain which they refer to.

Reference	Value chain part
<p>EC (2014): scope of this report is to individuate barriers, challenges and opportunity fields of a future shift towards CE within the European Union context.</p>	
<ul style="list-style-type: none"> • “Insufficient skills and investment in circular product design and production which could facilitate greater re-use, remanufacture, repair and recycling; • Current levels of resource pricing which create economic signals that do not encourage efficient resource use, pollution mitigation or innovation; • Lack of sufficient incentives due inter alia to the insufficient internalisation of externalities through policy or other measures; • Non-alignment of power and incentives between actors within and across value chains (e.g. between producers and recyclers) to improve cross-cycle and cross-sector performance; • Still limited consumer and business acceptance of potentially more efficient service oriented business models, e.g. leasing rather than owning, performance-based payment models; • Limited information, know-how and economic incentives for key elements in the supply and maintenance chain, e.g for repair and reuse, on chemical composition of certain products such as substances in electronic devices; • Shortfalls in consumer awareness (e.g. perishability of food products); • Insufficient waste separation at source (e.g. for food waste, packaging); • Limited sustainable public procurement incentives in most public agencies (i.e. Green Public Procurement); • Insufficient investment in recycling and recovery infrastructure, innovation and technologies (related to this is the lock-in of existing technologies and infrastructure); • Challenges in obtaining suitable finance for such investment; • Weaknesses in policy coherence at different levels (e.g. bioenergy and waste policies); • Widespread planned obsolescence in products” (V-VI); • “The analysis [of] case studies indicates that the relationship between actors in the value chain can be an important limitation on the realisation of opportunities from the Circular Economy, particularly when innovation [...] is required” (VII); • “The lack of internalisation of externalities through policy or other measures and the lack of resource pricing (cost recovery and pricing for the resource itself), which lead to economic signals that do not encourage the efficient use of resources (i.e. as there are greater incentives to use materials more effectively) or a transition to a Circular Economy (i.e. as resources become more costly there are increased incentives to reuse/recycle materials); • The lack of enablers to improve cross-cycle and cross-sector performance due inter alia to non-alignment of power and incentives for transformation between actors within and across value chains; • The lack of consumer and business acceptance regarding consumer-as user, and performance-based payment models; • The lack of know-how and economic incentives including for repair and reuse; • The lack of consumer information on origins and perishability of products; • The lack of sustainable procurement incentives for public authorities; • The lack of investment and innovation in recycling and recovery infrastructure and technologies; • The lack of harmonisation of transport flows systems between municipalities, which leads to confusion among shippers and transporters; • Weaknesses in policy coherence (e.g. bioenergy and waste policies); • Widespread planned obsolescence within product chains” (11-12). 	<ul style="list-style-type: none"> • Design & Production • Production • Production • All • Consumption • Waste • Consumption • Waste • Consumption & Waste • Waste • All • All • All • All • All • All • Consumption • Waste • Consumption • Waste • All • Retail • All • Production
<p>Acceleratio (2015). This literature review has confirmed the gaps that act as barriers to the development of a Circular Economy, and therefore where further consideration of policy action may be beneficial in promoting the Circular Economy.</p>	

<ul style="list-style-type: none"> • “The lack of internalisation of externalities through policy or other measures and the lack of resource pricing (cost recovery and pricing for the resource itself), which lead to economic signals that do not encourage the efficient use of resources (i.e. as there are greater incentives to use materials more effectively) or a transition to a Circular Economy (i.e as resources become more costly there are increased incentives to reuse/recycle materials); • The lack of skills and investment in circular product design and production which could also facilitate re-use, repair, remanufacturing & recycling; • The lack of enablers to improve cross-cycle and cross-sector performance due inter alia to non-alignment of power and incentives for transformation between actors within and across value chains; • The lack of consumer and business acceptance regarding consumer-as-user e.g. leasing rather than owning, and performance-based payment models; • The lack of know-how and economic incentives including for repair and reuse; • The lack of consumer information on origins and perishability of products is not helping to raise consumer awareness on Circular Economy aspects; • The lack of waste separation at source (especially for food waste and packaging); • The lack of sustainable procurement incentives by public authorities; • The lack of investment and innovation in recycling and recovery infrastructure and technologies; • The lack of harmonisation of transport flows systems within and between municipalities, which leads to confusion among shippers and transporters; • Weaknesses in policy coherence (e.g. bioenergy and waste policies); • Challenges in obtaining suitable finance for new Circular Economy Business Models; • Widespread planned obsolescence within product chains. 		<ul style="list-style-type: none"> • All • Design & Production • All • Consumption • Waste • Consumption • Waste • All • All • Retail • All • Production • Production 			
<p>This list is non-exhaustive but covers the main barriers to the development of a Circular Economy” (pp.5-6).</p>					
Value Chain Step	Design	Production	Retail	Consumption	Waste
Points	16(2)	21(7)	16(2)	21(7)	22(8)

Table III.2.6 - Barriers identification and match with value chain steps (Own 2018).

In Table III.2.6 the green identifies the elements which are present twice; the last row with the points represents the total number of times that the barrier refers to a single step of the value chain: the number in parenthesis represents the times when the step has been mentioned specifically.

In general, what comes out from the list in the Table III.2.6 is that information, resources and financing, technological aspects and the policy framework itself are believed to be the weak points to work on in the perspective of a shift towards an economy which embraces the CE principles. More specifically, with a total of 22 points, the waste step of the value chain is the one linked to the highest number of barriers and, consequently, challenges. This confirms also the arguments stated in several papers and publications on the topic and provides an additional reason to the authors of this work to start from the waste sphere.

This trend is also confirmed by the work of Geng & Doberstein (2008). The paper tells about the current situation of CE implementation in China and the authors individuate in their conclusions a series of barriers and challenges linked to three different topics, policy, technology and public participation. Although the Chinese situation is slightly different (see Section 1.3, Chapter 2), these barriers are useful to highlight the parts of the value chain that are generally weak. More precisely, they individuate the following barriers in China:

<p>Geng & Doberstein (2008: pp.234-237).</p>	
<ul style="list-style-type: none"> • Fragmented regulation system often works against CE innovations: <ul style="list-style-type: none"> ○ It is still much cheaper to buy some virgin materials; ○ “Fees charged for effluent discharges are still too low”, industries are not afraid of paying; 	<ul style="list-style-type: none"> • All ○ All ○ Waste

<ul style="list-style-type: none"> ○ Incompleteness of consumption taxes policy, i.e. some goods which are a threat for the environment are not regulated; ○ No incentives from policy perspective for sustaining scavenger and decomposer companies; ● Demand for environmental technologies is still too weak; ● Technical capabilities and financial resources are inadequate; ● “Better [and more integrated] information system is required to find more environmentally and financially beneficial ways to plan and manage their resources”; ● Lack of “human and institutional capacities to encourage public participation in a Circular Economy”, capacity building is believed to be imperative for initiate Circular Economy principles. 	<ul style="list-style-type: none"> ○ Consumption ○ Waste ● All ● All ● All ● All
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Table III.2.7 – Barriers to the implementation of CE principles in China. The trend individuated in the previous Table III.2.6 has been confirmed with 7 points for the waste step (Own 2018).

The stage related to waste represents again the one with more challenges, even though Chinese concept of CE is extremely production oriented (see Section 1.3, Part II).

Generally, it can be said that towards CE paradigm, financial, political and institutional barriers interpose. Such are for example the cost of recycling, the value of land ion cities, different interests in play among the actors involved in this dynamic and the political pressure of continuous growth (Williams 2018).

Other than the barriers identified in the previous Tables III.2.6 and III.2.7, the European Commission (2014) stated that some policies currently active at the European level may act as barrier. However, these barriers represent a too broad topic which goes far beyond the objectives of the present master thesis (for an overview, cf. EC 2014: p.37).

2.2 Opportunities

The already aforementioned studies (EC 2014; CEN 2015) conducted for the EU have laid the groundwork for the *EU Action plan for the Circular Economy*, a communication of the European Commission released in December 2015 (EC 2015).

In this plan, Circular Economy is defined as an approach by which “the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised” (EC 2015: p.2). Furthermore, in its pages it is clearly stated that CE represents “an essential contribution to the EU's efforts to develop a sustainable, low carbon, resource efficient and competitive economy” and again “Such transition is the opportunity to transform our economy and generate new and sustainable competitive advantages for Europe” (EC 2015: p.2).

All these three documents have highlighted not only barriers but also challenges and opportunities. This section aims to present such results.

2.2.1 Sectors

The European Commission individuates three main sectors²¹ in which CE actions should take place, namely Production (which includes both design and production processes), Consumption and Waste Management (CE 2015).

Product design

The principles of CE reach the early stage of product design: the aim here is the production of goods which are “more durable or easier to repair, upgrade or remanufacture” (EC 2015: p.3). In this way, at the end of life stage of the product the recyclers are facilitated in the disassemble activities in order to recover more parts as possible. Unfortunately, the current market situation does not reveal particular interests in this stage, mainly due to

²¹ These sectors are derived from other studies drafted on behalf of the EU. In other documents, they have been called domains and are named material resource management, which includes waste section, sustainable consumption and sustainable production (CEN 2015: p.12). It is interested to note that in this list waste management represents the first element of the triad.

misalignments of producers, users and recyclers activities (EC 2014; CEN 2015; EC 2015). However, this stage is especially relevant for electronic materials, which are not the topic of this work.

Production processes

Even if products are designed in smarter ways, an inadequate management of the production processes “can lead to lost business opportunities and significant waste generation” (EC 2015: p.4). In slightly contrast to CE principles, EU is aware that raw materials will consist a huge slice of the production phase: therefore, the Commission promotes the sustainable sourcing of raw material. The Commission committed itself to share best practices and to promote innovative industrial processes to enhance efficiency in this stage (EC 2015).

Consumption

On this side, the Commission is aware that the “choices made by [...] consumers can support or hamper the Circular Economy” (EC 2015: p.6). As this passage states, households are the main actors of this phase and especially their behaviour towards waste separation. Due also to discrepancies in the Waste Directives definitions (EC 2014) and in the various ways of translation from EU laws by the Member States, the mechanisms of waste separation at households' level can extremely vary between countries. Consequence of this problem was the Ecolabel which identified “the products that have reduced environmental impact thought their lifecycle” and have provided the households an easier guide for waste separation (EC 2015: p.6).

Another element that affects purchasing decisions is the price and EU has the aim of incentivise the usage of economic instruments “to ensure that product prices better reflect environmental costs” (EC 2015: p.6). Spreading behaviours related to reuse, repair and recycling of goods is also one point of the Commission that belongs to this stage: this element is tied to the topic of citizens information, which has proven to be of particular effect.

In the document innovative forms of consumptions are also mentioned, such as sharing products, consuming services, as well as promoting the use of digital platforms (EC 2015).

Waste management

As stated by the EU, “waste management plays a central role in the Circular Economy” in the extent in which it consists of the concrete application of the EU waste hierarchy (EC 2015: p.8). Main goal of the waste hierarchy is to allow the choice of the best possible option available in terms of high environmental outcomes. The way in which waste is firstly separated as source and then collected considerably influences the recycling rates of the materials.

A consistent part of the EU efforts in increasing the circularity within this phase is directed in the definition of recycling targets for materials and providing incentives for the development of innovative separation and collection technologies. One of the most challenging materials is represented by the residual waste (EC 2015: p.9), which is also one component of the present work. The illegal activities linked with the waste transportation represent one of the most difficult barriers to tackle, aspect that should be taken into consideration in the policy design phase.

In the case the material cannot be reused or repaired, recoverin its energy content is still the most preferable option. To this topic, the EU has performed several researches directed to the definition of waste-to-resource activities, with the aim of boosting the market for secondary raw materials and water reuse. At present, this sector of the market is rather small, but an improved waste management can initiate and support activities in this direction. One of the barriers individuated consists in the mistrust towards the quality of these materials. EU committed itself to design standard for their quality. A slightly different element is represented by the recycled nutrients, which are a “distinct and important category of secondary materials” (EC 2015: p.11): these are mainly derived by organic waste, which is the main topic of this research and of great important for who writes.

Logistic

“Lastly, as the transition to a Circular Economy has implications for logistics flows at all scales, drivers of a Circular Economy and associated barriers have been considered in the field of logistics. Logistical issues and solutions are cross-cutting, i.e. relevant at any stage of a value chain” (EC 2014: p.11). This field is also considered critical in particular for food and construction materials (CEN 2015).

2.2.2 Materials

As well as priority sectors are individuated, some materials are considered to be more urgent to tackle than others. Again, the EU action plan for the Circular Economy (EC 2015) gathers the results of other researches done previously.

Plastic

Related to this material, the first challenge individuated is its recycling. According to EC (2015), the usage of plastic in the EU has grown constantly in past years, but the percentage of this material recycled stays under 25% and around 50% is disposed (EC 2015: p.13). In general, this material has a long-term durability when it becomes waste. Moreover, plastic contains hazardous chemical which can threaten the biosphere if not treated carefully. Lately, innovative plastic materials which are biodegradable have been designed to overcome such problem. Given all these, most efforts are pointed to minimise the environmental impacts of this material at end-of-life (EC 2014: pp.17-18). Plastic is also one of the main components of packaging, another product which is considered of high priority (EC 2014: p.21). “They are also an important example to explore the range of cascading options for materials and the transition to a organic economy” (EC 2014: pp.VI-VII).

Food waste

“Food waste is an increasing concern in Europe” (EC 2015: p.14). It represents one of the two priority sectors according to the report of CEN (2015: pp.18-20) together with construction. Particularity of this material is that they can be localised with short cycles (see also Williams 2018). One of the most relevant threats related to this material is the discarding of still edible food, which create not only huge impacts on the environment, but also financial loss for consumers and the economy in general (EC 2015). Food waste occurs along the all chain, from production to consumption at home and this makes particularly hard to quantify it. Due to its link with households, it also represents a social dimension which has to do with behaviours of citizens and therefore the local administration is called to act a primary role EC 2015).

Critical raw materials

“Critical raw materials are both of high economic importance for the EU and vulnerable to supply disruption” (EC 2015: p.15). Those are the ones that can be found in electronic devices and through their extraction cause severe damages on environment. Currently, recycling rates of these materials are very low, causing several lost opportunities (EC 2015: p.16). Metals are identified by multiple studies as a priority area for circularity because of these characteristics (EC 2014: p.17).

Construction and demolition

“In volume terms, construction and demolition are among the biggest sources of waste in Europe” (EC 2015: p.16). The recycling rates of these materials vary a lot within the EU countries, but good practices exist. To this category belong several materials, each of them should be considered alone.

Biomass and organic products

Organic materials are all those elements which contain biological resources, such as wood or crops, and can be used for a wide range of products, also for producing energy (EC 2015: p.17). Per nature they are renewable and biodegradable and can be composted to create new forms of materials. Because of their adaptability they require to be monitored during their entire lifecycle. For agriculture products, for instance, the issue of land use enters in play consistently, creating pressure on municipalities for their usage EC 2015: p.17). The most positive characteristic of these materials is that the cascading process that distinguishes CE approaches can be feature several times, without relevant loss in the quality of the final product: such practices are called biomimicry, which is an attempt to mimic the nature as the perfect natural circular system.

3. Actors of the Circular Economy and innovation within European Union

The process towards a more circular approach needs stakeholders to implement it. The EU, in contrast with the theoretical conceptualisation of CE, attributes a high value to the social sphere and dedicates part of its effort in the correct identification of the potential stakeholders.

Firstly, it is important for the EU to bring together not only the right actors, but principally to gather them “as early as possible” (CEN 2015: p.22). According to this guide, those stakeholders are the ones that:

- Exploit natural resources for producing other materials or to convert them in energy

- Produce goods
- Commercialise products
- Collect and process waste, in particular the ones defined in the literature as scavenger and decomposer (Geng & Doberstein 2008)
- Consume goods, intended as both products and services

Citing the Circular Economy action plan of December 2015, through its actions, EU “will drive investments and create a level playing field, remove obstacles [derived] from European legislation [...] and ensure favourable conditions for innovation and the involvement of all stakeholders” (EC 2015: p.2).

However, the complexity of the topics related to CE and its demand for innovation call for a new type of actor which should be able to unify old and new, theory and practice: this is known with the name of innovative actor (Küçüksayraç et al. 2015). However, obstacles and challenges are present (see Section 2.1). Because of this, EU “explores a pilot approach to help innovators facing regulatory obstacles” favouring the stipulation of agreements between private stakeholders and public authorities: innovation deals²² (EC 2015: p.18).

These agreements are added to a wide range of existing Horizon 2020 programmes (e.g. FORCE and REPAIR) with the aim of “supporting innovative projects relevant to the Circular Economy, in fields such as waste prevention and management, food waste, remanufacturing, sustainable process industry, industrial symbiosis, and the bioeconomy” (EC 2015: p.18). EU helps do not stop to this instrument: other funding opportunities can be received under the Cohesion Policy, by which the Circular Economy is considered a priority and should be faced in Smart Specialisation Strategies (RIS3) of the Member States (EC 2015): such initiative provides a framework for a comprehensive innovation strategy aiming at enhancing the capacity of Europe to “deliver smart, sustainable and inclusive growth” (Foray 2015: p.13). Goal of the strategy is to deliver policy guidelines to influence the design of regional research and innovation strategies, especially in terms of efficient allocation of public resources (Foray 2015).

The Smart Specialisation is now part of the strategies that European Union has developed. Inside the Europe 2020 strategy, Smart Specialisation is part of one of the 7 key elements (Flagships) - the Europe 2020 Flagship Initiative Innovation Union - presented in 2010 by the European Commission (EU 2017a). Through this strategy, EU aims to:

- make Europe into a world-class science performer;
- remove obstacles to innovation which currently prevent ideas getting quickly to market; and
- revolutionise the way public and private sectors work together, notably through Innovation Partnerships between the European institutions, national and regional authorities and businesses (EU 2017b).

To reach these ambitious goals, the Commission has developed in 2012 a Guide to RIS3 for policy-makers. Here, strategies for Smart Specialisation are defined as “national/regional research and innovation strategies for smart specialisation (RIS3) are integrated, place-based economic transformation agendas” (EC 2012: p.8, Box 1).

Among others, RIS3 points towards the involvement of SMEs, including social enterprises, exploring alternative financing methods from public and private sources: this is believed to be “a key contribution to the Circular Economy [because SMEs] are particularly active in fields such as recycling, repair, and innovation”, fields which are all strictly tied with waste management, confirming the results of the Section 2.2 (EC 2015: p.19). Certainly, challenges for SMEs are not missing, mainly related to funding access and the “difficulty of taking account of the Circular Economy” in their core business (EC 2015: p.19). To help overcoming such barriers, EU has established support infrastructures, e.g. the Research and Innovation Strategies for Smart Specialisation (RIS3) Platform in 2011 located in Seville, Spain, which provides “technical assistance and develops a programme of peer review, knowledge sharing and experience exchanges” (Foray 2015: p.13).

The Commission is also willing to actively involve stakeholders in the implementation of its action plan towards Circular Economy. “This will be complemented by further support for public private partnerships, voluntary business approaches, exchange of best practice among Member States and regions, and will include consultation with social partners where changes may have important social implications” (EC 2015: p.20).

²² Visit also the platform at the following link: <https://ec.europa.eu/research/innovation-deals/index.cfm> (EC n.d.).

The monitoring of the progresses done in the Member States in the implementation of CE principles calls also, eventually, for the participation of all stakeholders in play, especially the ones at local level working in direct contact and facing physical changes of circular projects.

4. Main findings

Looking back at the theoretical conceptualisation of Circular Economy, the question in the policy-making sphere is: what kind of policy framework would make possible such a radical transformation from a linear towards a circular system? (STOA 2017). In the political level, it took around one decade before the declared promise for the EU to reach a complete policy proposal for the transition towards a Circular Economy (i.e. the communication 'Towards a Circular Economy: a zero-waste programme for Europe' in July 2014), firstly with the EU's 6th Environment Action Programme – adopted in 2002 and promoting the shift to seeing waste as a valued resource – followed by the 7th Environmental Action Programme – adopted in 2013 and setting the vision for 2050 with a Circular Economy within the European Union.

Beyond the fact that EU promise towards a Circular Economy policy has not reached its final shape yet, some conclusions can be drawn based on the initial intentions towards its definition and launching. Even though this commitment is presented as a development strategy which involves economic growth without increasing consumption of resources – with measures covering the whole cycle from production and consumption to waste management and the market for secondary raw materials – it appears clear that a strict relation to the waste policy area exists. This can be interpreted in such a way, since the legislative proposals launched by the Circular Economy Package focus mainly on the waste management phase. On the other side, the other initiatives (included in the Action Plan), covering the whole cycle, point more on rising the awareness of economic operators and society. From the overview presented in this Part, it can be understood that EU sees the waste management as a very important step towards producing high quality secondary raw materials that can be fed back into production processes (EC 2015; STOA 2017), and therefore it could play a key role in the overall transformation towards a resource efficient Circular Economy. As a result, it can be argued that waste management is expected to play a key role within this transition.

Additionally, although the Circular Economy approach goes beyond the waste management, still the European Commission acknowledges that waste management is a crucial element for reducing linear patterns of production and consumption. As also STOA (2017) sustain in their report 'Towards a Circular Economy - Waste management in the EU', the Circular Economy connects the waste management to other policy areas (i.e. production, consumption, and general policy frameworks), which is seen as a policy innovation at the EU level.

For what concerns barriers, the review work performed in Chapter 2 has observed that the most challenges refer to the waste management step of the value chain, in high contrast to the theory (see Part II). Lack of information among the actors within the value chain (citizens included), lack of incentives and investments on innovative technologies for recycling a reuse practices and a rather low separation at source have been individuated as the main barriers to tackle.

This trend is also confirmed by the EU Action Plan towards a Circular Economy (EC 2015) where waste management figures out as one of the most important opportunity fields to work on. Some materials are more urgent than others as well. Plastic, food waste, construction and demolition, and biomass and organic products see the most challenges linked to the waste management part. Especially, the last material has a great potential if principles of CE are followed, in particular at the local level for what concerns food waste and biomass and organic materials (see Section 2.2). Thanks to its high re-usability into energy or new raw materials (e.g. compost and pellet) and low environmental impacts when disposed or treated, biomass and organic materials have great potentials and are suitable for many different circular uses (EC 2015).

Said that, it is clear that EU alone cannot make the European economy circular and this transition – as also the Commission itself calls for – will need a long-term joint effort from different actors at all levels, from Member States, regions and cities, to businesses and citizens.

To deal with such complexity, it is important to involve the right actors. The CEN (2015) report suggests a series of actors which can be found along the value chain of products, consisting principally on SMEs. In doing so, the Commission has studied different instruments to bring together different actors typologies through the Horizon 2020 programmes as well. Besides, EU approaches the Circular Economy by promoting the idea of innovation, which several other initiatives refer to, such as the Cohesion Policy and, among all, the Research Innovation for Smart Specialisation Strategy (RIS3) (Foray 2015). The last one strengthens the relation between research innovation and the private sector, and favours new forms of agreements within these areas with the aim of overcoming obstacles present in the current system (EU 2017).

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*Experience without theory is blind, but theory
without experience is mere intellectual play*

(Immanuel Kant)

PART IV

From Theory and Policy to Praxis

The first chapter highlights the main characteristics from the theoretical background and from the European Union understanding of the Circular Economy concept which are considered fundamental by the authors of this work to start a reasoning on its implication on praxis. This introduction has led to the identification of two issues that we repute to be of great interest to discuss, namely the importance of the local level on taking actions towards Circular Economy claimed by EU, and second, on the potential contribution that the urban planning discipline can provide within these interventions through its practitioners. Finally, the choice and analytical approach for the case study considered in this work is introduced.

1. Lessons learnt from Theory and Policy

From the literature review and the EU policy commitment on Circular Economy, conducted respectively in Part II and Part III, an effort to frame this last approach on the policy level within the theoretical one can be briefly outlined. The theoretical review of CE showed that the concept itself gleans in very diverse theories – with the special attempt of merging ecology with economy – and it takes its main principles from the ‘sustainable growth’. Further, CE (see Chapter 3, Part II) from a theoretical perspective is defined in this work as a restorative or regenerative model by intention and design to the current one with a focus on sustainability aspects aiming to a closed-loop model of the economy which is based on the 3R principles (Reduction, Reuse and Recycle). Within this theoretical framework, the European Commission intention on a CE policy for the EU (see Chapter 4, Part III) has identified the waste management as the focus area to start with for the overall transformation towards a resource efficient Circular Economy. This policy approach can be interpreted as the answer to a currently self-claimed non-efficient European economy by the European Commission because of an extensive loss of potential secondary raw materials. Still, the waste management focus is not seen to act alone within this transition, instead, as also STOA (2017) sustains, it must be intended as interconnected to other policy areas (i.e. production, consumption, and general policy frameworks).

However, it must be stated that CE from theory (Chapter 1, Part II) as a policy framework presents considerable limits when applied to the city scale. According to its conceptualisation, the concept focuses on the production phase, mentions consumption patterns and leaves aside waste management aspects, in sharp contrast with the theoretical assumption of inclusiveness that it pursues. After all, the name itself seems to refer only on business side. This focus makes CE conceptualisation as an urban policy framework not suitable for tackling the complexity that characterises urban settlements, which are to the contrary a mix of economic, environmental, social and technological systems. Additionally, it is also argued by scholars that the social aspect is extremely underestimated by the concept of CE, aiming only at job creation. Hence, CE as a framework for urban policy-making leaves aside important social aspects, i.e. fairness, equality and equity.

The definition that European Union attributes to this concept is broader and seems to suit better the city characteristics, demonstrating a higher degree of concreteness. As a matter of fact, not only EU gives suggestions for production, consumption and waste management practices, emphasising the importance of the last one, but also stresses the need of citizens’ involvement within its framework to promote virtuous behaviours from the bottom. Moreover, policies at EU level are always inter-connected, obliging who in charge of the transposition to the national level to consider also other policy areas, speaking about social aspects: the social cohesion policy.

In addition, the theoretical conceptualisation and the EU approach to a CE as implied to the city scale leaves aside the important aspect of the impacts on the physical environment by the implementation of circular projects. A system which regards material production, transportation, consumption and reuse/repair/recycling actions is highly dependent on infrastructures, available or to be developed, which have to be organised on the territory (see Section 1.2).

Talking about European Union level and environment, it is immediate to analyse the relation with the sustainable development paradigm. Sustainable development has been leading every action on land use internationally since the Brundtland report has been published in 1987 with the fundamental idea that the future of the planet Earth has to be protected from inconsiderate economic development at the expense of the environment: the basic principle is to repair at the disastrous mistakes that industrial and technological revolution has provoked for ensuring the future generation a better life. However, it is the opinion of many scholars that sustainable development has failed in representing a framework, because it did not, in fact, deliver clear guidelines for the transformation of the territory, due also to the ambiguities and mystifications of the concept ‘sustainable’, which results hard to define. At this point, the issue is if the CE paradigm can be eligible to take the place of sustainable development, thanks to its more technical approach. However, as already argued previously, the perspective that both the conceptualisation and the EU provide of this concept results to be too limited.

Speaking about the relation between CE and sustainable development, it can be stated that these two are not complementary concepts, because they act at two different scales, with sustainable development situated at a much higher position than CE. The difference lies on the fact that CE has a more action-oriented approach than the sustainable development. Moreover, both aspects have revealed themselves unable to include social aspects. In this sense, a CE framework for urban policy and praxis (which can be linked to the concept of Circular City – see Section 1.1) might be eligible to take the place of sustainable development framework. However, this theme lies outside the purpose of the present work and therefore we pose this issue for further researches.

1.1. Circular Economy – A local issue

As seen until this point, the Circular Economy is an immensely ambiguous and complex concept, with claimed potential impacts throughout the economy and the environment. Its definitions, approaches, levels and areas of application vary a lot in theory and practice. Another relevant aspect to these characteristics of the concept may lie also on the fact that it has probably not come to an end shape yet. Said that, at this point, CE can be understood as a guiding paradigm, a further step that have been taken to reach the goals of sustainable development paradigm, always keeping in mind that its principles should be taken with a grain of salt to avoid disillusionments. In the political level – even though at this point CE is considered as deficit to address all issues of a sustainable development – it can represent a coherent framework, yet requiring further efforts to integrate other relevant aspects, for initiatives and strategies at all levels of governance connecting the social, economic and environmental dimensions (see Chapter 1). It is clear that – as also the Commission claims – international bodies like EU cannot work alone towards a more circular European economy, and this transition will need a long-term joint effort from different actors at all levels, from Member States, regions and cities, to businesses and citizens. Moreover, the Circular Economy paradigm calls not only for the involvement of institutions and public/private stakeholders, but also for a coordination and integration of different policies at every level (Dell’Olmo 2017): from the international to the very local - being it municipality and/or region.

As seen also in Part II, CE concept has its roots in the local context with its various applications around the world of business and industry. What is of concern here are its implications for the urban agenda and its potential benefits. As cities are likely to experience greater rates of urbanisation in the coming decades, they are as well expected to pay more importance and attention towards their urban development. Therefore, the issue of growing urbanisation rates in the future calls for new and more sustainable models of urban development. EMF (2017), in their report ‘Cities in the Circular Economy: an initial exploration’, gathers several negative impacts which have arisen particular concern from urban policymakers in recent years, especially concerning the environmental issues. These include air, water, and noise pollution, the release of toxic substances, and greenhouse gas emissions (all negative externalities of the linear model of cities development). These challenges are making it always difficult for cities to remain competitive, in terms of being able to attract people, businesses, and diverse economic activities. Moreover, these are seen as at the base of a fragile socio-economic situation, faced nowadays in different cities and countries around the world. EMF (2017) mentions the cities as on the frontline for the increasing need for change of the current linear model.

On the other side, as EMF (2017) claims, cities could play a fundamental role and benefit from a global transition towards a Circular Economy: this thanks to their high concentration within a small geographic territory of resources, capital, data, and talent. From another perspective, the high density of businesses (especially retailers) and consumers makes cities concentrators of flows and also at the same time the hotbed of innovation, therefore as EMF (2015) advocates, city governments can generally move faster than their national counterparts towards the transition to the Circular Economy. In addition, cities or even regions have a deep knowledge of their local territories and potentials. Consequently, they are in the best position to create the favourable framework conditions, deploy targeted policies, mobilise regional stakeholders and boost synergies between economic sectors (Dell’Olmo 2017: p.24). On the other side, the benefits at the city/region level claimed by the CE paradigm involve a range of issues varying from the ones more traditional and already well developed – the stimulation of an innovation-rich urban economy (through systems to support the Circular Economy which could offer new sources for innovation in cities), the reduction of carbon emissions, the minimization of pressures on municipal services and budgets on waste management (through the minimisation of waste amounts), and the increment of disposable income for citizens (through the reduced cost of products and services) – to the less explored ones – the increasing of liveability

standards, and impact on employment opportunities in the cities (EMF 2017). As explained also in the Part I, CE points to address several tangible issues as well which can be considered collective problem as they concern the so-called ‘global character of environmental problems’ which are at the same time local issues (e.g. waste management, resource efficiency, and so on). At this phase, where the CE has high priority in the political agenda of EU but has not yet taken its final shape, the local level can already play a crucial role for more efficient and sustainable local economies, cities and regions, anticipating EU directives.

Approaches to the topic of CE concerning the local level vary a lot. Together with the development of CE paradigm, new concepts are emerging to describe its relation to the city/region framework. From a theoretical perspective, these approaches imply the integration and redesign of the 1) industrial system, 2) infrastructure system, 3) cultural framework, and 4) social system (Ghisellini et al. 2016). For this level, or the macro level as defined by Geng & Doberstein (2008) and Ghisellini et al. (2016), several approaches can be mentioned. Literature agrees on enumerating the ‘eco-city’ and ‘eco-provinces’ as the main attempt to reach circularity at city level and beyond.

Another emerging concept in the last years involving the application of the concept of CE at the local level is the ‘circular city’, which until now results in a lack of consensus on what it refers to. Different definitions are already available, such as “a city that practices CE principles to close resource loops, in partnership with the city’s stakeholders (citizens, community, business and knowledge stakeholders), to realize its vision of a future-proof city” (Prendeville et al. 2017: p.17). Another definition of the concept was provided in 2016, based on a variety of circular strategies undertaken and presented in a workshop by representatives from the cities of Amsterdam, Bristol, London, Paris, Peterborough and Stockholm. In the results report of this workshop “Circular Cities: Strategies, challenges and knowledge gaps”, which has seen participation of representatives from different fields of action, from a European perspective a circular city is described as a city that undertakes a set of seven circular strategies. “In a circular city resource flows are cyclical and localised through closed-loop, integrated systems, often resulting in reduced resource consumption, waste and CO₂ production (looping, localisation and optimisation). The built fabric is adaptable, flexible and recyclable (adaptation). Resources are re-used, recycled, recovered (looping) and shared (sharing). Renewable energy makes a significant contribution to the energy mix and there is a shift towards non-resource-based economies (substitution). The urban living environment adapts to people’s needs throughout the life-cycle, also evolving with cultural and demographic changes (adaptation). Natural capital is restored and regenerated. Ecosystem services actively support, regulate environmental processes and produce new resources within the city-region (regenerate)” (Williams 2016: p.7). Therefore, these seven circular strategies – looping, localisation, substitution, adaptation, sharing, optimising and regenerating natural capital – can be understood as integrated actions in delivering the circular city-region, where emphasis on each strategy varies on the context.

Finally, as observed also by Williams (2016: p.7) based on real case studies adopting circular strategies, the main goal of cities-regions in adopting this approach is to reduce resource consumption (i.e. land, energy and water as well as materials) and waste production. Moreover, it is seen as the way from the cities-regions to ensure the long-term sustainability of the city-regions natural ecosystem and urban infrastructure. Within this vision (i.e. circular city), from the perspective of EU legislative proposals, as explained also in this Part, waste management is addressed strategically as the focus area for the overall transformation towards a resource efficient Circular Economy. This may represent a good starting point but still not sufficient for tackling all the issues arisen as related to the ‘linear economy’ from the theory, and therefore in delivering the claimed benefits. This last issue is further explored with the empirical research in Hamburg.

1.2 Implications for the urban planning discipline

Because this thesis represents the arrival point of a long journey within urban planning studies, two unavoidable questions arise at this point: in this scenario, why urban planning should be concerned on Circular Economy implications on cities? And, how urban planning can contribute to circular strategies in cities?

Undoubtedly, Circular Economy takes inspiration from sustainable development principles (see Chapter 1, Part II). Since it is a rather ambiguous concept because the word “sustainability” can be seen and understood in a variety of ways, depending on who confronts with it, as Thompson & Beck (2014) argue, to tackle sustainable development

issue and the problematics which its conceptualisation rises applied into praxis, it is necessary to take an inclusive approach which offers the possibility to tackle different problems and provide various alternative solutions.

On the other side, tackling problems that the sustainable development targets with the perspective of Circular Economy requires a specialised know-how as well, especially when it comes to the development of technical solutions. In general, the current trend of sciences is specialisation: scientists tend to deepen their knowledge the more they can to become experts in their fields and create a personal expertise. Therefore, a specialised view as the one of the scientist is required.

Yet, specialisation might limit innovation. As extensively argued in Chapter 2, Part II, the definition of a problem influences significantly its perception and the consequent actions guiding toward its solution: a single and specialised definition might mean that relevant possible solutions are left aside. Therefore, a more comprehensive view seems to be preferred in circular projects (i.e. projects in the field of Circular Economy) because it has a systemic perspective both in terms of problem framing and in providing solutions, i.e. a perspective which is inclusive by nature (Thompson & Beck 2014). As a matter of fact, Circular Economy aims in taking different traditionally scattered and/or fragmented elements (e.g. production value chains, waste management sector, consumption) that contribute to find a balance mainly between economic development and environmental protection by combining all these elements in one network.

Urban planners and architects generally spurn the specialisation approach of the scientists opting for achieving the most general overview possible to get the overall mechanism by which ‘things’ work: elements that composed urban systems (i.e. infrastructures, environment and social aspects) and other intangible aspects that keep these systems together (e.g. economy, legal frameworks, urban policy, etc.) are object of the planner interpretation of the city. This interdisciplinarity of urban planning allows the systemic vision that Thompson & Beck (2014) refer to.

In studying where and when these dynamics occur and who takes its steps within them, one realised that exchanges happen especially at the city level, referred in the literature as the macro level (Geng & Doberstein 2008; Ghisellini et al. 2016 and others). As a matter of fact, Circular Economy conceptualisation calls to some extent for the localisation of material loops within the city boundaries as a way to reduce pollution and further resources exploitation due to transportation, for instance (see Section 1.1). This action implies a wise disposition of the relevant infrastructures part of the value chain on the territory, from production fields to disposal/recycling facilities: taking decisions on and determining the use and quality of land have always been a prerogative of planning activities.

Eventually, material flows do not remain within the boundaries, most of the time. The practices of disposal closed to urban settlements, for example, have contributed to worsen the market value of land, pushing local authorities to transport waste elsewhere (ESA 2017). Waste is even shipped to other countries which are paid to get rid of the waste because they have the technology or simply the space to do that. In this sense, keeping loops at local level is not always possible and calls for cross boundaries relations. To coordinate these flows, local, national and even transnational policies are needed and required to be connected (ESA 2017).

To sum up, it appears that developing projects which respond to the principles of Circular Economy requires a mix of specialised and comprehensive knowledge to combine different elements which take place within city boundaries and even beyond, implying a multi-scale dialogue: the aim is to create a solid network which is able to pursue circularity purposes and keep it functioning. All these given, it can be argued that these aspects seem to entitle urban planning as a highly suitable discipline to work on and with circular thematic thanks to the interdisciplinary knowledge that this discipline embodies towards the city and its relationship with the surrounding which allows connection of elements of different nature.

Now, designing circular systems implies choices on technological and technical level but also involves social and spatial actions, i.e. it requires an interdisciplinary approach, as argued extensively above. Indeed, technological and technical aspects can consider the best available solutions at the time but without a reasoning on the territory, i.e. where they these solutions take place, and the users that they are going to use, effectively, these solutions, efforts might result useless. As a matter of fact, unfortunate choices on the location may lead, for instance, to negative impacts on the environment which put under threat the health of the inhabitants living in the surroundings and contribute to damage the landscape (Petts & Eduljee 1994). Speaking of impacts on citizens, it becomes clear that circular projects have effects and require the inclusion of civil society. As extensively explained in Chapter 1, Part II,

CE conceptualisation seems to underestimate this aspect, promoting a more economic and business-oriented approach; approach which is not completely followed by the European Union (see Part III). As a matter of fact, by including social aspects the goal of the Circular Economy might be to raise citizens' awareness and teach them how to think circular, hence creating what can be called a circular society: this is not only a society able to separate waste, but it contributes with virtuous practices since the consumption of products and services (Murray et al. 2017; Williams 2018). Together with economic and environment systems, the social one contributes to form the complexity of urban system, they are all aspects strictly intertwined and cannot be separated (Lenhart et al. 2015). Circular Economy should aim to embrace all these.

The choice on technologies, on location and the ability of predicting and influencing/guiding behaviours imply the capacity of envisioning a future which is plausible. Among all, the urban planner is trained to create visions for the city's future and can provide metrics to help choosing among alternatives. Besides, a strong political leadership able to build adaptable future, "using experimental approaches [...], developing contextual knowledge about resource use, and engaging with diverse stakeholders" is considered vital for circular projects (Prendeville et al. 2017: p.1) and urban planners are known to work in and with political environment.

To conclude, the reasons adduced here for the urban planning to be interested in Circular Economy implications on cities are the following:

- Its comprehensiveness allows a systemic vision of the elements and their inter-relations in networks necessary to understand and describe the complexity of the urban system
- Interdisciplinary perspective helps to broaden interpretation of problems and to enlarge the alternatives among to choose
- Actions towards circularity occur and have spatial effects at the city level and even beyond, calling for a multi-scale approach

The urban planner can contribute to circular strategies in cities in the following ways:

- Find spatial/technical alternatives, provide metrics for choosing among these alternatives and warn about impacts and opportunities
- Create a vision and drive changes towards it
- Translate and bridge between different levels and sectors

In both REPAiR and FORCE projects, the HafenCity University - and in particular the urban and regional development department - is partner of the consortium and stands for the governance analysis of the various case studies. The task is therefore to understand at which point the governance background is helping (or impeding) the path towards a more circular approach within the case studies. In regard to the points listed above, one can attempt to attribute a role to the urban planner in the definition of circular projects, having in mind the categories explained in the public policy theory of Chapter 2, Part II. From the list above, it seems that the urban planner can play a determinant and peculiar role, i.e. the one of the broker: the act of bridging and translating between existing networks of actors from different levels and sectors can be performed by an individual that has an understanding of the problem(s) from different perspectives to address it/them from all sides; and the information of who among the stakeholders in the network can solve or deal with a specific issue.

2. Analytical Framework – Building the case study

Aim of this Chapter is to present the reasons that have led to the selection of the case study of the organic material stream in Hamburg. This choice has been taken according to some criteria, which are listed below:

- Data availability. This point was always the main driver especially because in this case it was fundamental to have numerical data of the material flow from REPAiR project.

- State of the art of Circular Economy initiatives in Hamburg. In the perspective of implementing Circular Economy related policies, the presence on the territory of on-going initiatives is helpful to understand if dynamics are already started.
- Difficulties in tackling the material stream. The material stream should be affordable for a master thesis, e.g. it should involve a few number of administrative levels. The presence of instruments or policies related to the material can provide insights on problematics, challenges and solutions to be tackled and pursued.
- EU dictations. The idea of this thesis started from the intention of the European Union to draft a policy on Circular Economy; therefore, understanding what the Commission believes are the priorities it is relevant. Moreover, documents from European Union related to Circular Economy have been considered.
- Presence of case studies. The availability of case studies facing the same material can support certain decisions on solutions and actions undertaken already somewhere else: this transfer must be done with accuracy, being aware especially on the context differences.

2.1 Why Hamburg?

The decision of the case study of Hamburg has been derived from the acknowledgment that both projects REPAiR and FORCE are currently taking place in this context. Moreover, Hamburg has a special governance situation: as a matter of fact, it is at the same time a municipality and a federal state. The coincidence of governmental bodies allows a much higher concentration of power and resources. The decision on focusing on a city retraces the hypothesis that CE has a strong component on the local level. Actions take place within the 4 phases – design, production, consumption and waste management – which have effects on the local levels and involve both private and public actors which are committed in establishing connections for their activities: the background scene of all these actions are the cities (see Section 1.1). Moreover, the research performed in the next Part V has shown that the City of Hamburg is particularly active in carrying on practices in the field of innovation together with other local actors (see Chapter 1, Part V).

2.2 Why organic material stream?

The reasons that have brought to the selection of the organic material stream is here discussed. Again, this is the material flow that is explored in REPAiR project. Because of this, a base in terms of data and general knowledge was already present. Moreover, this has facilitated the provision of the contacts of the main stakeholders. For what concerns the stream itself, organic materials are one of the five priority streams according to the Circular Economy Action Plan of the European Commission. It can be argued that dealing with the organic material means to focus on a more local scale, which makes the work slightly easier. Of course, this stream crosses as well the city boundaries, especially if one considers the goods import and export through the harbour activities and Hamburg owning the second biggest port in Europe.

Focusing on waste management, bio-waste (the end of life of organic matter) is seen from EU as problematic in case of non-proper disposal, such as incineration or landfilling, as related to the loss of material value through incineration and the production of methane from such decomposing processes in landfills. Whereas the proper bio-waste treatment – beside the avoided greenhouse gases – involves the production of compost and bio-gas contributing to enhanced soil quality and resource efficiency, as well as to energy self-sufficiency improvements (EC 2016).

Already in Chapter 2, Part III, the definition of organic material stream from the European Union has been proposed, i.e. are all those elements which contain biological resources, such as wood or crops, and can be used for a wide range of products, also for producing energy (EC 2015: p.17). Moreover, “as they are derived from renewable raw materials such as plants, organic products can help reduce CO₂ and offer other advantages such as lower toxicity or novel product characteristics (e.g. biodegradable plastic materials)” (EC n.d.). A characteristic that identifies organic products is their property of being used in cascades. Of course, their utilisation can never be unlimited, because of losses occurring in every step of the chain. As a matter of fact, the final stage of utilisation of this material is always either energetic or it leads to its disposal. According to the type of material, the primary organic product can be turned into secondary, tertiary or quaternary materials (Körner 2015: pp.302-305). Nowadays, the primary products are reused one time and even with a low value. Additionally, “a lot of secondary, tertiary, and quaternary

bioresources are wasted. They are often disposed. In best cases they are environmental-friendly treated to fulfil legislative guidelines, but with low utilization efficiency” (Körner 2015: p.306).

For this material actions embracing Circular Economy principles are not present in all the 4 phases of the chain. In the production phase something can be done to reduce waste of materials. On the consumption side, awareness campaigns can be done to inform citizens about new practices like food sharing and how to conserve at best the food. It is anyway in the waste management phase that the impacts of actions can bring to a relevant result (see above): again, the awareness campaigns seem to be central in this case to show how waste should be separated to facilitate its reuse later. For the design phase nothing can be done at present days directly on organic products, except for their packaging.

Moreover, the organic stream has been considered within other intervention areas of circular initiatives and/or strategies in other cities worldwide (see Circular Amsterdam and Ontario).

2.3 Analytical approach

The organic material stream as the focus stream in Hamburg was chosen with regard to the reasons explained above. The analysis of the case study was based on a series of steps considered of relevance for delivering the results to be then interpreted from the perspective of a collaborative governance aiming to improve the circularity of the material stream.

The first step consisted on grasping the national and local perspectives of Circular Economy practices and other innovation policies by means of a qualitative documents analysis of the policy framework in place. The results were interpreted for depicting the approach of the German and Hamburg policy towards the topic, as well as a background for the interviews framework of analysis.

Although the analysis for Hamburg goes beyond the waste management phase by exploring its relations as well with production and consumption side, this phase was considered strategic for the analysis of the case study. This decision was led by several reasons. First, when talking about ‘circularity’ or ‘leakage’ of materials within the cycle, due to the lack of useful data for monitoring resource flows, waste management phase can represent always (also at the EU level) a reliable area of indicators. Availability of the data on quantities and qualities of waste streams provide a picture of the situation with regard to problematics related to reprocessing of materials and their re-insertion in the production stage. Secondly, as related to Hamburg case study, REPAiR and FORCE projects have their focus on this phase of the chain. Third, the public waste company in Hamburg, Stadtreinigung Hamburg (SRH), is partner in both projects and therefore one of the everyday contacts. The company is in charge of the bio-waste collection from households – and in minor quantities from industries and commercial sectors – and, due to its public nature, main data are as well accessible by everyone on the internet: this allowed to recreate the flows of this material mainly within waste management stage in Hamburg. Fourth, the city of Hamburg has recently drafted a new waste management plan in which principles of Circular Economy are considered and main waste streams within Hamburg (both through private and public activities) are explained. The waste management of this material is undoubtedly more linked to the local scale than others: this is in line with our research question and also avoid complications coming from the international trades due to the presence of the port. Finally, EU dictations suggest the waste management phase as strategic when it comes to deliver Circular Economy projects.

Next step consisted on identifying within the waste management stage barriers related to the organic material stream as well as the implication of the other phases (production, consumption) on these problematics. The understanding of the status quo of the chosen material stream and potential changes that the improvements of this would cause was performed by means of Material Flow Analysis (MFA) method: the data were provided from the waste management documents analysis and from the experts’ interviews. Further, the MFA performed within the waste management area allowed also the identification of the relevant stakeholders within the material stream management activities. By interviewing some of the stakeholders, the network had been enlarged involving other relevant ones which actions or non-actions can have impacts on the organic material stream in Hamburg. Other stakeholders which do not belong to the organic stream but considered as necessary to achieve the objectives of the present project were as well investigated.

Within the identified network of stakeholders, innovative collaboration arrangements that can arise the possibility of success in tackling the identified problems were explored, based on the empirical research and the mechanisms/methods provided by policy studies (Chapter 2, Part II).

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Curiosity begins as an act of tearing to pieces or analysis.

(Samuel Alexander)

PART V

Hamburg Case Study – Analysis

This Part focus lies on exploring the case study on the organic material cycle in Hamburg. This occurs through an analysis methodology based on policy documents (in Chapter 1), the tool of material flow analysis (MFA, see Chapter 2), and interviews with relevant stakeholders derived from the case study (Chapter 3). The main objective of this analytical part is to capture the organic material flows and related activities throughout the cycle, the actors and their activities/responsibilities along the same, and the problematics that prevent the action of ‘closing the material cycle’.

1. State of the art of Circular Economy – National and local perspectives

The first chapter focuses on describing the governance context and policy initiatives in Hamburg on relevant topics of environmental policy, with a particular focus on the waste management area as the effort to introduce Circular Economy topic in the German policy framework and consequently in Hamburg.

1.1 Institutional framework and governance context

1.1.1 The city-state Hamburg – An introduction

The City of Hamburg, officially the Free and Hanseatic City of Hamburg (FHH), is a city-state and one of the 16 Federal States of the German Federal Republic. It is a republic, democratic welfare state and a constitutional state (*Land*) as well as a local municipality. The city government is organised at the Federal State level through the Hamburg State Parliament (*Hamburgische Bürgerschaft*) and thus there is no distinction between these administrative levels in Hamburg (Offizielles Stadtportal für Hamburg n.d.a).

Hamburg is the second-largest city in the country and the largest urban centre in north Germany, with around 1,770 million inhabitants consisting in 930,000 private households. It is the most densely populated German State with a population density of 2,366 inhabitants/km² (Eurostat 2017; cited in EC n.d.a).

With its population counting for approx. 2.2% of the total German population, Hamburg generated 3.6% of the German gross domestic product in 2015 (Senat FHH 2017). The economic output of Hamburg is among the strongest of the Federal States, where traditionally the dominant industries have been the wholesale and retail trade and shipbuilding (EURES 2017). Due to its geographic location with direct access to the North Sea via the Elbe river, it can be stated that Hamburg is situated in a strategic location, which has led recently to a large scale industrial and commercial development for the city. The development of the port as the second busiest port in Europe is pushed by the growing world trade transactions and the increasing turnover of goods (Senat FHH 2017). As a major transportation hub, Hamburg has also developed broader financial and infrastructural systems that have impacted on the employment rate in the city, where Hamburg has a comparatively low unemployment rate of 7.2% as of February 2017. In addition, with more than 320,000 people commuting into the region from the neighbouring Federal States, Hamburg can be considered as an employment hub in north Germany (EURES 2017). The economic structure of Hamburg is strongly influenced by the service sector, contributing with around 80% to the gross value added. Despite this data, Hamburg leads within Germany as one of the main industrial locations in the country with 108,500 establishments in 2014, consisting mainly of small and medium-sized enterprises (*Statistisches Jahrbuch Hamburg 2015/2016 Statistikamt Nord*) (Senat FHH 2017).

1.1.2 Institutional framework

As one of the three German city-states together with Berlin and Bremen, the Free and Hanseatic City of Hamburg (FHH) presents a particular governance and institutional framework. As previously stated, Hamburg is a city and a Federal State at the same time with no distinction between these administrative tasks. This takes place in two levels: a citywide and Federal State administration (Senate of Hamburg) and a local rank made of seven districts (*Bezirke*) (Offizielles Stadtportal für Hamburg n.d.a).

The Senate represents the executive power of the Hamburg government which includes the Senators (or Ministers) of the different ministries (*Behörden*) and is headed by the First Mayor. Therefore, the Senate represents the Federal State government and deals with several issues, such as representing the Free and Hanseatic City of Hamburg in dealing with the other Federal States, the federal government and other countries. The Senate is at the same time responsible for the municipal tasks and administration (Offizielles Stadtportal für Hamburg n.d.a; EC n.d.b). At the same time, the citizen's assembly (*Bürgerschaft*) of Hamburg represents the Federal State Parliament as well as the city council (Kramer 2005). The government agencies (*Fachbehörden*) of FHH – which correspond to ministries in other Federal States – beyond the Federal State affairs they carry out also the municipal tasks in cooperation with the districts (*Bezirke*) (Offizielles Stadtportal für Hamburg n.d.b). They strategically plan, steer and advise the Senate (Offizielles Stadtportal für Hamburg n.d.c). Each ministry is headed by a senator as member of the city-state

government i.e. the Senate. At the moment, there are eleven government agencies or ministries (*Fachbehörden*) in the FHH (see Table V.1.8) divided into numerous departments and offices. In addition, together with the ministries, there are two Senate Offices i.e. the Senate Chancellery and the Personnel Office, which have inter-ministerial tasks and where the First Mayor is the head of (Offizielles Stadtportal für Hamburg n.d.b).

Government Agency/Ministry	Fachbehörden
Ministry of Labor, Social Affairs, Family and Integration	<i>Behörde für Arbeit, Soziales, Familie und Integration</i>
Ministry of Health and Consumer Protection	<i>Behörde für Gesundheit und Verbraucherschutz</i>
Ministry of Justice	<i>Justizbehörde</i>
Ministry of Environment and Energy	<i>Behörde für Umwelt und Energie</i>
Ministry of Culture	<i>Kulturbehörde</i>
Ministry of Finance	<i>Finanzbehörde</i>
Ministry of Economics, Transport and Innovation	<i>Behörde für Wirtschaft, Verkehr und Innovation</i>
Ministry of Science, Research and Equality	<i>Behörde für Wissenschaft, Forschung und Gleichstellung</i>
Ministry of Internal Affairs and Sport	<i>Behörde für Inneres und Sport</i>
Ministry of Urban Development and Housing	<i>Behörde für Stadtentwicklung und Wohnen</i>
Ministry for School and Vocational Training	<i>Behörde für Schule und Berufsbildung</i>
Senate Offices	Senatsbehörden
State Chancellery	<i>Senatskanzlei</i>
Personnel Office	<i>Personalamt</i>

Table V.1.8 - FHH Federal State government (Offizielles Stadtportal für Hamburg n.d.c).

On the other side, the seven districts of Hamburg are comparable to the third-level administration in Germany and have minor rights to establish regulations that preside over questions of local importance to the districts (Offizielles Stadtportal für Hamburg n.d.a). Each district is led by a district Council Executive board together with a district assembly (TRANSFORM 2013). Their tasks concern mainly the administration of their territories and fulfilling Federal State and communal tasks assigned by the Senate (Kramer 2005).

1.1.3 Governance context

Germany's politics is notable regarding the considerable powers given to the Federal State and cities. The politics in the country is remarkably consensus-driven, where the Federal States meet weekly to discuss the state of affairs across their administrative territories within the nation, and within each Federal State (*Land*) cities and boroughs for what concerns the individual states. Another element contributing to this character of the country's politics is attributed to the Germany's existing financial equalization system redistributing tax revenues among the Federal States (BROOKINGS et al. 2017). Additional aspect of the governance within the Federal States, and especially in the case of Hamburg, lies in the collaboration between the government and the private sector, where several policy areas face a high degree of private actors' involvement. Examples involve several citywide strategies, such as the cluster policy – an integral component of the city's technology and innovation efforts, the model of a publicly owned and privately-run corporation, e.g. HafenCity urban development project (see Section 1.2) (BROOKINGS et al. 2017).

As a city and Federal State at the same time, Hamburg has a general competence in bringing forward all public affairs concerning its territory (Othengrafen 2012). It has considerable autonomy with regard to some policy fields. On one side, as a Federal State's government, the Senate is responsible for issues such as public education, public safety etc, whereas on the other side as a municipality, the Senate is responsible for more local issues such as libraries, recreational facilities, sanitation, water supply and welfare services (TRANSFORM 2013). The city-state's economic policy is oriented along strategic guidelines and in relation to ecological objectives: locational marketing, cluster policy innovation and real-estate policies are oriented towards these guidelines and objectives (EC n.d.a).

With regard to research and innovation policy, responsibilities lie between the Ministry of Economic Affairs, Transport and Innovation and the Ministry of Science, Research and Gender Equality. Especially the Ministry of Economic Affairs, Transport and Innovation steers the issues of regional growth, addressing them by promoting future-oriented sectors and clusters (see Section 1.2), enabling the development of key transport infrastructure and supporting research and development ²³ (EC n.d.a).

Within the urban planning policy area in Hamburg, the Ministry of Urban Planning and Housing (*Behörde für Stadtentwicklung und Wohnen BSW*) is responsible for planning policies and processes on city level. Below the city-level, the districts are responsible for the local development plans (*Bebauungsplan*) that need to follow the guidance of the preparatory land-use plan (*Flächennutzungsplan*). Under special occasions the City of Hamburg has the right to take over the local development planning from the districts, e.g. for projects of importance for the whole city. The districts additionally can produce spatial development concepts or thematic concepts to steer and stimulate planning processes (Wickel 2013)

In addition, Hamburg constitutes together with the neighbouring districts of the Federal States of Lower Saxony, Schleswig-Holstein and Mecklenburg-West Pomerania the Metropolitan Region of Hamburg: a platform for the city location branding, investment attraction, commerce, tourism, research, innovation and technology transfer, and also the territorial base for the policy clusters (see section 1.2) (EC n.d.a).

Concerning the waste management policy at the Federal State level the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (*Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit BMUB*) represents the government body responsible for the tasks of setting priorities, participating in laws actualisation and overseeing strategic planning, information and public relations, as well as defining requirements for waste facilities (EEA 2009; Fischer 2013).

1.1.4 The governance of Waste Management

In Germany the responsibility for the waste management and environmental protection is shared between the national government, the Federal States and the local authorities (EEA 2009).

The Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (*Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit BMUB*) tasks comprise setting priorities, participating in laws actualisation and overseeing strategic planning, information and public relations, as well as defining requirements for waste facilities (EEA 2009; Fischer 2013). Further, it leaves the implementation of the legal requirements set by the EU and national law to the Federal States and local authorities (EEA 2009).

Each Federal State is required to adopt its own waste management act, which contains supplementary and more detailed information to the national law (e.g. more severe norms on certain facilities and regional waste management concepts). As there is no national waste management planning in Germany, each Federal State has its own waste management plan (*Abfallwirtschaftsplan*) (EEA 2009) which contains supplementary and more detailed information and operational guidelines to the national law (e.g. more severe norms on certain facilities and regional waste management concepts). In Germany the extended producer responsibility introduced in 1991 (Fischer 2013) is the core of German waste legislation: at present it is applied to certain waste fractions such as packaging and waste electric and electronic equipment (EEA 2009).

The Recycling Management and Waste Act of 1996 assigns responsibility to the local public waste disposal authorities for waste generated by households: among other tasks, local waste disposal authorities are in charge of collecting and transporting waste, promoting waste prevention and recovery, planning, construction and operation of waste disposal facilities. Finally, within this framework municipalities have more practical tasks such as those of providing sites for waste collection (Arcadis 2014; EEA 2009; Fischer 2013).

Municipal waste management structure in the city-state of Hamburg is based on the division of tasks between the public local waste disposal authority and the private waste management industry. The framework is completed by the various schemes within the context of extended producer responsibility (EPR) (Senat FHH 2017).

²³ i.e. development of research and cooperation infrastructure; supporting application-oriented research, training and education; developing a new innovation portal and acting as the university-industry contact point (EC n.d.a).

Local public waste disposal authorities and the municipality activities and competences

The Free and Hanseatic City of Hamburg (FHH) has the tasks of implementation of the legal requirements set by the EU and national law.

As a Federal State, FHH is left with the task to adopt its own waste management act and plan (EEA 2009). At the Federal State level, in the Ministry of Environment and Energy (*Behörde für Umwelt und Energie*), the department for waste management (*Abteilung Abfallwirtschaft*) is the supreme agency for waste management in Hamburg. It is responsible for all ministerial and administrative duties concerning waste management and for controlling Hamburg's local waste management company, known as Stadtreinigung Hamburg (SRH) (BUE 2017).

The public waste management and cleaning company Stadtreinigung Hamburg (SRH) is the responsible body for the collection, treatment and disposal of waste from households, with the exception of packaging material stream where the private sector (i.e. "dual" system) is responsible for (Boisch 2013). Conducted by 2,700 employees, SRH activities cover 924,000 households and more than 100.000 business units (SRH 2017) and also include street cleaning, cleaning of public toilets and winter services. As a public company, SRH is owned completely by the City of Hamburg. The City is hence represented in the supervisory board of the SRH and therewith involved in decision making (Expert SRH_1 2018). They are by law obliged to take care of households' waste (bio and residual waste), a small fraction of the commercial waste, street cleaning, winter service and public toilets (Senat FHH 2017). SRH releases every year a report of their activities, which has represented one of the main source in the writing of this and the following sections. It is worth to note that SRH is engaged in and interested, among all, to environmental issues and to citizens' participation, element that shines through also in the table of context (see SRH 2017: p.2).

Moreover, Stadtreinigung Hamburg operates different collection systems that ensure separate collection and recycling of recyclable waste, the collection of pollutants from residual waste and ensure their proper disposal (see Section 2.1). Stadtreinigung Hamburg operates 12 recycling stations on which different types of waste can be delivered and owns around 900 container storage locations. In addition, commercial waste is also to be disposed by SRH, provided that the waste cannot be recycled and is therefore included in the waste exclusion regulation (*Abfall Ausschluss Verordnung, AbfAusschlussVO*) (Senat FHH 2017).

Private sector activities and competences

In addition to the public waste disposal authority, the private disposal sector is also an important pillar for the disposal of municipal waste. Regarding the disposal of commercial waste, the responsibility in Hamburg falls mainly on the private sector, where mostly medium-sized waste disposal certified companies compete on a market basis with each other. The services offered by these certified companies include collection, transport, pre-treatment, (temporary) storage, recovery and disposal of waste. At the same time, the private waste management companies are involved in various collection systems from SRH and other service providers (e.g. EPR schemes) (Senat FHH 2017).

Producer associations activities and competences

With regard to the producer responsibility schemes, waste producers have established associations in dealing with their recover and disposal obligations assigned by the law. In Hamburg there are currently two associations coping with these tasks:

- FHE Disposal Association of the branch of retail, wholesale and foreign trade with currently approx. 460 members (*FHE-Entsorgungsverband der Branche Einzel-, Groß- und Außenhandel*)
- Disposal Association of the North German Handicraft (ENH) with approx. 420 members (*der Entsorgungsverband des Norddeutschen Handwerks*)

In addition, both associations have concluded a cooperation agreement with Stadtreinigung Hamburg for the disposal of mixed commercial waste, where the disposal services for a fraction of it i.e. non-sortable household-like commercial waste is carried out by Stadtreinigung Hamburg (Senat FHH 2017).

1.2 Policy perspective – From climate policy to Circular Economy

In 2009 Hamburg was elected by the European Commission as “European Green Capital 2011”. The city was and continues to be considered as a “green”, sustainable, environmentally conscious and innovative city (BUE 2016).

The demographics forecasts predict that up to 1.9 million people will be living in Hamburg by the mid-2030s which face Hamburg with challenges regarding the social and environmental policy. For the city-state of Hamburg this means that the housing supply and urban infrastructure have to be expanded accordingly (BUE 2016). Considering these emerging issues, the City of Hamburg has developed projects and strategies in the recent years to address the needs of a growing city in line with its commitment towards environmental and climate protection. Hence, this section focuses on presenting a non-exhaustive number of environmental policies, projects and initiatives in place in Hamburg, as a framework to understand the City’s commitment to the emerging issues above-mentioned. It follows the introduction of the Circular Economy topic in the German and Hamburg policy framework. Therefore, this section outlines the commitment of the city-state of Hamburg in the following areas:

1. climate protection and climate change adaptation
2. energy transition policy
3. urban development projects
4. cooperation with industry and civic actors
5. waste management policy and the commitment to a circular economy

1.2.1 Climate protection and climate change adaptation

The first concentrated and integrated effort of the climate action policy i.e. Hamburg’s Climate Action Plan 2007-2012, was completed by managing to reduce the carbon emissions in its territory by 2 million tons with regard to 2007 and therefore by successfully meeting the main objective of the Climate Action Plan. As a continuation of the Hamburg Senate’ climate policy, the Climate Action Master Plan was adopted in 2013 by putting forward these efforts (BUE 2016). This Master Plan has provided Hamburg with a vision of a modern city where climate mitigation and climate adaptation are integrated and where “Hamburg becomes a Climate Smart City” (Senat FHH n.d.a) In addition, Hamburg aims to achieve a big contribution to the national goal of reducing carbon emissions of 40% by 2020 with regard to the emissions level in 1990. At the same time, carbon emissions are to be reduced by at least 80% by 2050 (Senat FHH 2011). The Climate Action Master Plan was then complemented with the new Action Plan with the ambitious resolution to halve carbon emissions by 2030 as compared with 1990 levels. Additionally, the Climate Plan 2015 sets as well cross-sectoral objectives and measures e.g. integrated climate-friendly urban and district development (BUE 2016).

Some examples of climate protection measures include:

- Hamburg has set itself the goal of making the Federal State administration largely carbon neutral by 2030 or, failing that, to compensate for its carbon dioxide emissions;
- Renovation concepts and roadmaps for city owned buildings will be drawn up by the end of 2017;
- Underground and suburban railway lines will be expanded, electric mobility promoted, and low-emission buses deployed. The proportion of electric cars in the fleets of public authorities will double to 50% by 2020;
- The share of bicycle traffic in the transport sector will double to 25% sometime in the 2020s;
- More educational work will be performed at schools and for adolescents in a bid to encourage younger generations to actively contribute to climate protection (BUE 2016).

Examples of adaptation measures from the Climate Plan include:

- Flood control and protection against storm surges to be intensified;
- More climate-resilient trees and plants to be grown in the city;
- The Rain InfraStructure Adaption (RISA) project to be implemented in order to counter inland flood events and flooding due to severe cloudbursts. This includes, for example, the expanded use and promotion of green roofs (BUE 2016).

Some of the initiatives within the climate policy include:

The energy-efficient retrofitting of public buildings initiative

In order to reach the climate change mitigation targets, Hamburg is investing in energy rehabilitation and technology in the publicly owned buildings. The Senate has called for the extensive energy-efficient retrofitting of public buildings by 2050. The aim is to reduce the final consumption of energy by 30 per cent by 2030 and primary energy consumption by 80 per cent by 2050 as compared to 2008 (BUE 2016).

The green roof strategy

Hamburg is the first city in Germany to develop its own comprehensive Green Roof Strategy. The objective is to create 100 additional hectares of green roofs in the urban area by 2020. The project was initiated by the Ministry for Environment and Energy in cooperation with HafenCity University (BUE 2016).

1.2.2 Energy transition policy

Since 2011 with the reactor disaster in Fukushima, the energy policy in Germany has changed towards the abandon of the nuclear energy, and by 2050 Germany's electricity production is to be generated from renewable resources. On the other side, Hamburg has set the goal to make its energy supply more sustainable and climate-friendly. Towards this transformation, Hamburg is focusing on three areas: reducing energy consumption by achieving greater energy efficiency; introducing smart grids; and promoting more energy from renewable sources (BUE 2016).

Some of the initiatives within the energy policy include:

NEW 4.0 project

Through the North German Energy Transition (NEW 4.0) project starting in 2016, the two northern German Federal States (Schleswig Holstein and Hamburg) have jointly demonstrated how – through intelligently coupling electricity generation with electricity storage and consumption – 70% of the region's energy needs can be met using renewable energy by 2025. In this project funded by the federal government, more than 60 north German partners from industry and science have joined forces forming an innovation alliance (BUE 2016).

Hamburg Energie: the city's own utility company

Since the 90s the power supply in Hamburg has been privatised and since 2009 the city has its own municipal electricity supplier again i.e. Hamburg Energie, providing to more than 100,000 customers with climate-friendly, coal-free, nuclear-free energy as well as gas products with a high proportion of biogas. The city owned company has been developing also as an innovative energy generator by offering solutions in the area of renewable energies and combined heat and power (BUE 2016).

The city as a network operator of energy grids

As decided in the 2013 referendum with the citizens, the City of Hamburg should completely buy back the electricity, gas distribution networks and the supply of district heating as well. Moreover, the city should meet – based on renewable energy technologies – the objective of ensuring a climate-friendly supply of energy. As a result, the electricity grid is now fully owned since 2015 by the city. The reacquisition of the gas grid and the supply of district heating are to be assessed in 2018 and 2019. Currently the city owns 25.1% of these infrastructures and operations (BUE 2016).

The Grid Advisory Council

The City of Hamburg has lately established the Energy Grid Advisory Council – a new model of participation in energy policy – including representatives from environmental associations and initiatives, chambers, industry and trade unions, academia and the parties in the Hamburg Parliament. The objective of the Council is to provide advice to Hamburg's administration to be incorporated into the city's energy policy in the future (BUE 2016).

Energy Bunker and Energy Hill

The objective of the use of renewable energy technologies is an important objective for the City and the projects of Energy Bunker and Georgswerder Energy Hill represent valid examples from this commitment.

The first project i.e. Energy Bunker is an example of transition to decentralised energy supply through renewable energy. The former artillery bunker has been transformed into a renewable local power plant with solar collectors and a large heat reservoir during the International Building Exhibition IBA Hamburg 2013. It provides 1,650 households in the surroundings are supplied with climate-friendly heat and generate electricity for around 1,500

households in Hamburg (BUE 2016). The project was principally funded by Hamburg Energieo along with contributions from IBA, the city of Hamburg and the European Regional Development Fund. Except the planning phase, Hamburg Energie – the energy company owned by the city – has been highly involved in all stages of the project (BROOKINGS et al. 2017).

Georgswerder Energy Hill, a former landfill site and a dump for toxic industrial waste, is now a center for renewable energy innovation as well as a place of learning and relaxation. The first wind turbines were installed on the top of the hill as early as the 1990s. By installing a new wind turbine, a photovoltaic system and a heat pump in the context of International Building Exhibition IBA Hamburg 2013, this supplies 4,000 households with site renewable electricity (BUE 2016).

1.2.3 Urban development projects

Currently, due to the high demand on housing the City has set itself the goal of approving and building 10,000 apartments each year, towards achieving the goal of one million housing units by the early 2020. These include 30% state-subsidised rental apartments for low-income and middle-income households (Offizielles Stadtportal für Hamburg n.d.d).

In this commitment, inner urban development is prioritized as related to outer developments. Quality of the urban development projects include: more efficient use of land; preferred use of land earmarked for conversion; and urban density with high-quality open space. These guidelines are to be interpreted along the objective of retaining existing green areas and open spaces. Additional requirements include setting ambitious environmental and energy standards for the new and existing buildings in the city. These objectives are translated into standards for the real estate investors together with compensation measures. In addition, the City pursues innovative funding approaches (e.g. plans to finance preservation of natural capital via the increase in value generated by the altered land use) (Offizielles Stadtportal für Hamburg n.d.d).

The following urban development projects illustrate the commitment of the City of Hamburg in the urban development policy:

Leap across the Elbe

Between the Northern and Southern Elbe river, lie the river islands and districts of Wilhelmsburg and Veddel. For a long time neglected and little attention had been paid to this part of Hamburg. Between the 2006 and 2013 – thanks to the International Building Exhibition IBA Hamburg and the international garden show 2013 – the conditions on the Elbe river islands and at Harburg Inland Port had been significantly improved, with a particular attention to ecologically oriented urban development issues. New constructions and requalification projects, new parks and open spaces have contributed in creating an attractive location in the southern part of the city (BUE 2016).

HafenCity inner-city development project

Currently Europe's largest inner-city development project (formally established in 2008 and expected to be completed by 2025-2030), HafenCity project rather than expanding Hamburg's municipal area into the outskirts it revitalises inner city dockland areas and former industrial sites. The issue of ecological sustainability is to be explored in different aspects, from ecological building concepts and climate-friendly heat energy supplies to an ambitious mobility concept (BUE 2016). The urban development project of HafenCity represents the model of a publicly owned and privately-run corporation. It lies entirely on the publicly owned urban development corporation (i.e. HafenCity GmbH) and therefore the local government exerts a degree of control over the development of HafenCity. Private developers are required to dedicate 30% of the building stock to social housing purposes – as an objective of the city's target to have one third of the HafenCity's housing dedicated to low-middle income groups (BROOKINGS et al. 2017).

Hamburger Deckel: a green cover housing estate over the motorway

Towards the housing provision objective, the City is actively involved since 2009 for the completion of the cover over the A7 motorway with up to ten lanes, which will be covered with a three-part 'hood' along a stretch of road 3.5 km long. More than 3,200 residential units, 25 hectares of new green spaces, comprising approximately 13 hectares of public parks and some 320 allotment gardens are part of the "Hamburger Deckel" project. In tackling the task of protecting residents from pollution and noise from the motorway, the project introduces a new concept by integrating issues of infrastructure mobility, mitigation and housing provision as a sustainable model of urban

development. The first two covers ‘hoods’ are expected to be completed by 2019 and 2020, whereas the third one is to be completed by 2025 (BUE 2016).

1.2.4 Cooperation between the City, industry and civic actors

Beyond statutory regulations which are considered necessary to direct companies towards the fulfilment of environmental and climate protection requirements, the City of Hamburg demonstrates how voluntary measures, aligned with consultancy services, incentives and marketing opportunities, can generate innovative solutions to several environmental issues for the city (BUE 2016).

Some of the initiatives involving voluntary collaboration commitments between the city and industry and civic actors include:

Eco-Partnership initiative

Eco-partnership acts as a platform for environmental policy exchange between industry, politics and the civil service since 2003, counting more than 1,000 small, medium-sized and large companies. The objective of the Eco-Partnership – an alliance between the City of Hamburg and Hamburg’s economic actors – is to promote sustainable and resource-efficient economic activity. It is a voluntary alliance supported by the Chamber of Commerce, the Chamber of Crafts and Trades, the industrial association, the *Unternehmensverband Hafen* and the Ministry for Environment and Energy (BUE 2016).

Companies for Resource Protection programme

“Companies for Resource Protection”, is a programme launched in 2001 and where the City of Hamburg offers support in the implementation of environmental protection measures for companies in Hamburg (Offizielles Stadtportal für Hamburg n.d.e). It includes financial sponsorship, advice and practical assistance – particularly for reducing carbon emissions and generating energy savings – aiming to initiate voluntary investments in efficiency improvement measures by offering customer-oriented programmes (BUE 2016).

Through “Companies for Resource Protection” programme, Hamburg-based companies have so far invested in efficiency measures totalling some €367 million and as a result, approximately 281,800 tons of carbon emissions, 27,400 tons of material and 744,600 cubic metres of water are saved annually (BUE 2016).

Partnership for Air Quality and Low-Emission Mobility initiative

Established in 2012, the “Partnership for Air Quality and Low-Emission Mobility” represents a shared alliance between the city and the industry with the aim to help improve air quality in Hamburg. With more than 200 companies involved and extended until 2020, the initiative supports its endeavours to achieve low-emission company mobility. Within it, companies take measures to optimise their fleet of vehicles or to help their employees commute in a more environmentally friendly way. As a result, every year during the campaign week, more than 10,000 Hamburg employees are made aware of the issue of low-emission mobility, and a label “Air Quality Partner of the Year” is assigned to a partner as well (BUE 2016).

Innovation and Cluster policy: “Hamburg. An Innovation Capital for Europe 2020”

The Innovation Alliance’s (*InnovationsAllianz*) Strategic Guidelines (signed in 2010) – a joint and shared effort by 160 stakeholders from science, industry, institutions and associations in Hamburg under the leadership of the Hamburg Senate’s science and economic affairs divisions – expressed the general vision “Hamburg. An Innovation Capital for Europe 2020”. Towards this commitment, the Regional Innovation Strategy 2020 was launched in 2014 by the City of Hamburg, to be implemented in collaboration between all stakeholders involved (EC n.d.c; Senat FHH 2016).

The Regional Innovation Strategy 2020 is mainly released through strategic initiatives, known as thematic clusters in the key relevant sectors for the city-state of Hamburg (Senat FHH n.d.b). These clusters represent the strategic areas of “smart specialisation of Hamburg” (Senat FHH 2016).

Hamburg’s clusters history is long, when in 1997 the first cluster initiative (i.e. *Hamburg@work*) in Germany was established in Hamburg. Since then, Hamburg has further explored and promoted this area through a systematic cluster policy. Today, the city-state supports through a cluster policy a mix of eight cluster initiatives representing a cross-section of all key sectors of the economy:

- Media & IT;
- Aviation;

- Life sciences;
- Logistics;
- Creative industry;
- Healthcare;
- Maritime industry;
- Renewable energies.

Through this holistic approach, Hamburg's objective is to strengthen its regional economy and to provide an innovative eco-system that involves all regional actors towards achieving its vision "Hamburg. An Innovation Capital for Europe 2020" (Senat FHH n.d.b). Hamburg commitment is to "promote the holistic approach towards innovation for a sustainable development of a city" (Senat FHH n.d.b). The basis for the cluster policy lies in a tight, well-functioning network of companies, science, politics and civil society (Quadruple-Helix). According to recent findings, clusters can play a special role in overcoming societal challenges when organized as a Quadruple Helix and the Hamburg Senate is currently working on this. In some clusters, civil society is already strongly represented in the form of trade unions and other civil society organizations. So far, the Senate has introduced and implemented some essential social issues in the Hamburg cluster policy (Offizielles Stadtportal für Hamburg n.d.f).

The cluster policy development and coordination are tasks of the Ministry of Economics, Transport and Innovation of Hamburg. The government, beyond the funding provision and decision-making tasks, sees itself also as a long-term partner, moderator and stimulator of new ideas for the clusters (Senat FHH n.d.b). The commitment of the Senate lies in bringing together the strengths and potential of economic, employment, research, and education policies through the cluster policy. Moreover, each of the eight clusters has a dedicated partner from one ministry, who plays the role of intermediary between the politics, administration, business, research, and civil society. Thus, a continuous exchange between the clusters and the government is guaranteed. In doing so, the Senate aligns its policies directly with the formulated needs and perspectives of the industry players through participatory processes in the clusters. As depending on the cluster interests', the cluster policy may extend beyond the Federal State borders seeking for new synergies (Senat FHH 2016). Thus, through the cluster policy Hamburg works together closely with neighbouring north German Federal States in fields of common interest (Senat FHH 2016).

In practical terms, the cluster policy focuses and engages with the stakeholders needs through:

- Providing platforms or 'space' to discussions within the industry actors, and between them and the Senate;
- Initiating and development of joint strategies for the city in close relation to the stakeholder-specific strategies and assessments;
- Initiating strategic decisions for the industries in relation to Hamburg's commitment known as 'smart specialisation' (Senat FHH 2016).

The cluster policy development within the Hamburg's vision and towards the achievement of its commitment to become Europe's capital of innovation, lies on identifying common topics and complementary interests beyond defined established clusters. The City has a particular interest in constituting cluster bridges i.e. cooperation between sectors, value chains or cluster organisations to generate common value. To foster these cross-clustering activities, clusters management are strategically located in one place to increase exchange of information, mutual learning, and synergies between projects and initiatives (Senat FHH n.d.b). Examples from the past show concrete initiatives in the frame of cluster bridging in Hamburg:

- Smart Life Cycle Analysis and Evaluation of Complex Systems
- Skills and Competences
- Acoustics
- IT
- Cluster-Evaluation
- Internationalisation
- Industrial Law
(Senat FHH n.d.b)

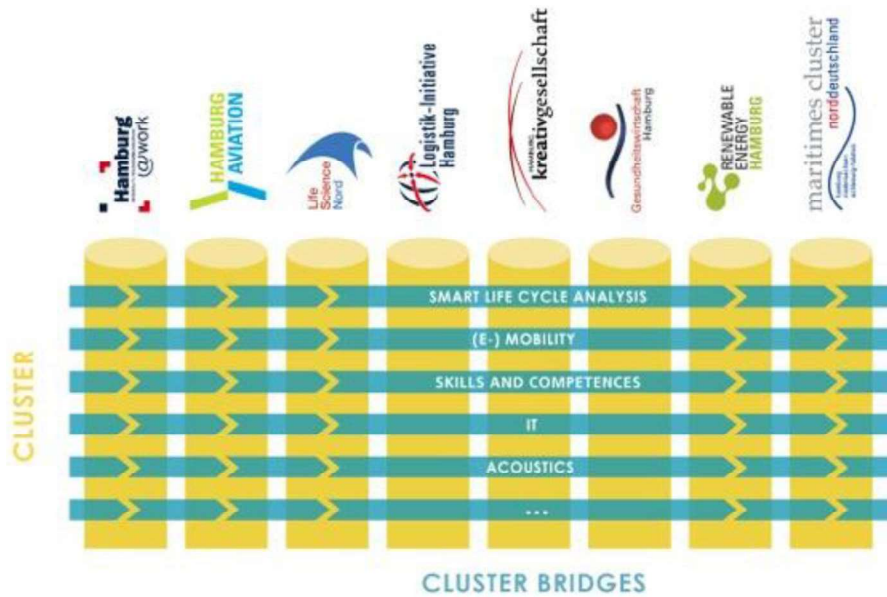


Figure V.1.2 - Current clusters constellation and examples of cluster bridges in Hamburg (Senat FHH n.d.b).

The aim within the ‘cluster bridges’ in Hamburg involve the structuring in a systematic way of the topics and the process of their development (Senat FHH n.d.b). The commitment of Hamburg towards this innovative policy area has been awarded as well internationally, when in 2014 EU selected Hamburg as one of six model regions for modern cluster policy. Within the topic of ‘cluster bridges’, the City through the cluster stakeholders and in collaboration with European Commission experts is developing a cross-clustering concept for Hamburg (Senat FHH 2016): this include the development of new formats that foster a systematic approach towards cluster bridges (Senat FHH n.d.b).

1.2.5 Waste Management policy and the commitment to a Circular Economy

Back in the late 80s, Germany was facing a situation where waste disposal sites were considered a problem due to the quantities of disposed waste and at the time there were too few incineration plants available. First focus from the public and political interest concerned on making disposal sites safer and incineration plants cleaner. This was followed by the introduction of regulations on waste management, as well as setting strict limits on emissions from incineration plants and requirements for the waste disposal sites. It was soon recognized that disposal practices were not enough and sustainable, therefore recycling and energy recovery were soon prioritized. In this line of actions, the emerging of the polluter-pays principle by involving the waste producers to be held responsible for their waste became fundamental for the introduction of the producer responsibility scheme within Germany: it was first laid down in 1991 with the Packaging Ordinance by introducing the obligation to take back packaging after use from the producers. These efforts have been comprehensively put forward by the national Closed Substance Cycle and Waste Management Act of 1996: the producer responsibility with this act is intended to be implemented through legally binding measures (i.e. laws/ordinances) and voluntary commitments from the producers and distributors (BMUB 2017). This way, following the packaging experience producer responsibility schemes have been established in Germany for end-of-life vehicles (ELV), waste electrical and electronic equipment (WEEE), batteries and accumulators (B&A), and Oils (BIO Intelligence Service 2014). Another milestone in the waste management has been introduced with the 2001 Waste Deposition Ordinance (later incorporated in the 2009 Landfill Ordinance) which required treatment for the municipal waste (generated by the households and commercial similar to households) for incineration or mechanical-biological treatment plants (BMUB 2017).

The measures adopted along the waste management history have led to high rates of recycling and low rates of landfilling in the country. By 2001 the recycling rate of municipal waste in Germany was 52 %, whereas around 26 % was landfilled and 22 % was incinerated. These rates have continued to improve also in the following years concerning the recycling with 64% and landfilling with 1% in 2014, whereas incineration had increased to 35% in the same year (Eurostat, 2016; cited in EEA 2016). Waste recovery rates in Germany continue to be considered relatively high and the German current government's environmental efforts focus on further enhancing the circular economy

and its implications are to be transformed into a comprehensive materials flow management over the coming years. This because Germany aims to make a big effort to use as much as possible substances and materials bound in waste (BMUB 2017).

On this context, Germany has as well been focusing on the topic of circular economy – topic which has been introduced in the German policy framework as a terminology since 1996 with the Waste Management Act (i.e. *Kreislaufwirtschafts- und Abfallgesetz* or *KrW-/AbfG*) and further put forward in 2012 with the new and current Waste Management Act at the federal level i.e. Circular Economy Act (*Kreislaufwirtschaftsgesetz* or *KrWG*). Therefore, with respect to the waste management side of the circular economy, Germany has long been one of the absolute leaders. Largely technical regulations – e.g. on landfill, incinerator emissions and producer responsibility – have created a successful model of waste management technicalities and infrastructures (Wilts 2016).

The Waste Management Act of 2012 – *Kreislaufwirtschaftsgesetz* or *KrWG* – incorporated the requirements of the EU Waste Framework Directive (WFD) into the German legislation (EEA 2016). It has been complemented by separate regulations for different specific waste streams (BiPro & CRI 2015; cited in EEA 2016). Further, it brings forward measures contained in the previous Act and introduces new ones in line with the EU waste management framework. One of the main measures this Act introduced include the mandatory separate collection scheme for the bio-waste in Hamburg from 2015, which applies also to paper, metal, plastic and glass waste. The Act sets the overall target of 65% recycling rate by 2020 for the municipal waste (EEA 2016).

A core provisions of the Waste Management Act (*KrWG*) is the five-step (previously three step) hierarchy, according to which the following ranking of waste management measures applies:

- Prevention
- Reuse
- Recycling
- Other types of recovery, particularly use for energy recovery
- Disposal (UBA 2014)

The targets and objectives together with policies of waste management vary to every Federal State's waste management plan (Gibbs et al. 2014). Finally, the Waste Management Act (*KrWG*) is intended to tighten resource, climate and environmental protection regulations in Germany (UBA 2014).

Following the Article 33 of the national Waste Management Act (*KrWG* 2012), a German Waste Prevention Programme (*Abfallvermeidungsprogramm des Bundes unter Beteiligung der Länder*) – with the goal of implementing a relevant EU requirement – was launched in 2013. The overall objective of the waste prevention programme is to decouple economic growth from the impacts on human health and the environment caused by waste production. Operational objectives of the programme involve:

- Reducing the quantity of waste;
- Reducing the adverse impacts of waste;
- Reducing the content of harmful substances in materials and products.

The Waste Prevention Programme is not an individual waste prevention measure, but rather the interplay between multiple instruments that focus on avoiding waste generation. This programme – launched by the Federal Ministry for the Environment (BMUB) – was based on the scientific and technical findings of the study titled "Substantive implementation of Article 29 of Directive 2008/98/EC". The measures take into account all product life-cycle stages e.g. avoiding of waste generation during the production, product design is to be considered with regard to avoiding waste generation and by making more durable products (UBA 2015).

On the other side, Hamburg has a long tradition of dealing with waste. The first incineration in Germany was built here in the between 1894 and 1895 to tackle the Cholera disease that hit grand part of the population (UBA 2008). At that time, the main waste that was produced was mainly organic. The people that were dealing with the waste were mainly prisoners. Later, other chemical wastes have been resulted from human activities and they were firstly disposed. The contamination of the soil and the water, as a consequence of the disposal, has raised in the 1950s the awareness towards this topic bringing to the resolution of 'composting everything'. The activity of composting was a normal practice already carried out. The composting process happens by nature, both anaerobically and

aerobically: the first in swamps and mosses, the second directly on the ground. Waste management sector had soon realised that the ‘compost everything’ initiative was not optimal: the problem was that every kind of waste has its own treatment method which might not be composting: this means that compost could not be obtained from every type of waste. To tackle this issue, the waste management sector has started to push for the separate collection at source. Plastic, organic, glass, metals and residual waste are the new sorted categories today (recycling offensive 2009²⁴). Only in late years they have started to produce biogas from bio-waste before the composting process (Expert SRH_2 2018).

With regard to waste management policy in Hamburg, Waste Management Plan for Hamburg 2017 (*Abfallwirtschaftsplan Siedlungsabfälle Hamburg 2017*) represents the main policy implementation instrument and contains supplementary and more detailed information to the national law (e.g. more severe norms on certain facilities and regional waste management concepts) with further operational indications. In Hamburg the obligation for the delivering of the plan falls to the Senate. This plan deals with the emergence and disposal of the settlements and infrastructure waste generated in the city-state of Hamburg. It deals with waste from private households, commercial enterprises including public facilities, sewage treatment and road cleaning (infrastructure waste) as well as the ash (slag) from municipal waste incineration (Senat FHH 2017). As required by the national Act (*Kreislaufwirtschaftsgesetz KrWG 2012*) climate and resource protection aspects as well as the continuation and intensification of the recycling efforts to optimize waste management in Hamburg are brought forward by this plan. As a result, the required household-related separate collection is largely implemented in Hamburg by the Hamburg recyclable materials regulation. By 2020, the Senate wants to make its contribution to the climate protection target of 40% CO₂ reduction and strengthen its efforts. In addition to climate-friendly consumption, recycling - and thus the goals of the recycling offensive - is an important component (see Hamburg Climate Plan). With regard to the recycling target of 65% by 2020 for the municipal waste (required by the national Act KrWG 2012) in Hamburg, the recycling quotas are generally slightly lower due to local issues, such as the amount of green waste generated is low in Hamburg, and there is often a lack of space for the separate collection bins in densely populated areas. As a result, in this plan Hamburg admits to reach the 65% target for the entire federal territory from 2025 onwards (Senat FHH 2017).

2. Project Case Study – Organic material flows

As already mentioned, the case study for this thesis has been derived from the EU funded project REPAiR. This chapter aims to present the status quo of the organic material stream in Hamburg through the instrument of Material Flow Analysis (MFA) and it concentrates on the waste management sector as the phase of the material cycle which can represent always (also at the EU level) a reliable area of indicators concerning flows and treatments.

Because of the aforementioned reason, this Chapter presents firstly a focus on the waste management sector in Hamburg, describing the collection and the treatment schemes of the main flows. The second Section provides an insight on the MFA performed for the organic material stream in Hamburg.

2.1 Focus on Waste Management

The Circular Economy implies an overview on the entire flow of a certain material. However, the waste management has been taken as focus (see Part IV). This Section is therefore ceded to introduce the waste management sector in Hamburg. In Hamburg the organic waste has to be found in three different sources: commercial sector

²⁴ “...the State Ministry of Urban Development and Environment joined forces with the public waste management enterprise Stadtreinigung Hamburg to launch a recycling campaign in 2009. Since then, the number of recycling bins for private households for organic and green waste, paper and recyclables has increased from 236,000 to around 370,000 bins, representing a 56 per cent increase compared to early 2011. The quantity of organic and green waste collected has risen steadily since 2011. In addition to the recycling bin newly introduced in the same year, it has also been possible to increase the quantities of lightweight packaging considerably by adding other waste from metal, such as old pots, and plastic. What counts is that the volume of municipal solid waste that year was reduced considerably by 55,000 tons” (BUE 2016: p.36).

(*Gewerbeabfälle*), households (*Abfälle aus privaten Haushalten*) and along infrastructures (*Infrastrukturabfälle*). For each of these are illustrated the collection and treatment method.

2.1.1 Collection schemes and treatment methods – Commercial waste

This type of waste consists of four fractions: separately collected, mixed commercial waste, garden and park waste, and market waste (Senat FHH 2017).

The separately collected commercial waste fractions from the economic sectors include: paper and cardboard, glass, plastic, waste wood, metals, textiles, organic waste from gastronomy, garden and park waste, and street foliage. This type of commercial waste is collected separately in monofractions and further recycled. The responsibility for their collection and recovery falls mainly on the private sector, where mostly medium-sized waste disposal certified companies compete on a market basis with each other. For what concerns the bio-waste fraction coming from the commercial sector, the BioWerk plant oversees its treatment (see Subsection 2.2.2).

The mixed commercial waste is typically generated in commerce, industry, businesses and department stores, but also in government agencies, schools, hospitals (only non-hazardous waste) or care facilities. The collection of this fraction for recycling purposes is based on the private sector. The recovery takes place either after sorting (where fractions are recovered for the material and energy), or for high heating values the mixtures are directly sent for energy recovery in the approved facilities, i.e. to the two incinerators located in Hamburg (see below for a deeper explanation).

Garden and park commercial waste are generally plant wastes generated in activities of gardening and landscaping of companies as well as care and maintenance measures on public areas. These wastes are almost completely recovered, mainly by composting. Gardening and landscaping companies are responsible for this type of waste generated during their activities: task which they usually assign to composting companies. In addition, districts utilize the green waste generated in the parks and green areas in different ways: some hand over their green waste to certified companies for recycling while others compost their waste directly on their land.

Finally, the market commercial waste is generated from weekly markets as well as from the fish market (*Fischmarkt*). The management of these activities and thus also the cleaning of these areas are the responsibility of the district offices, which then tender private disposal companies to carry out such activities i.e. to properly dispose of or remove the collected waste (Senat FHH 2017). However, no more precise data are available for this type, therefore it has not been inserted in the MFA.

Incineration plants

This paragraph delineates briefly the incineration plants for three main reasons: in Hamburg there are two incinerator facilities; these are also, secondarily, involved in the MFA of organic waste; CE principles do not consider incineration a practice to pursue when it comes to circularity of materials.

The first incineration plant was built in the late 19th century in Nottingham, Manchester (1876) as a solution to get rid of the waste that was creating serious problems to the health of the population. This practice was observed with interest by other countries in Europe and after a while Germany adopted this solution, putting in operation the first incineration plant in 1896; location: Hamburg. At that time, 300,000 people were living in the city. Today, it is well-known that incineration practices are not environmental friendly, but 100 years ago was not an issue, although its construction encountered not little opposition. It is in the 80s of the 20th century that, with the rise of citizens' awareness towards environmental pollution, the incinerators started to be seen as a problem. Therefore, the German Waste Management Act of 1986 was introduced to prevent generation of residual waste (UBA 2008). The more and more strict laws have put pressure on this technology' performances: already in 2008, "dioxin, dust and heavy metals emissions from waste incineration are no longer an issue" (UBA 2008: p.3).

Thanks to a good separation of waste at source, these plants went in deficit of input material, fact that has pushed the country to import waste from other states, like Italy, Britain, Ireland and Switzerland (Groden 2015). All this brought in 2015 to the close down of one of the three incinerators active in Hamburg, the one in Stelling Moor (MVB 2017).

Hamburg has a long tradition of incineration practices (see Subsection 2.1.1). Nowadays, the residual waste accounts for 63% and it is entirely brought to incinerators. SRH owns at 100% the incinerator of Borsigstraße

(Müllverwertungsanlage Borsigstraße, MVB) and at 45% the one of Rugenberger Damm (Müllverwertungsanlage Rugenberger Damm, MVR). The big scheme explains in detail the functioning of the two plants: what concerns this part of the chain is that through this plants Hamburg aims to produce energy from waste for households. Together with the incinerator in Schleswig-Holstein, heat and electricity are delivered to households in the amount of ca. 770,000 and 250,000 MWh a year (see Annex A).

Talking about organic waste, unfortunately a remarkable amount of it is now lost, due to the burning on site practices. According to Schüch et al. (2016), “annually around 100 million tons of biodegradable wastes from, for example, forestry, agriculture or wastewater and waste management, arise nationwide. [They argue that, even though] approximately 65% are technically and ecologically sensible usable, [their reuse can account for] a potential of four to five percent of primary energy demand in Germany. Realising this residue potential is a significant part of the municipality’s responsibility” (Schüch et al. 2016: p.311). Incineration is already a possibility, but not efficient. As a matter of fact, statistics say that 6 Million tons of residual waste is produced in Germany per year and, with their incineration, they produce energy with an efficiency of around 50% (UBA 2016). In particular for Hamburg case study, around 42% of the residual waste coming from households is composed by organic waste, ca. 38% of which can be reused for compost production (UEC Berlin 2017). This does not actually represent a problem for the incineration plants, which are able to burn every waste that is brought without any technical change in the process. Only exception are metal materials, which do not burn at the low temperature of around 100 °C: these pieces are collected and sold to other industries (Expert MVB 2018).

2.1.2 Collection schemes and treatment methods – Households’ waste

The door-to-door collection is the principal scheme for the residual waste from households in Germany. The recyclables collection in the urban areas follows the same scheme, whereas in rural areas the main scheme is the bring point collection system. Commercial waste similar to household waste is generally collected through the same systems (Gibbs et al. 2014; BiPro & CRI 2015). The collection schemes for the residual waste, bio-waste and bulky household waste are financed by a fee scheme paid by citizens and defined by each municipality. Instead, schemes for other recyclables such as for the packaging waste are financed by EPR schemes with the collection points partly paid by the municipalities (Gibbs et al. 2014; cited in EEA 2016).

In Hamburg, household waste including residual waste, bulky waste, as well as recyclable waste such as waste paper, bio-waste, plastics and metals are to be collected through separate systems for separate collection. Waste from private households is collected with a four-ton system separating residual waste, biowaste, paper / cardboards and packaging (grey, green, blue and yellow respectively). This follows the Hamburg ordinance on recyclables (*Hamburgische Wertstoff-Verordnung, HmbGVBI*) from 2011. The collection service is provided through a mix between door-to-door and bring point schemes (Senat FHH 2017). SRH is in charge of collecting residual and organic waste (SRG 1994; Senat FHH 2017). The residual waste is sent to incinerators (see Subsection 2.1.1) meanwhile the organic waste is brought to the biogas and compost plant of Bützberg, located just outside Hamburg (see Subsection 2.2.2).

Additionally, SRH has a contract with the dual system to collect packaging waste (consisting of plastics, metals) and paper / cardboards (BUE 2017). However not all households - especially in dense urban areas - have the four-ton system. Therefore, SRH started so-called recycling offensives over the last years to increase the separate collection (SRH 2017: pp.29-30).

Exceptions to this collection schemes for the household waste applies in the cases where: the waste producer uses the waste properly for his/her utility (e.g. by composting the bio-waste); the waste is subject to extended producer responsibility schemes (e.g. packaging waste and WEEE); and, the waste is collected from the so-called commercial or non-profit collection (as defined by the law) consisting of a proper and harmless recovery (Senat FHH 2017).

2.1.3 Collection schemes and treatment methods – Infrastructure waste

Infrastructure waste within Hamburg consists of the waste coming from machine sweeping, hand sweeping, bins, street leaves and special-purpose sweepings. The machine sweeping waste is treated in a soil treatment plant in Hamburg, where the reusable minerals are separated from the small amounts of waste to be disposed of. Waste coming from hand sweeping and from bins are collected in the walkway area. Half of the footpaths surface is to be cleaned by the residents if belong to their plots and the other part by SRH. Bins are emptied from SRH, private

companies which have contracts with the districts for their own area, and for the Elbe buffer area from the Hamburg Port Authority. The sorting and therefore recycling of this fraction is not carried due to the high mixture of waste materials. Road leaves are mainly used to produce and ensure road safety on main and secondary roads. Special-purpose sweeping are waste resulting from the cleaning after events (Senat FHH 2017).

2.2 MFA for organic material in Hamburg

The Material Flow Analysis is defined as “a systematic assessment of the flows and stocks of materials within a system defined in space and time. It connects the sources, the pathways, and the intermediate and final sinks of a material” (Stendl-Rast & Lebell 2004: p.3). Its conceptualisation is based on the principle of mass conservation. It was in the 20th century that this concept started being applied in different fields of study. One of these fields is the waste management. “MFA is a valuable tool in substance management because it can cost-efficiently determine the elemental composition of wastes exactly”: it can contribute in finding the best-suited recycling or treatment technology or even going beyond acting in the design phase (Stendl-Rast & Lebell 2004: p.18). “An MFA-based total material balance shows whether given goals have been achieved. An MFA balance also identifies the processes and flows that have the highest potential for improvements” (Stendl-Rast & Lebell 2004: p.19). For all these reasons, this method is a tool that has been used²⁵ to support decision regarding waste management (Brunner & Rechberger 2004: p.256).

The MFA presented in this Section does not describe the entire cycle, but it focuses on waste management, both for lack of data and time constraints. However, to perform an MFA, it is usually not necessary to analyse all parameters, namely materials or fractions of MSW, physical, chemical or biochemical parameters, and substance concentrations (Brunner & Rechberger 2004: p.258), allowing to concentrate just on one single part.

Normally, an MFA represents just flows and related numbers. In this case, its realisation has been conducted for determine not only the status quo of the organic material flows in Hamburg (see below), but also to understand the processes to which these flows undergo, and which stakeholders are involved, aiming at building the network (see Chapter 3). For this reason, this analysis has been called ‘Stakeholder MFA’ (S-MFA) on the wipe of the methodology introduced in the project REPAiR. The S-MFA retraces the subdivision of the waste flows defined by the waste management plant of Hamburg according to the theory (Brunner & Rechberger 2004), i.e. commercial waste, households waste, and infrastructure waste (Senat FHH 2017). Moreover, taking also information from the project REPAiR, the agricultural sector has been included as potential producer of organic waste and receiver of the output from composting activities. However, no quantifiable data are available for this part and a simple explanation its provided in Section 2.2.4. The Annex A represents the overview of the S-MFA with quantities, processes and stakeholders who conduct such activities. The circle closes with the energy distribution to the Hamburg households and businesses: in the last energy balance for the Hanseatic city conducted in 2008, households and businesses use 14.8 TWh of energy per year, of which 4.0 of electricity and 2.2 of heat (IEK 2010: p.14). From the waste treated in the incinerators, BKWB and BioWerk plants, the electricity and heat produced by bio-resources is around 1/6 of the total demand (see Scheme in the Annex A).

2.2.1 Commercial sector (Senat FHH 2017: pp.32-36)

The flows of organic materials from the commercial sector are rather difficult to depict, although a rough description is offered by the waste management plan of the city of Hamburg (*Abfallwirtschaftsplan*). Drafted in 2017, the plan describes the various waste fractions and indicates who is in charge to deal with each of them and how. The fractions included in this plan fall under the category called municipal waste: this category does not include some materials, such as construction and demolition waste.

For what concerns the waste related to this sector, the plan dedicates the Section 4.2 (*Gewerbeabfälle*): with this term must be intended all those wastes that come “from economic areas, for instance commercial, wholesale and retail, public and private transport, banks and insurances, hotels and catering as well as the healthcare system.

²⁵ An example can be found in the region of Nordrhein-Westfalen (Germany), which represents the first case in the Federal Republic where MFA has been inserted as standard tool in waste management planning (Stendl-Rast & Lebell 2004: p.19).

Within this category falls also the public and common non-economic activities (e.g. municipality, churches, etc.)²⁶ (Senat FHH 2017: p.32). In the entire city of Hamburg, this waste type is collected from 108,000 production sites. This waste is divided into three types: the ones that are separated at source, the ones that are separated after the collection and the ones coming from the gardens and parks. All data that are represented in this document refer to a 2015 survey.

The waste that belongs to the organic waste from non-households is listed in the Decree on waste management of commercial fraction of the municipal solid waste and certain construction and demolition waste (*Gewerbeabfallverordnung, GewAbfV*), Section 2. A step further has been recently done to improve the separation of this waste. Since August 2017, the businesses are asked to separate, other than paper, cardboard, packages, plastics, glass and metals also wood, textiles and all biowaste (Veolia Deutschland 2017).

Waste coming from the separate collection

A total of 349,000 t is the amount of waste collected in 2015 from the commercial sector. The fraction of interest is mentioned as Biowaste from gastronomy (*Bioabfall aus Gastronomie*) and the street leaves from gardens and parks (*Garten- und Parkabfälle, Straßenlaub*), which account for 20,200 t and 85,900 t respectively.

Fraction	Quantity
Bio-waste from Gastronomy	20,200 t
Street leaves from gardens and parks	85,900 t

Table V.2.9 - Organic waste from commercial sector separate collection system (Own 2017).

These wastes are collected by private firms, with a small percentage which is reused directly by the producers. The leaves are then used by private composting firms. The waste from gastronomy is sent to BioWerk, a biogas production plant which is partly owned by SRH (see below).

Mixed commercial waste

To this type belongs every kind of waste, usually of big dimension, for a total of ca. 200,000 t per year. By law, activities in this category are obliged to have a small bin for the residual waste coming, for instance, from tiny kitchen activities. This waste is called ‘business waste’ (*Geschäftsmüll*) and they are collected together with the households’ residual waste (*Hausmüll*) by SRH. The rest is collected and sorted after. Paper, metals and plastics are sent to reuse facilities. The other is brought or to other industries for recycling as replacement for their burning materials (especially woody materials) or to one of the two incinerators located in Hamburg (*Müllverbrennungsanlagen*).

Fraction	Quantity
Mixed commercial waste (total)	200,000 t
- Residual materials (paper, metals and plastics)	40,000 t
- Residual waste (collected together with the households’ residual waste)	52,600 t
- Other	100,000t
Replacement for other industries	22,100* t
Incineration	77,900 t

Table V.2.10 - Mixed commercial waste amounts. *This number has been derived by subtraction (Own 2017).

²⁶ „Gewerbeabfälle sind Abfälle aus allen Wirtschaftsbereichen wie z.B. verarbeitendes Gewerbe, Groß- und Einzelhandel, Transport und Verkehr, Banken und Versicherungen, Hotels und Gaststätten sowie dem Gesundheitswesen. Auch öffentliche, gemeinnützige und sonstige nichtwirtschaftliche Einrichtungen (z.B. Behörden, Kirchen, Vereine) sind Erzeuger von Gewerbeabfällen im Sinne dieses Abfallwirtschaftsplanes“.

This waste category is not directly connected to the organic waste, but the residual waste collected by SRH can include organic matter. This is the main reason why the mixed commercial waste has been investigated as well.

Garden and park waste

These are the wastes of plant origins which comes from gardening usage of plots, from public parks and graveyards, and areas aside the streets and areas under flood protection and riparian zones (close to rivers). This category accounts for ca. 30,000 t per year. They arise in activities of gardening and landscaping companies as well as care and maintenance measures on public areas. Pruning is often used directly on site after shredding for green area care, especially with extensive care measures. In Hamburg there are ca. 250 businesses engaged in garden and landscape activities. Normally, these firms collect directly the green waste that cannot be reused on place. Just small part is composted on site, the rest is sent to private composting firms.

Fraction	Quantity	Action
Green areas in the districts (<i>Bezirke</i>)	13,000 t	Compost
Graveyards	14,000 t	Compost
Flood protection areas	300-3,000 t	Compost
Riparian zones	700 t	Compost on site
Natural protected areas	3,000 t	Compost on site

Table V.2.11 - Categories of garden and park waste from commercial sector (Own 2017).

BioWerk – The biogas production plant of SRH²⁷

In Hamburg, part of the waste from the commercial sector coming from the separated collection (i.e. the gastronomy bio-waste, see Subsection 2.2.1) is brought to the Biogas plant called BioWerk, located at the East side of Hamburg in Schnackenburgallee 100. BOWERK Hamburg GmbH & Co. KG is a company built with the concept of public-private partnership: it is owned by SRH at 47.5%, by BioCycling at 47.5% and by ETH at 5%. The agreement foresees that SRH is dealing with the technological part of the plant and insert the biogas in the grid, BioCycling has the duty to collect the waste from the gastronomy and ETH is in charge to sell on the market the digestate. The waste that they collect included in the wording 'gastronomy' is composed by:

- fruits and vegetables,
- overlaid food from trade activities,
- food rests from gastronomy, retirement homes, hospitals and company canteens,
- and fats and oils.

The large amount of liquid waste flowing in this plant determines the production of digestate instead of compost. Yearly BioWerk receives around 20,000 t of this waste. About 1,000 t of packaging, metals and other substances are separated and input in other cycles. The rest 19,000 t, after a process of sanitation, generates the digestate: it consists of 5% of dry matter and 95% of water and it is used as fertilizer for agriculture. To obtain the digestate, the matter must go through a process of dehydration and desulphurisation, releasing biogas. Inserted in the heat and power plant (*Blockheizkraftwerk*) for an amount of 330 m³/h, the biogas is then used to produce heat and electricity, 7,000 MWh and 6,700 MWh respectively, which is input in the grid, covering the energy demand of ca. 2,500 houses.

²⁷ Information on this plant where obtained from Biower-hamburg.de (n.d.) and from the interview with Expert SRH_2 (2018).

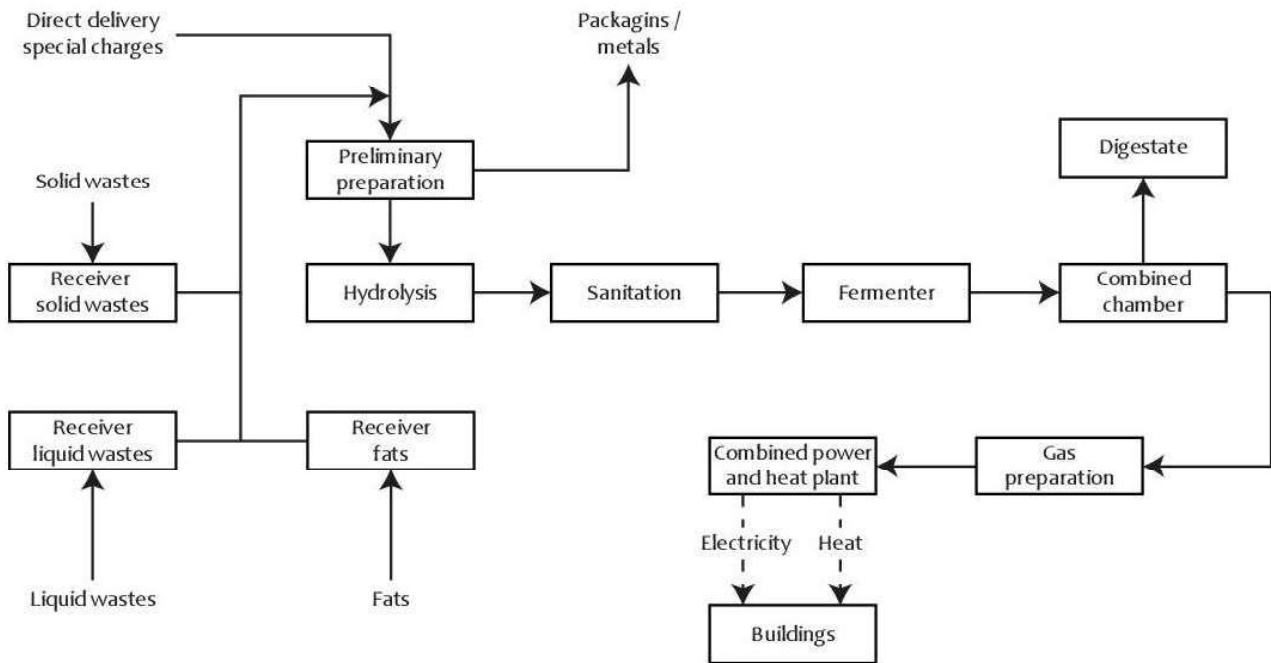


Figure V.2.3 - Functioning scheme of BioWerk (Biowerk-hamburg.de n.d.).

2.2.2 Households

When one thinks to waste, the first source that comes in mind is households; and it is indeed so in the case of Hamburg. Household waste accounts for 727,275 t a year against the ca. 200.000 t from the commercial sector. Since the beginning of 2011, the separate collection of paper and organic waste is compulsory in Hamburg (Senat FHH: p.16). Moreover, since 2015 it is obligatory for each house to have the bin for the organic waste, following EU guidelines and the national Act (Senat FHH 2017). Hence, nowadays to this category belongs the separate collection of plastics and metals (yellow bin), paper (blue bin), organic (green bin) and residual waste (grey bin). Glass, plastic and metals is also separated but collected by private firms.

Among all these, the residual and the organic waste represent the main focus. 455,430 t represents the portion of residual waste, which is sent to the incineration plants MVB and MVA. The organic waste according Hamburg waste terminology is divided into two main categories: bio-waste (*Bioabfall*) and green waste (*Grünabfall*). In turn, bio-waste is divided in kitchen waste (*Küchenabfall*) and garden waste (*Gartenabfall*), which is divided in a) garden waste to be brought in one of the 12 recycling stations because of dimensions, and b) leaves bags (see Figure V.2.4). The total organic waste accounts for 95,739 t, with reference to the year 2016. It has been registered in the last years an increase in the share of organic waste correctly separated, sign that the recycling offensive (see Section 1.2) undertaken by SRH has been successful (SRH 2017: p.II).

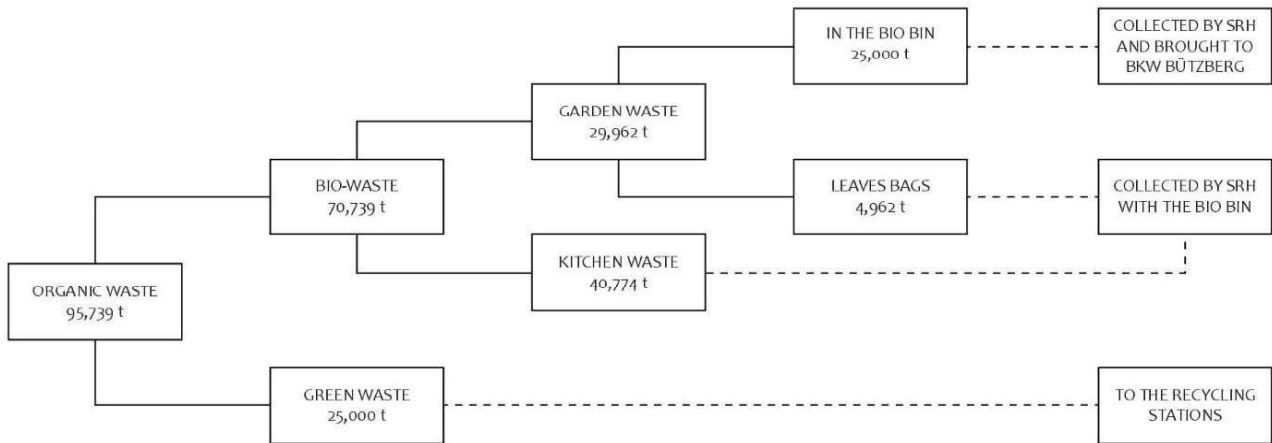


Figure V.2.4 - Organic waste organogram (Own 2017).

The following sections are aiming in describing all the process through which the organic waste fraction from the households undergoes. The type of waste that belongs under the bio-waste category coming from households is listed in the annex one of the Organic Waste Decree (*BioAbfallverordnung, BioAbfVO*) of 2010, updated in 2017 from the city of Hamburg.

Source	Material
Kitchen waste	<ul style="list-style-type: none"> Bread and cake leftovers Vegetable scraps Fruit leftovers and fruit skins Potato skins Eggshells Coffee powder and filter Tea leaves and tea bags Cooked leftovers Deteriorated milk products Other non-hazardous organic waste
Garten waste	<ul style="list-style-type: none"> Cut and potted flowers Contents of flowerpots and window boxes Foliage and brushwood Grass clippings Crushed branches Wild grass and weeds Sawdust of untreated wood Straw and hay Other plant remains
Other organic waste	<ul style="list-style-type: none"> Kitchen paper and napkins Tissues Hair Sand for birds Small animal litter made of wood chips Unbleached paper in small quantities (only single sheets or bags, no glossy paper)

Table V.2.12 - Types of organic waste from households according to the BioAbfVO in Hamburg (Own 2018).

Bio-Waste

As shown in the Figure V.2.5, under the name bio-waste is intended the sum of kitchen waste and garden waste that is collected by SRH. This waste accounts for ca. 70,000 t a year. Depending on the type, it is treated in a different way. The kitchen waste and the garden waste in the bio bin are brought by SRH to the Biogas and compost plant in Bützberg (*Biogas- und Kompostwerk Bützberg*), from now on shortened in BKWB. This plant has a yearly capacity of 70,000 t, just enough for dealing with the current amount of bio-waste received (Stadtreinigung-hamburg.de n.d.). The Figure V.2.X below shows the basic functioning of the cycle.

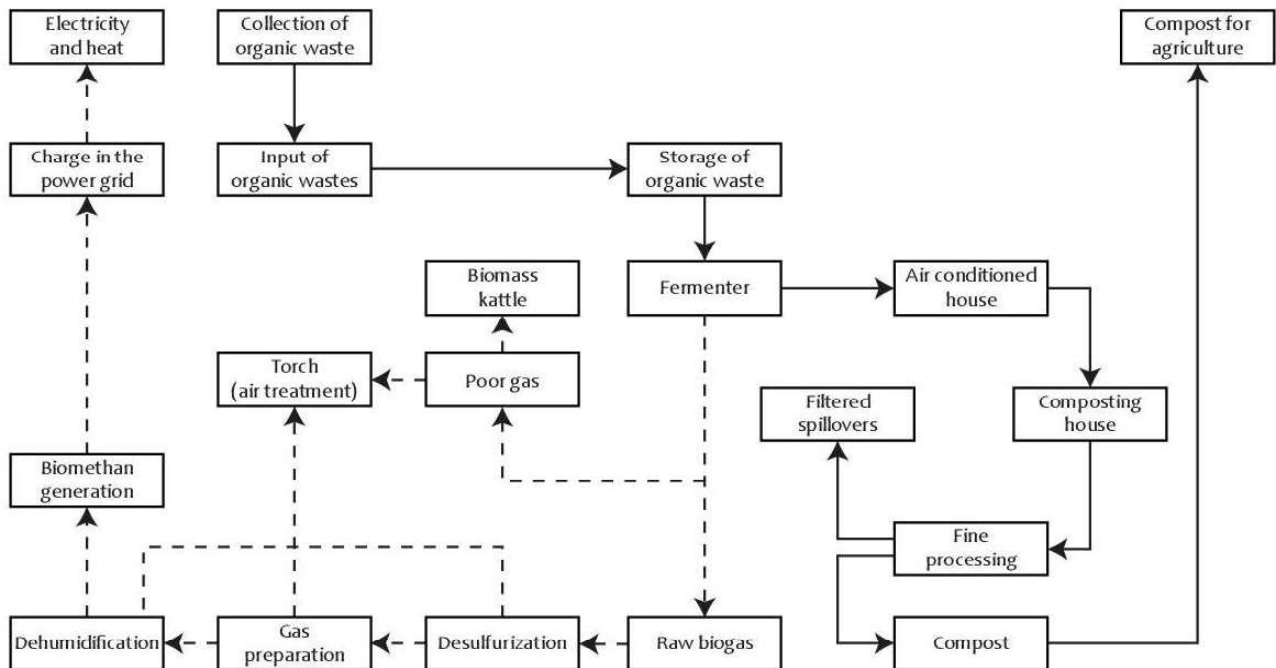


Figure V.2.5 - Scheme of biogas and compost production in BKWB Bützberg (Stadtreinigung.hamburg.de n.d.).

The organic waste firstly runs through a sorting plant to eliminate pieces of metal, glass and plastic and after is brought to the plant and left in the fermenter for two weeks: here, the anaerobic process conducted by bacteria and other microorganisms produces bio row gas (Stadtreinigung-hamburg.de n.d.; Expert SRH_1 2018). This gas is sent to a gas production plant where around 1.3 million m³ of bio methane is generated and input in the grid to generate both electricity and heat for an amount of 13,000 MWh through a CPH system (Expert SRH_2 2018), able to cover the energy demand of 10,000 two-persons households (BKWB brochure). After the first two weeks the matter is moved to other containers where through an aerobic process compost is produced: this product is characterised by a portion of water that varies between 35 and 45%, completely different from the digestate from BioWerk (see Subsection 2.2.1). The amount of this quality compost generated accounts for ca. 35,000 t a year (Boisch 2013; Expert SRH_2 2018). Another company owned completely by SRH, VKN (Vertriebsgesellschaft Kompostprodukte Nord mbH), oversees the selling of the compost produced in BKWB: 70-80% is used to fertilize agricultural fields in Hamburg and Schleswig-Holstein, 5-10% is used instead of peat, and the rest is collected into around 16,700 bags which are brought to the recycling stations where can be bought by privates.

To work, this plant has an internal heating plant system which burnt 2,800 t of green and wood waste for covering its own energy needs, generating 850 kW of energy ready to use. BKWB has also a contract with AWSH, the waste collection company of the adjacent Federal State Schleswig-Holstein to receive up to 2,500 t of organic waste from the households of this State in 2017, quantity that has been increased to 5,000 t in this year (Expert SRH_2 2018).

A fraction of the garden waste is constituted by the leaves bags. Since 2017 SRH offers the possibility to the households living in some parts of the city outskirts, characterised by single houses with garden. These bags are then sold to private companies to produce compost.

Green Waste

For the waste fraction coming from gardens that is too big in dimension for fitting in the bio bin and for those households who do not have the bin at all, they can bring this waste to one of the twelve recycling stations (*Recyclingshöfe*) situated spread all over the territory after payment of a small charge. To incentive this practice, since 2017 SRH decided to set the first cubic metre free of charge; moreover, some private firms are offering this service after payment, if citizens themselves are not willing to transport them to the stations. The waste collected here is rather various: glass (700 t), paper (4,500 t) and green waste (25,000 t + 11,280 t), residual waste (5,870 t). The green waste that comes to these stations is then separated in two parts: the wet and the woody part. The wet one is sent to other private compost facilities and the woody one is bought by industries for their burning requirements (Expert SRH_2 2018).

2.2.3 Infrastructure

SRH is also in charge of the public street cleaning, leaves included. These are brought to the 12 recycling stations where are divided into two parts: the woody part is acquired by privates to cover their energy demand; the green part is sold to private companies for generating compost. This waste accounts for ca. 11,000 t a year (SRH 2017: p.II).

2.2.4 Production sector

As already mentioned previously, among all the steps, this is the least explored one, due to lack of available data and the difficulties of determining the origin of organic materials in a port city like Hamburg, which sees its import and export activities being connected all around the world. Therefore, the production flows have been related mainly to agricultural production and the tree nurseries present in Hamburg and its surroundings, to keep the flows rather local: in addition, these are the focus of the REPAiR project.

The fractions that belong to the bio-waste category from agricultural activities are listed in the annex two of the Organic Waste Decree (*BioAbfallverordnung, BioAbfVO*) of 2010, updated in 2017.

Agriculture

For what concerns agriculture production, Hamburg has rather much diversity to offer: in the North of Hamburg it is possible to find crops and potatoes; to the East, every kind of vegetables is produced; the West side is famous for plants and flowers production; the South of Hamburg is much various with cherries and apples (grown in the area known as *Altesland*, old land), vegetables and crops (Expert SRH_2 2018). The agricultural land accounts for a total of 177.2 km², which is around the 23% of the entire Hamburg surface (AdV 2015). Farmers make use of their waste to produce compost on site; in addition, they buy the one generated from bio-waste in the plants of BioWerk and BKWB (see Subsections 2.2.1 and 2.2.2).

Tree nurseries

The tree nurseries (*Baumschulen*) are a special branch under the agriculture sector. In North Germany the tree nurseries are around 400 on a surface of 4,200 hectare spread between the States of Hamburg and Schleswig-Holstein, 85% of these located within the county of Pinneberg (Expert BdB FHH 2018): this accounts for ca. 250 units (Expert HCU_1 2017; Expert BdB FHH 2018). Within the boundaries of Hamburg, 4 tree nurseries are nowadays active (FHH website n.d.) for a total surface of ca. 1 km² (AdV 2015) and they are represented in the Figure V.2.6. They are grouped under the tree nursery association (*Bund deutscher Baumschulen, BdB*) and, as a branch of the agriculture sector, depend from the Chamber of Agriculture of Hamburg. The BdB sets policy goals for environment, health and economic growth at State level for the tree nurseries which are asked to follow these dictations. Every Federal State has then its own BdB, like the ones for Hamburg and Schleswig-Holstein, both objects of this work. It is known, however, that the connection between BdB and the single tree nurseries is rather mild (Expert HCU_1 2017).

In both cases, the demand for compost produced in Hamburg is mainly coming from outside the city-state boundaries. This is due to the fact that within Hamburg the land uses for agriculture and tree nursery occupy a rather small portion of the territory. As a result, the necessity to look at these activities from the surrounding Federal States, such as Schleswig-Holstein, when it comes to involve the production phase within CE practices.

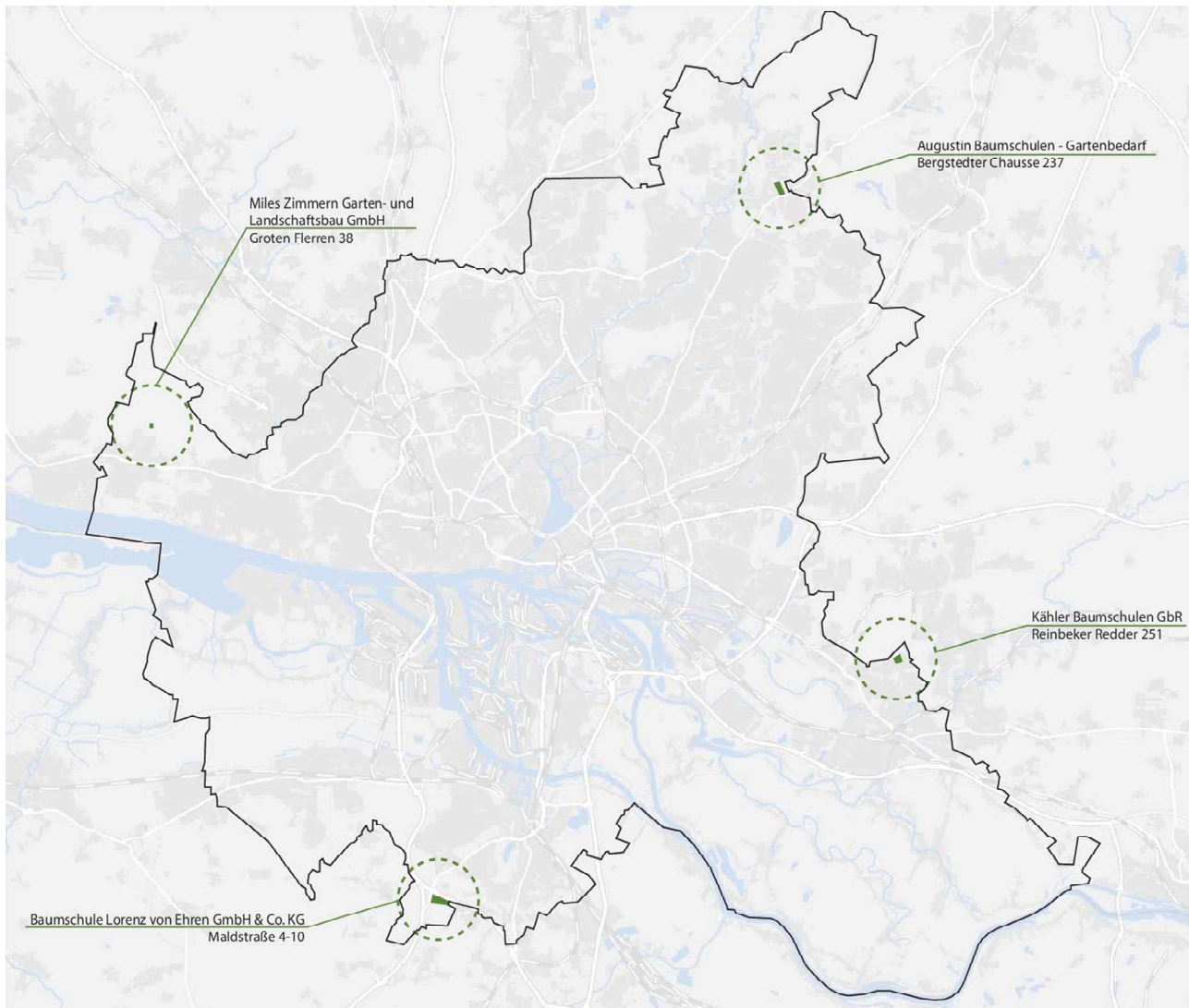


Figure V.2.6 - Map of the tree nurseries in Hamburg (Own from AdV 2015).

3. The actors and the network

The description of the status quo through the SMFA methodology gives already the possibility to trace the connections between the various stakeholders in play along the organic material flows management. In addition, through policy documents analysis and interviews, other relevant stakeholders whose activities can have an impact on the organic material activities have been considered for the network of actors and the case study of this work. Therefore, this Chapter aims to describe the stakeholders' constellation involved in the organic material in Hamburg, both practitioners and decision-makers.

3.1 Views and perceptions on barriers and opportunities of collaboration

3.1.1 Interview framework

As already mentioned in the previous section, relevant information has been derived also from interviews conducted with the stakeholders by means of a general interview guide approach. However, the main reasons for the interviews were to find out first the relations occurring between the stakeholders and second understand the main interests in play. Therefore, the objective of the interviews is to capture the views and perceptions of different actors on the barriers and opportunities of collaboration within the network with the aim of reducing leakage and increase the circularity of the organic material stream.

The general interview guide approach chosen for deriving the interviews is developed based on two theoretical models:

1. **CONCEPTUAL FRAMEWORK ON DECISION-MAKING PROCESSES** – (Dente 2014). The focus through this theoretical background has been in understanding the composition of the subset of actors and the other conditions or elements of the decisional processes, which are determinant in achieving decisional success. The set of questions here is derived from the elements of the framework from Dente (2014), i.e. actors, goals, resources, types, roles, stake, and the patterns of interaction (see Chapter 2, Part II).
2. **COLLABORATIVE GOVERNANCE THEORY** – (Ansell & Gash 2007; Emerson et al. 2011). The focus through this second theoretical background has been capture the perspectives or conditions necessary to collaborate within the network of actors. Here the set of questions is derived from scientific literature which identifies different variables within the framework of collaborative governance.

The entire framework for the interviews is reported in Appendix A.

3.1.2 Interviewees

The interviewees have been chosen in order to answer to the interview framework aforementioned in the previous Subsection and to get a general picture of the organic material flow. The Table V.3.13 that follows presents the stakeholders that have been interviewed within this work and provides a first categorisation.

The interview questions have been derived from a common structure which has been further adapted to each interviewee according to the position he/she covers. The duration of the sessions with the stakeholders varies between 30 minutes and 2 hours. Except for one, all the other seven were a face-to-face meeting. The scripts of the interviews have been inserted in the Appendix B: each of them has been approved by the interviewee, to assure the veracity of the information gathered.

Name	Date
BdB Hamburg (Expert BdB FHH)	21.02.2018
City of Hamburg (Expert FHH)	26.01.2018
HafenCity University_1 (Expert HCU_1)	15.12.2017
HafenCity University_2 (Expert HCU_2)	15.02.2018
Incinerator (Expert MVB)	19.02.2018
Stadtreinigung Hamburg_1 (Expert SRH_1)	17.01.2018
Stadtreinigung Hamburg_2 (Expert SRH_2)	31.01.2018
University Hamburg (Expert UNI-HH)	20.02.2018

Table V.3.13 - List of interviewees categorised with indication of date and place of the interview (Own 2018).

BdB FHH and SH represents the production side of the flow, more specifically the tree nurseries. From SRH two experts have been interviewed. The two experts have contributed in the design of the MFA scheme and provided further information on their activities. MVB is part of SRH but it has the status of an independent company (Expert MVB 2018). The City of Hamburg is in charge of urban policies that include one or more phases of the organic material flow. Since the two projects, REPAiR and FORCE, see the involvement of research institutions, the role of the universities in the field of Circular Economy has been investigated. The role of universities will be extensively discussed in the next Part VI.

3.1.3 Interviews' findings

The main results from the interviews, which include new information about the organic material flow as well, represent the identification and definition of problems which prevent this material to be circular. These problems are presented in the Section 4.2. Moreover, the interviews have led to the identification of other stakeholders

ignored by the initial research from the policy documents: this mechanism is known in the literature as snowball method (Reed et al. 2009). These are presented in the next Section 4.3.

3.2 Stakeholders – Status quo

This first Section outlines the main entities that constitute the groundwork stakeholders' constellation of this master thesis. These are divided into two groups: the ones directly involved in the SMFA (i.e. involved in the material flows management activities), and the ones outside but able to influence the organic material flow through their actions and/or non-actions, to be found in the political/administration arena.

3.2.1 Within MFA

The stakeholders directly involved in the flow have been individuated through the method of Material Flow Analysis (MFA) explained in the Chapter 2 of this Part, through policy documents analysis, and through interviews with experts (that are, at the same time, stakeholders). Table V.3.14 below presents these stakeholders with a brief description of their main activities.

Sector	Name	Description
WM	Abfallwirtschaft Schleswig-Holstein (AWSH)	Waste management company of Schleswig-Holstein Federal State. It has a contract with the biogas and compost plant of Bützberg (BKWB) to bring part of their organic waste (Senat FHH 2017).
WM	Abfallwirtschaftszentrum Tritttau GmbH & Co.KG (AWT)	The biogas and compost plant of Schleswig-Holstein (Senat FHH 2017).
P	Agriculturists and Gardeners	Agriculturists are the producers of food from agriculture (see Subsection 2.2.4); gardeners are to be intended both as professionals and as private citizens with a garden. They both act as receivers for compost (Expert SRH_2 2018).
WM	BioCycling	Together with SRH and ETH, it is the owner of the biogas and digestate plant of BioWerk. It oversees the collection of organic waste from the business sector in Hamburg (Expert SRH_2 2018).
WM	Biogas- und Kompostwerk Bützberg (BKWB)	It is the biogas and compost plant located in Bützberg, Hamburg. It is completely (100%) owned by SRH (SRH 2017).
WM	Biomasse Einkauf Nord GmbH (BEN GmbH)	Collector of biomass from Hamburg and Schleswig-Holstein, providing then the wood for the incineration plant MVB in Hamburg (MVB 2016).
WM	BIOWERK Hamburg GmbH & Co. KG	Biogas and digestate plant in Hamburg owned by SRH (47,5%), BioCycling (47,5%) and ETH (5%). It processes organic waste coming from the business sector (Senat FHH 2017; BioWerk-Hamburg.de n.d.).
C	Commercial sector	This general term refers to all those commercial activities which have a biowaste bin, accounting for 108.000 units in Hamburg (Senat FHH 2017). Included in this category are wholesale and retailers. These are the receivers of agriculture and tree nurseries products. Moreover, they are generators of organic waste. They are a subcategory of the business sector.
WM	ETH	Together with SRH and BioCycling, it owns the biogas and digestate plant Biowerk. Its role in the cooperation is to sell the digestate on the market (Expert SRH_2 2018).
C	Households	This term represents the people that generate organic waste at house level.
WM	Müllverwertungsanlage Borsigstraße (MVB)	One of the two incinerators in Hamburg located in Borsigstraße and completely (100%) owned by SRH (MVB 2017).
WM	Müllverwertung Rugenberger Damm (MVR)	It is one of the two incinerators located in Hamburg. It is owned at 45% by SRH and receives the residual waste from households (MVR 2017).

WM	Private composting firms	In Hamburg are present many private firms which make compost out of that fraction of organic waste which is not collected by SRH and neither by BioCycling, e.g. BUCH Gruppe (Senat FHH 2017).
WM	Stadtreinigung Hamburg (SRH)	The city-owned public waste management company, responsible body for the disposal of waste from households in Hamburg (Senat FHH 2017).
P	Tree nurseries	The four tree nurseries of Hamburg plus the around 250 in Schleswig-Holstein (see Subsection 2.2.4).
WM	Vertriebsgesellschaft Kompostprodukte Nord GmbH (VKN)	It is a company owned at 64.84% by SRH and it oversees the selling of the compost produced in BKWB in North Germany (SRH 2017).
P	Vattenfall Europe GmbH	One of the biggest energy provider in Germany (Anon n.d.). It receives the biogas generated by BKWB and BioWerk plants.

Table V.3.14 – List of stakeholders directly involved in the organic material stream. P stands for Production, C for consumption and WM for waste management (Own 2018).

The stakeholders’ constellation directly involved in the organic material flow management activities in Hamburg – as drawn by the legislative framework in place and market conditions in Hamburg – is represented in the Figure V.3.7.

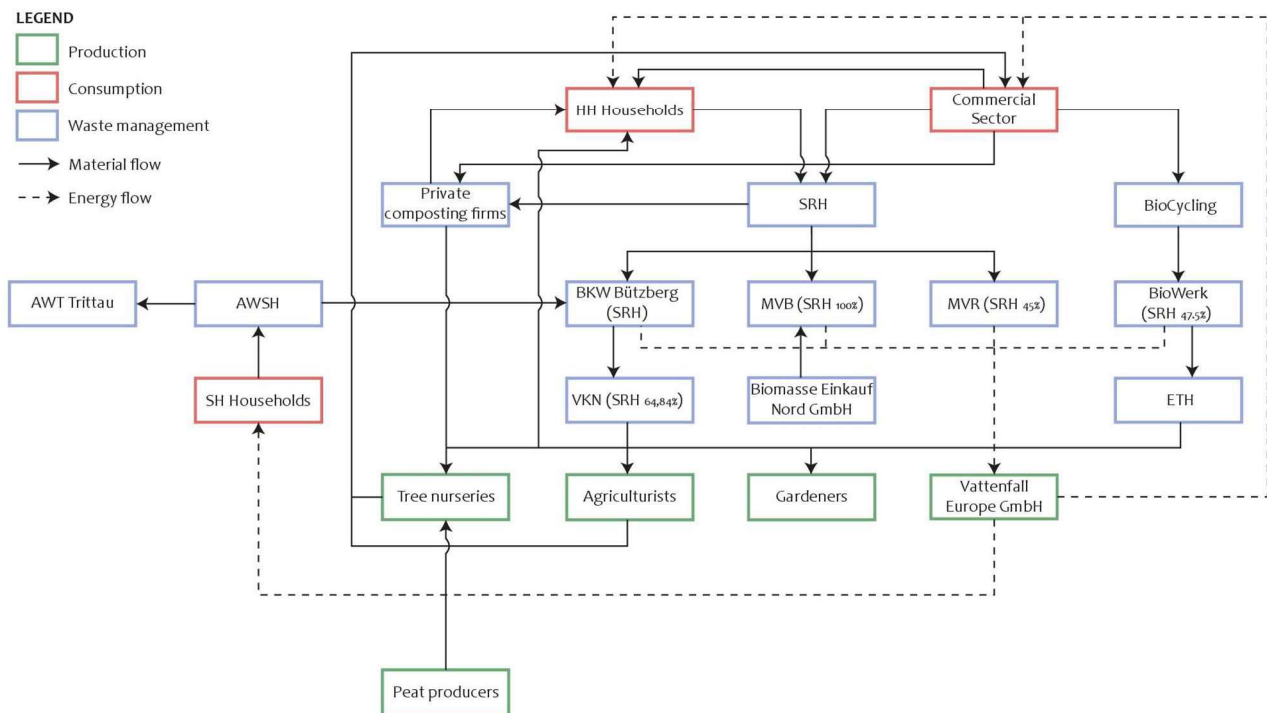


Figure V.3.7 - Stakeholders involved in the organic material flow (Own 2018).

3.2.2 Outside MFA

The focus of this Subsection are the stakeholders able to influence the organic material flow activities as based on the power that the law assigns to them (e.g. public agencies). This information has been derived by policy documents analysis. As already done for the previous group, the following Table V.3.15 provides the names of these stakeholders with a short description of their main activities. The relevance for the organic material flows management has been specified.

Outside		
Name	Description	Relevance within the material flow
European Union (EU)	The political body at the international level guiding and supervising the policy of its Member States and that of the Union itself in relation to other international bodies. Policy areas of its competence include also the environmental and waste management policy as part of it.	Policy body at international level
The Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety – <i>Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit</i> (BMUB)	A cabinet-level ministry of the Federal Republic of Germany responsible to prepare legislation in order to shape the legal framework in the policy areas of environment, nature conservation, building and nuclear safety. This includes preparing regulatory legislation and transposing EU directives into national law (BMUB n.d.). Its tasks with regard to waste management governance include setting priorities, participating in laws actualisation and overseeing strategic planning, information and public relations, as well as defining requirements for waste facilities (EEA 2009; Fischer 2013).	Policy body at national level
Ministry for Environment and Energy - <i>Behörde für Umwelt und Energie</i> (BUE)	The ministry in charge of the policies in the field of environment and energy for the Hanseatic City of Hamburg (Offizielles Stadtportal für Hamburg n.d.c). The department for waste management (<i>Abteilung Abfallwirtschaft</i>) within this ministry is the supreme agency for the waste management in Hamburg. It is responsible for all ministerial and administrative duties concerning waste management and for controlling Hamburg's local waste management company (BUE 2017).	Policy and governance body at the Federal State level
Chamber of Commerce Hamburg	It represents the business community, providing services for new establishing firms, advocating for market-based legislative and regulatory environment which favours SMEs, and supporting fair business (Handelskammer Hamburg.de n.d.).	Representation of the business community and therefore the consumption side of the commercial sector of the organic material flow
Chamber of Agriculture Hamburg	It promotes and supervises agriculture-related activities, including training, experimental projects and providing experts support. All agricultural companies have a legal claim to use the services offered. The Board of Representatives of Chamber determines the directives under which the affairs of the Chamber must be conducted (Lwk-hamburg.de n.d.).	Representation of the agriculture sector and therefore the production side of the organic material flow
The Free and Hanseatic City of Hamburg (FHH)	The City of Hamburg is a city-state and one of the 16 Federal States of the German Federal Republic. It is a republic, democratic welfare state and a constitutional state (Land) as well as a local municipality (Offizielles Stadtportal für Hamburg n.d.a).	Policy and governance main body at the Federal State level
Districts of Hamburg - <i>Bezirke</i>	These entities can be compared to municipalities of other Federal States. Hamburg is divided into 7 districts. Their tasks concern mainly the administration of their territories and fulfilling Federal State and communal tasks assigned by the Senate (Kramer 2005), including waste management, in particular space provision for waste collection.	Governance branches of implementation within the city-state FHH policy

Table V.3.15 – List of stakeholders outside the organic material stream but able to influence it (Own 2018).

4. Main findings

This Chapter presents the reflections related to the case study analysed in this Chapter. Each Section presents the conclusions of the previous three Chapters respectively.

4.1 City commitment towards innovation and Circular Economy

Hamburg is a city and a Federal State at the same time with no distinction between these administrative tasks and with strong legislative, executive and administrative powers tied and concentrated in one geographical area within the city boundaries. Because of this special status, Hamburg has a general competence in bringing forward all public affairs concerning its territory and considerable autonomy with regard to some policy fields. Concerning the waste management governance, Hamburg lies on shared responsibilities between local public and private actors, with the city-owned public waste management company Stadtreinigung Hamburg (SRH) as the main operational and policy implementation body.

Overall, it can be concluded that the city's commitment in the environmental policy illustrated in Chapter 1 shows a strong involvement of the city-state government in a strict collaboration with the private sector and other civic actors. The city's strategic planning is ambitious and well-integrated with clear goals around environmental sustainability in all policy areas investigated. Local government of Hamburg – through its public agencies – has been actively involved in bringing together diverse stakeholders in projects concerning sustainability and innovation issues. The initiatives and projects outlined often involve local public funding. The urban governance and cooperation model present in Hamburg includes different formats, such as bilateral cooperation (e.g. The Green Roof Strategy), financial and policy advisory platforms (e.g. Energy Grid Advisory Council; Eco-Partnership;), publicly owned and privately-run corporations (e.g. HafenCity urban development project), etc.

The City of Hamburg demonstrates how voluntary measures, aligned with consultancy services, incentives and marketing opportunities, can generate innovative solutions to several environmental issues for the city. Particular attention – as an innovative policy area within the urban governance – is given to the 'smart specialisation' issue through the Regional Innovation Strategy 2020 and the integrated Cluster Policy as an example of the modern economic policy and collaborative governance. Therefore, the city-state of Hamburg, not only engages in long-term strategic planning but also drives these efforts through also a rich network of subsidiaries (e.g. HamburgEnergie; IBA) – either wholly publicly owned or joint ventures with local business stakeholders.

Status quo of the circular economy topic introduction in Germany and as a result in Hamburg, illustrate the approach of EU commitment on the topic, where waste management has been strategically chosen at this stage as the area to deliver the first objectives for the transformation of the current linear economy. Said that, it should be mentioned that at the EU level the Circular Economy Package (December 2015) connects the waste management as well to other policy areas (i.e. production, consumption, and general policy frameworks), which can be considered a policy innovation at this level (STOA 2017). From this perspective, circular economy as a policy commitment in Germany (introduced by the national Waste Management Act since 1996) can therefore be considered as conceptualised on measures that only take effect at the end of a product's life cycle (i.e. waste management), such as through optimised separation of recyclable materials from residual waste and an overall target of recycling rate for the municipal waste. As Wilts (2016) argues, "one explanation for the focus on technical and purely waste-related solutions [concerning the introduction of the circular economy concept] may also be found in Germany's leading global position in waste management infrastructure" which is as well driven by an ambitious waste management policy (Wilts 2016: p.19). It should be considered – as also stressed from EU approach and theoretical conceptualisation – that a whole new realm of cooperation and coordination will be required also in the German and Hamburg policy framework in order to make this model viable right along the entire value chain. This is as well sustained by BMUB (2017) advocating for further enhancing of the circular economy and where its implications are to be transformed into a comprehensive materials flow management over the coming years. The case study on the organic material stream of this master thesis starts from this presupposition in exploring the 'network building'.

4.2 Problems related to the organic material stream in Hamburg

This section aims to present the problems individuated for each part of the material flow. These have been derived from four sources:

- REPAiR project
- Scientific literature on organic waste in Germany and Hamburg
- Policy documents
- Qualitative interviews with relevant stakeholders

The problems individuated refer both to material input and output mainly from the waste management sector.

4.2.1 Commercial sector

To this sector there are two main problems. The first one is related to the residual waste generated in the commercial sector. By law businesses are obliged to have a small bin to collect residual waste similar to household waste and SRH conducts its collection, treatment and disposal (*Hausmüllähnlicher Geschäftsmüll*). Businesses mostly don't collect organic waste separately in a biowaste bin, consequently the organic waste coming from the commercial sector is mixed with the residual waste and sent to the incinerators and therewith loss for biogas and compost production. (Expert SRH_1 2018; Expert SRH_2 2018).

The second problem is related to the market of the compost. In Hamburg, due to high share of green spaces in the city, there are present many private companies which produce compost: therefore, competition on this market is high. However, the production of compost within Hamburg is not high enough, thing that oblige local compost buyers (e.g. agriculturists, gardeners) to be opened for imports (Expert SRH_2 2018).

4.2.2 Households

The most problematic part of the chain is probably at households' level, especially in terms of separation. Nowadays, it has been calculated that 41.5% of the residual waste is composed of organic waste (UEB Berlin 2017). Around 38% can be diverged to the bio-waste stream, i.e. used for compost production (Expert SRH_2 2018). There are two main reasons from which this problem originates:

1. At present, not all households are covered by the separate collection scheme of bio-waste. In addition, some parts in the old inner quarters of the existing urban fabric lack space for the accommodation of organic waste bins (Expert SRH_1 2018; Expert SRH_2 2018);
2. The awareness and interests of households is at the moment rather low regarding bio-waste separation (Expert SRH_1 2018; Expert SRH_2 2018; Expert MVB 2018).

In a future scenario where these issues will be addressed and solved, it will result in a huge increase of waste flow to BKWB (ca. 170,000 t per year), which is currently operating already at full speed. SRH is aware of this possibility, supported also by data which show an increase in the percentage of separated waste every year. As a matter of fact, the new Centre for Resources and Energy (*Zentrum für Ressourcen und Energie, ZRE*) planned to be completed by 2023 (Expert SRH_2 2018).

As previously mentioned, from bio-waste it is possible to generate compost. A non-optimal separation at source compromises the quality of the final product. With new technologies it is possible to eliminate macro pieces of extraneous materials, like plastic, glass and metal. However, smaller pieces (micro) are impossible to remove, especially glass parts, which might make dangerous its handling (Expert SRH_2 2018).

The first cause of this problem is related to the fact that not every household has a bio-waste bin, although it was made obligatory for all houses to have one by law in 2015 (Senat FHH 2017; Expert SRH_1 2018). One of the reasons for this is the scarce interest of the big housing companies, like SAGA, which are not willing to participate or incentive their tenants to separate. Another point is the lack of space for creating a place for bio-waste bins, especially in the already existing houses in the city centre built in the last century (Expert HCU_1 2017; Expert SRH_1 2018; Expert SRH_2 2018).

Another problem regards the other part of the households' organic waste, the garden and green waste. At present, the green bin for organic is used mainly for this type of waste: this is not optimal for the biogas production (Expert

SRH_2 2018). On the other side, it is important for SRH that households produce green waste to increase compost production for the agricultural sector, with the aim of reducing peat usage. However, it is still possible nowadays to burn this waste on the ground and to produce compost on site. These practices are both discouraged by SRH: the first is obviously clear; the second is due to the fact that not only the compost generated on ground creates health problems (Griffiths & McDermott 2013) as well as bad odours, but also it is rather inefficient, because the need of compost is anyway higher; moreover, a high quantity is necessary to cultivate few products and to reduce the possibility of spreading diseases (Expert SRH_2 2018).

For both waste types, the interviewees have mentioned the lack of interest and awareness among the citizens. SRH is working intensively and for long time on campaigns to motivate people to separate, also through economic incentives: for instance, the collection of residual waste cost is much higher than the one for bio-waste (Expert FHH 2018; Expert SRH_1 2018; Expert SRH_2 2018).

4.2.3 Incineration practices

Given that for CE theoretical conceptualisation incineration practices is not considered an option at all, the practice of incineration is still today a common practice to get rid of a big part of the waste which otherwise would not find any alternative usage, if not landfilling which is excluded here in this context. It can be stated that incineration is can still represent a temporary solution. Especially in the case of Hamburg, with a long tradition of incineration and contract based running infrastructures, getting rid of these practices now is rather impossible. At the end, they contribute to energy generation from waste, which can be still considered a sort of ‘value recovery’ in terms of energetic values, still not optimal from the CE theoretical conceptualisation. For German legislation, this activity is found under the name of recycling if the calorific value of the substance is over a certain limit (Wilts 2016).

Another point that makes not easy the reduction of quantities that are brought to incineration, namely the organic waste (see previous Subsection), is that there is no problem for the plant to incinerate organic waste. Moreover, no separation is performed before the incineration, leading to potential material losses (Expert MVB 2018).

To conclude on this argument, incineration in Germany is nowadays too profound rooted and its business is moved by strong interests. Of course, to pursue the principled of a CE, such practice must be reduced. The trend of the last years seems to go in this direction: the quantity of waste that the three incinerators has processed is decreased, leading to the closing of one of the plants and the reopening of another plant for bio-waste treatment.

4.2.4 Production sector

The problems for the production sector for what concerns the input lies in the need for compost. On their fields, farmers produce their own compost with the few green wastes that they have, but generally they prefer not to practice this activity on site because of the dangerous effects that the process of composting might generate. Therefore, farmers tend to buy compost already produced somewhere else. The one coming from BKWB and BioWerk is not enough for their activities and they are forced to import it from outside. This process contrasts with the principles of the theory on CE of the local cycles.

As already said, tree nurseries represent a special part of the agriculture sector that in North Germany is of great importance (see Subsection 2.2.4). Their demand of input material consists mainly of peat. This substance “is a heterogeneous mixture of more or less decomposed plant (humus) material that has accumulated in a water-saturated environment and in the absence of oxygen” (Peatsociety.org n.d.). For plants and flowers cultivation, this material is preferred because it is mainly just soil with no sort of fertiliser inside: it is particularly good for plants and flowers production because in order to grow at best the feed should be poor of nutrients, especially with low concentration of potassium (K). Peat is considered, however, a non-renewable material: its generation, which occurs in mosses, takes around 100 years. This substance usage was rather common in the past century and was used to heat houses instead of coal because of its cheaper price. Nowadays there are few places on the world where this substance is still present in nature: these are the Baltic countries and Russia, under the permafrost layer. In the East part of Germany, it is possible to find peat lodes (Expert SRH_2 2018). It follows that reducing the usage of this raw material is a priority, also in accordance to CE theory dictations.

For what concerns waste, agriculture sector generates a rather small quantity of reusable material from which is possible to generate compost on field. The most waste consists of animal faeces, which is not optimal for compost

generation (Expert SRH_2 2018). This is indeed one of the reasons why the practice of composting on site is tended to be avoided.

The waste generated from tree nurseries is rather diverse: it varies from vases and plastic to wood and organic waste in general. For the same reasons that are valid for agriculture, compost is not generated by the tree nurseries on site: in this case, the risk of spreading diseases to other plants is more important here than for agriculture. Woody parts are instead mainly incinerated on site: this practice is allowed by law, even though discouraged. This practice is not only a misuse in terms of energy waste, but it has also brought citizens living in the surroundings to protest these fires (Expert BdB FHH 2018).

The compost produced by BKWB and BioWerk can be used both by farmers and gardeners. The firsts buy already the compost from the local BKWB and BioWerk plants, but the quantity generated is not enough to cover their demand. For the seconds, the compost from organic waste is too rich of fertilizers: it can be mixed with peat to a maximum of 20%. The one coming just from green waste has less nutrients and therefore can be used in a percentage of 40% maximum (Expert SRH_2 2018).

One of the challenges mentioned by the interviewees is the need of finding a sustainable way to produce peat, stopping the extraction of this raw material. Linked to this, the market is pushing to production of an always better compost in terms of quality and nutrients (Expert SRH_2 2018).

4.3 Other stakeholders' identification

As already mentioned in Chapter 3, the interviews have led to the identification of other stakeholders ignored by the initial research from the policy documents: this mechanism is known in the literature as snowball method (see Reed et al. 2009). Therefore, the category named as 'other stakeholders' describes the stakeholders that have been mentioned during the interviews conducted, such as other non-political bodies, considered relevant as their behaviours/directions currently have or may have an impact on the organic material flow management.

These represent the potential actors of the process that are in charge of realise the project towards the 'closing the cycle' of the organic material stream in Hamburg, object of Part VI. These stakeholders are listed and described in the Table V.4.16 below.

Name	Description	Relevance for the empirical study
German Federation for Environment and Nature conservation – <i>Bund für Umwelt und Naturschutz Deutschlands</i> (BUND)	It is a German NGO dedicated to the preservation of nature and the protection of the environment in a broader view. It was founded in the 70s of the past century and works with the older NABU on daily basis (Grüne Journalismus 2014).	As NGO, it has the power to move people and influence their behaviour.
Nature and Biodiversity Conservation Union - <i>Naturschutzbund</i> (NABU)	It is a German NGO dedicated to the conservation of rivers, forests and individual species of animals. Founded in the last years of the 19 th Century, it is one of the largest and most well-known nature conservation groups in Germany (Grüne Journalismus 2014).	As NGO, it has the power to move people and influence their behaviour.
Association of garden friends – <i>Landesbund der Gartenfreunde</i>	Association at Federal State level which manage 33.000 small garden plots all over the city. These plots fulfil social tasks as integration, acting as spaces for people to gather (Gartenfreunde-hh.de n.d.). They represent those privates which buy compost.	It represents the private citizens with a garden.
SAGA <i>Unternehmensgruppe</i>	It is the biggest housing owner in Hamburg and the biggest social housing company in Germany. In 2016, the number of apartments owned by SAGA was of 132.511 units (Saga 2017).	Most of these units do not present a bio bin for the correct separation of the bio waste.

<i>Bund deutscher Baumschulen Hamburg</i> (BdB FHH)	The association of the tree nurseries for Hamburg. It acts as intermediary between the local farmers – representing their interests – and the chamber of agriculture – reporting their decisions (Expert BdB FHH 2018).	It represents the interests of the tree nurseries in Hamburg.
<i>Bund deutscher Baumschulen Schleswig-Holstein</i> (BdB SH)	The association of the tree nurseries for Schleswig-Holstein. As the one for Hamburg, it acts as intermediary between the local farmers – representing their interests – and the chamber of agriculture – reporting their decisions. The number of tree nurseries represented by this association amounts to more than 200 elements (Expert HCU_1 2017).	It represents the interests of the tree nurseries in Schleswig-Holstein.

Table V.4.16 - Other stakeholders individuated from the interviews (Own 2018).

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Nothing is created, nothing is destroyed, everything is transformed.

(Antoine Laurent Lavoisier)

PART VI

Hamburg Case Study – Organic gets circular

The sixth Part focus lies in presenting the approach chosen for the project development and the results derived in the end, based on the lessons learned from theory and policy background from the previous Parts (II-IV) and empirical analysis to the Hamburg case study (Part V). Therefore, the proposal on the network building, related dynamics and results in the end are founded mainly on this basis. This Part is structured into four Chapters. The first Chapter focuses on constructing the content of the decision (stake) for the network of actors to deal with. The second Chapter introduces and applies a methodological approach from public policy sciences with the objective to understand the elements and dynamics of the decision-making process, identify potential obstacles and further derive the ways for overcoming them. This results in the network of actors required to develop a strategy/policy based on Circular Economy theoretical and practical implications for the organic material stream in Hamburg. The third Chapter describes the temporal sequence of all the aforementioned dynamics with regard to the decisional process. Finally, the implementation instruments and conclusions on the case study of this master thesis work are called in the last Chapter.

1. From the problem to the stake/project

This Chapter accomplishes to describe how the problems that impede the organic material in Hamburg to become circular have been individuated, categorised and structured, together with the related goals, in order to the definition of the overall goal that the network of actors should reach. This overall target represents the stake of the network. The entire process that led to this definition is represented in the scheme of Annex B.

1.1 Problem definition

As stated several times in this work, tackling problems related to Circular Economy require a broad perspective able to include many and diverse issues. These contribute to increase the complexity of such related problems; fact which implies the necessity of complex solutions. According to Dente (2014), when a problem is too complex, it can be ‘unpacked’ in smaller ones. Starting from this assumption, the issue of circularity for the organic matter in Hamburg has been faced from three perspectives, retracing the subdivision proposed for the S-MFA, namely Production, Consumption and Waste Management. The problems have been derived from the Section 4.2, Part V and represented in Table VI.1.17.

Sector	Problem	Problem specification
Production	1. Peat usage in agriculture is not sustainable	Agriculturists need to import from abroad peat for their activities. Long way transport is unsustainable. Furthermore, peat is a non-renewable resource.
	2. Insufficient local supply of compost	Necessity of importing compost from other countries and German states. Long way transport is unsustainable.
	3. Burning of organic matter on site	Loss of potential resources. Unsustainable.
	4. Composting on site	It is a good practice but not efficient (Expert SRH_2 2018).
	5. Conflicts with citizens	As result from problem 3, citizens complain about fires.
Consumption	6. Scarce participation of households in the separation schemes of organic waste	Separation of organic matter is not optimal. Still 38% of organic waste is thrown in the residual bin.
	7. Scarce interest of commercial sector in the separation schemes of organic waste	Waste coming from commercial sector, except for the one from gastronomy, is not at all separated (<i>Geschäftsmüll</i>).
	8. Burning of organic matter on site	Loss of potential resources. Unsustainable.
	9. Compost on site	It is a good practice but not efficient (Expert SRH_2 2018). In dense areas, composting might bring illnesses caused by bacteria.
Waste management	10. Uncomplete collection scheme coverage of all households and commercial sector	Not all Hamburg households are provided by a bio bin. This is the case both of outer areas and too dense inner ones.
	11. Lack of technical solutions for sorting organic waste before treatment	A technology for separating organic waste from residual one before the treatment is missing.

Table VI.1.17 - Problems categorisation (Own 2018).

1.2 Potential actions and practical obstacles

Ones identified the problems related to the organic material flow along the entire chain, a goal for each problem has been determined. After, obstacles that preclude the achievement of a goal are individuated. These results are represented in the Table VI.1.18 below.

Sector	Action	Obstacle
Production	1. Technological and market solution for a sustainable peat generation	a. Transition takes time; b. Lack of awareness and/or interest in solving the problem among agriculturists.
	2. Increase of local compost production	Not enough supply at local level of organic matter for compost production. In the case the quantity of organic matter will increase, it will be necessary to power the current insufficient infrastructures capacity (Expert SRH_2 2018).
	3. Prohibition of burning on site practices	a. Transition takes time; b. Lack of interest in solving the problem among agriculturists.
	4. Discouragement of the composting on site practice	Lack of interest in solving the problem among agriculturists.
	5. Solved with 3	If 3 is solved, no obstacles will occur.
Consumption	6. Increase the separation rate at households' level	a. Awareness and/or interest issues among households; b. Lack of collection infrastructure (bins).
	7. Increase the separation rate at commercial level	a. Awareness and/or interest issues among businesses; b. Lack of collection infrastructure (bins).
	8. Prohibition of burning on site practices	a. Transition takes time; b. Lack of interest in solving the problem among households.
	9. Discouragement of the composting on site practice	Lack of interest in solving the problem among households.
Waste management	10. Full coverage of collection scheme for households and commercial sector	a. Transition takes time, but pilot projects already in place; b. Lack of space for bins; c. Scarce interest from landlords.
	11. Generate technical solutions for improving sorting	a. Transition takes time; b. Lack of awareness and/or interest from waste management company in investing on technological.

Table VI.1.18 - Problems categorisation (Own 2018).

1.3 Merge and choice of goals – Building the stake

As the Table VI.1.18 shows, the actions individuated are many and the most diverse: such a set would be too much time-consuming and most likely another work to be singularly explored, each of them with their own network and related strategies. Therefore, expedients have been performed to find the main ones which converge to an overarching goal, in other words, the stake of the network: this is the improvement of circularity of the organic material stream in Hamburg.

Proceeding in order of numbering, the goal number (1) has been discarded because not relevant for this thesis, since it concentrates on a technical solution. Moreover, finding a new kind of peat which is completely renewable is a global goal, hence it does not regard specifically Hamburg. The action number (2) is willing to tackle a problem related to Hamburg case study, even though its fulfilment includes several other actions described here, therefore it has been considered part of the stake but as an overall action to pursue (see Annex B). Action (3) and action (8) are the same, even though they refer to two different sectors. They are both specific to the case study and treated as one. The same is valid for action (4) and (9). Number (5) is a consequence of action (3), therefore, if this last will

be tackled, the (5) will be solved consequently. Actions (6) and (7) fulfil a rather important part of the stake: bad separation at source affects the entire waste management sector which then falls back on compost generation rates. These have been kept separately, since two different target groups are involved. Number (10) represents an action that can be reached if both actions (6) and (7) are tackled. Finally, actions (11), (6) and (7) would be excluded mutually: if a technology able to sort post-consumer waste would be invented, there would be no need for the consumers to pay attention on the types of waste that they throw in the bin. Since the invention of a new technology is a much more complex issue and expensive (at the same time a global level challenge) than acting on the consumer's behaviour – area where SRH is already engaged – action (11) has been discarded.

What comes out from this exercise is that actions (6), (7) and (10) represent the key intermediate objectives to achieve in order to reach the overall goal of 'improving circularity of the organic material stream in Hamburg'. At this point, action (2) can be considered as secondary, since by tackling these three it will result in more organic matter for generating compost. Moreover, actions (3) and (8) consequently - and action (4) together with action (9) need a relative small effort from the actors' network to be solved: the first by introducing a law that prohibits the incineration on ground, and the second by thinking to specific incentives. The real challenge and stake of the current network building issue is, therefore, offered by actions which point to the increase of separation rates of the organic material at households (action 6) and commercial level (action 7) supported by a full coverage of collection schemes (action 10), which is afterwards expected to generate compost (goal 2) – and additional renewable resources (e.g. biogas) – to be then re-inserted in the organic material cycle in Hamburg following a material flow management approach (BMUB 2017). This stake is considered a challenge from Circular Economy perspective: as a matter of fact, it involves innovative thinking by bringing together different issues, actors and, consequently, interests. The next Chapter presents the *ad hoc* network that has been built starting from the results of the previous Part V able to achieve this goal.

2. A methodological approach – Network building

The second Chapter focuses on the issue of structuring of the decisional network of actors required to deal with the issue or stake concerning Circular Economy theoretical and practical implications for the organic material stream in Hamburg, as defined and described in the previous Chapter 1. This is conducted by means of a conceptual framework from public policy sciences (see Subsection 2.2.1, Part II) which combines quantitative and qualitative methods for understanding the elements and dynamics of the decision-making processes. The utility of this methodology in this case – combined with the empirical research performed and described in the previous parts – lies in building the network of actors through the identification of potential obstacles and definition of the so-called strategies for overcoming them and thus maximise the probability of a successful adoption and implementation of the decision on the identified stake (Section 1.3).

2.1 Empirical network

Starting from the stake defined in Section 1.3, the network has been built with the information provided by the interviewees and the documents analysis. To identify the actors that are going to compose the starting network, a group of five criteria (in the form of questions) have been drafted, the answer of which would result in the base set of actors of the network. Secondly, connections between the identified actors have been identified as mirroring the current relationships derived from the interviews and the documents. The five criteria are the following:

- I. Who generates the problem?
- II. Who is directly affected by the problem?
- III. Who has an interest in solving the problem?
- IV. Who is against the resolution of the problem?

- V. Who are the actors that represent the ones generating the problem and, therefore, influencing their behaviour?

These questions have been answered at first extent separately for each problem (Table VI.1.17 - Problems categorisation) as related to the respective actions, namely (6), (7) and (10). The results are represented in Table VI.2.19 below.

Problems			
	6. Scarce participation of households in the separation schemes of organic waste	7. Scarce interest of commercial sector in the separation schemes of organic waste	10. Uncomplete collection scheme coverage of all households and commercial sector
I	Households who do not separate correctly, both for lack of bin and for behaviour	Commercial sector, both businesses and agriculturists	SRH
II	SRH, private composting firms	BioWerk (SRH, BioCycling, ETH)	BioWerk (SRH, BioCycling, ETH), SRH
III	SRH, BUE	SRH, BioWerk, BUE, BdB FHH and SH	BioWerk, SRH, BUE
IV	SAGA, (MVB, MVR)	MVB, MVR, Tree nurseries	SAGA, (BSW)
V	Civil society organisations, District committees, Districts, Ass. of garden friends	Ch. of Commerce, Ch. of Agriculture, Farmers association	SRH

Table VI.2.19 - Actors' identification (Own 2018).

For what concerns the action number (6), those households which do not separate correctly, both for lack of bio-bin and for a matter of behaviour, have been individuated as the source of the problem. Even though the lack of bins is not a problem that can be solved by households alone, this represents anyway one reason for an incorrect separation. SRH is the actor directly affected by these two problems, since less organic matter reaches its plants for compost and biogas generation. The private composting firms find themselves to be affected by this behaviour as well: more organic waste would mean for them a higher economic return. Hence, SRH together with BUE, holds the stake for this action (see Section 2.2). Obstacles for the resolution of this point is represented mainly by big housing companies and agencies like SAGA, because they are often not favourable to the introduction of new bins in their apartment blocks, not convinced that their tenants would be able to separate the waste correctly (Expert SRH_1 2018; Expert SRH_2 2018). Furthermore, the two incinerators of Hamburg, namely MVB and MVR, might be consider against this solution since this would result in less material for them to incinerate (Expert MVB 2018). Strategic actors to be involved for the solution of this issue have been individuated in civil society organisations and/or district committees: these could play a key role of mediation between citizens and governmental actors.

Action (7) represents the same problem as of (6) but on the commercial sector side. Therefore, the interest group is composed by businesses and agriculturists which do not separate correctly (the first ones) and burn the organic matter (the second). In this case, BioWerk is the directly affected actor: they are responsible for the commercial organic waste and do profit from the selling of the compost on the free market. SRH is part of this company, so it is affected as well. Hence, SRH and BioWerk, under BUE, and BdB FHH and SH on the consumption side are the actors with the higher stake towards the solution of this problem. It is rather difficult to state which actors would be against this action, but the two incinerators again could oppose the process for the same reasons explained for the action (6). Moreover, the tree nurseries might be not willing to participate if no incentives are provided: their main argument is that the payment for the waste collection is an additional cost that they prefer to avoid, since by law they

can get rid of it for free, i.e. by burning these materials on site. For these target groups, the Chambers of Commerce and of Agriculture are representatives of their interests: talking with them could be essential to move these groups towards a decision.

Finally, the action (10) sees the problem of collection scheme coverage as a technical one as charged to SRH. Because of this, both SRH and BioWerk endure its effects which cause a smaller provision of organic matter and, consequently, lower generation of compost. Again, SRH, BioWerk with BUE share the stake of this action. The municipal housing agency SAGA and other bigger housing agencies or individuals representing them are the main actors opposing to the provision of bio-bins to all households (Expert SRH_1 2018; Expert SRH_2 2018). A secondary actor that might be interested in this action can be the Ministry of Urban Development and Housing (BSW), linked to the space issues mentioned in the previous Chapter 1. In this case, the strategic actor that must be involved to complete the collection scheme coverage is SRH. It must be said that this process is currently undergoing, and it sees SRH as leader of this transition with the help of BUE (Expert MVB 2018).

Merging all this information in one scheme results in the network of actors concerning the stake related to this case study and it is represented in the Figure VI.2.8 below.

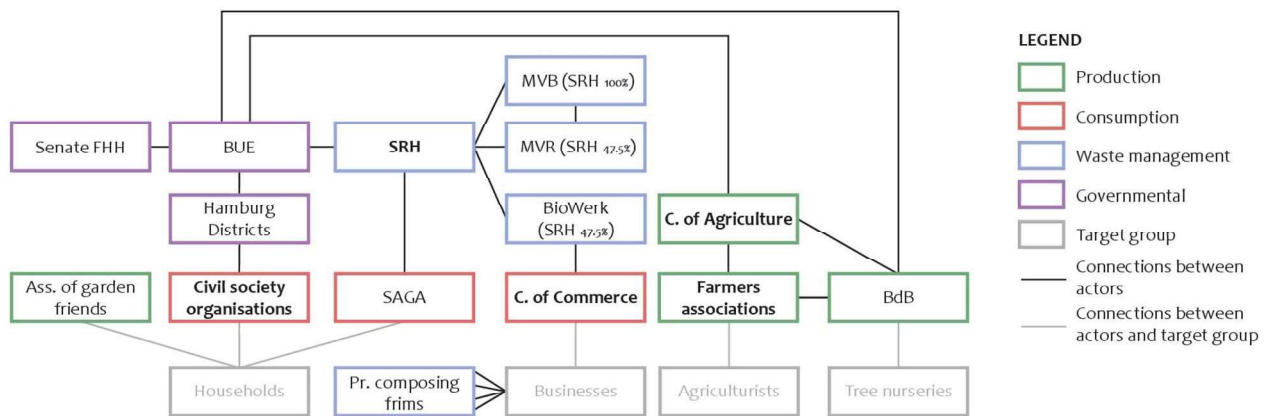


Figure VI.2.8 - Empirical network of actors. In bold the strategic actors to be involved (Own 2018).

The actors have been divided into production, consumption, waste management, governmental and target groups. The connections represented in the Figure VI.2.8 are the relations that currently exist between the actors without concerning the stake individuated: this because this stake is purely theoretical and understanding the connections between the actors is part of the project analysis, once individuated the promoter (see Section 2.3).

2.2 Promoter and Director roles – Identification and goals definition

With regard to the decisional content of the *ad hoc* network built for this case study, the current stake or content of the decision identified concerns the increase of separation rates of the organic material at households and commercial level supported by a full coverage of collection schemes, which is afterwards expected to generate compost and other renewable resources (e.g. biogas) to be then re-inserted in the organic material cycle in Hamburg (Chapter 1). To this identified stake, towards the characterisation of the network as one of the elements of the decision-making processes, the role²⁸ that each actor plays in this process is a fundamental aspect to be considered.

²⁸ The roles can be defined as the function that the actors play in decisional processes with regard to the problem and other actors and that implies limits to its behaviour and that of the other actors. Within the decisional process the actors can play

Within this context, first of all the role of the promoter is to be defined according to the policy decision-making theory (Subsection 2.2.1, Part II) and in relation to the author's understanding of CE practical implications (i.e. policy in this case) aiming towards a material flow management approach (Part IV). Afterwards, following the empirical research on the organic material stream case study (Part V) the first part of this Section concludes with the identification of the promoter that is most likely to take the lead of the policy innovation for the achievement of the objectives of the current case study. Finally, its goals are specified as well. The second part instead – starting from the argumentation of the promoter's role – focuses on delineation of the director as a necessary role within the network of actors, as well as its goals and limitations.

2.2.1 The Promoter and the goals

The role of the promoter in policy making theory is considered as the central actor in the policy formulation phase and further. This actor is characterised as the one who raises the problem, activates the other actors and often formulates the solution. There are two main features of this actor to be mentioned: a) he/she has content related goals²⁹ and b) determination is mostly a vital condition that he/she needs to possess. The combination of these two elements together with the almost obsessive focus on the proposal, is a common feature of public policy transformation and most probably one of the shared characteristics between the public policy innovator and the private entrepreneur (Dente 2014). On the other side, Circular Economy practical implications in the political sphere require for new and innovative policies with regard to cross-cutting issues and plurality of interests (see Part IV). This policy innovation is currently explored also at EU level with the Circular Economy Package (December 2015) which stresses the connections between the waste management field and other policy areas (i.e. production, consumption, and general policy frameworks) (STOA 2017). From this perspective CE practical implications will require a whole new realm of cooperation and coordination also in the Hamburg policy framework in order to make this model viable along the entire value chain. This is as well sustained by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety BMUB (2017) advocating for further enhancing of the circular economy and where its implications are to be transformed into a comprehensive materials flow management over the coming years. Hence, the complexity of the topics related to Circular Economy practical implications and its demand for innovation call for a type of actor which should be able to unify old and new, theory and practice: this is known with the name of innovative actor (Küçüksayraç et al. 2015) which in this case corresponds to the promoter role.

Referring to the question “Who would you expect to initiate and maintain a cooperation process in the context of ‘reducing leakage of the organic material stream in Hamburg?’” addressed to the experts from different areas of competences during the interview sessions (see Appendix B), is to be mentioned that the answers have been addressing mainly to a local public authority (i.e. a city-state agency) varying from the Ministry of Environment and Energy (BUE) and the Ministry of Urban Development and Housing (BSW) (Expert SRH_1 2018; Expert MVB 2018; Expert SRH_2 2018; Expert HCU_2 2018; Expert FHH 2018). Additionally, other types of actors such as the German Federation for Environment and Nature Conservation BUND (national NGO), the Nature and Biodiversity Conservation Union NABU (national NGO), and the Chambers of Commerce and Agriculture have been pointed as well (Expert HCU_2 2018; Expert UNI-HH 2018). Noteworthy from this last expert reference, is the fact that the cooperation can be initiated from a university and then to be maintained from one of the aforementioned actors. These indications should be taken simply as a perception that the experts have on the profile of the promoter of such a cooperation project in the context of the case study of this master thesis. This is further elaborated as follows.

different roles, some considered as necessary, namely the Promoter and the Director, while others may not appear, such as the Filter (Dente 2014).

²⁹ A relevant aspect concerning the actors is the goal(s), which are generally purposive in the sense that actors take actions with the aim of reaching an objective related to their interests, which can be to earn money, improve their reputation, or to implement values that contribute to the definition of their identity. Hence, the goal(s) of an actor can be content related or process related. The actors involved in the decisions have preferences and goals as regards the problem itself and/or the solution to adopt. This are known as content-related goals. The other type of goal(s) of the actors is the so-called process-related goals, which concern nor the problem neither the solution, but they are essentially linked to the actors' relations with the other actors (Dente 2014).

With regard to the actors identified in the Section 2.1 (Part VI) as the ones most likely in having a stake on the decision (Senat FHH, BUE, SRH, BSW, Chamber of Agriculture, etc.) the actor who would be more likely to cover the position of the promoter, is to be identified as related to maximise the fulfilment of the following criteria:

- the status for promoting an innovative cross-cutting policy i.e. which connects the waste management as well to other policy areas (production, consumption, and other general policy frameworks);
- the interest in the solution of the problem (i.e. content related goals: Dente 2014).

Actors such as SRH – who might be the most interested actor in favour of solving the problem (see Chapter 4, Part V), and who may push the issue in the political agenda through its reference ministry (i.e. BUE) – most probably has not the status in covering this role, and above all it does not possess these requirements: as a matter of fact, the administrative task that the law assigns to this particular body lies only on waste management issues. Ministry of Urban Development and Housing (BSW) may have probably no direct interest as its policy focus area is very specific into other issues, and it lacks also the required status for a cross-cutting policy promotion. The Chamber of Commerce and the Chamber of Agriculture lack at least the status for promoting such cross-cutting policy, and probably also the relevant interests in solving the problem. The Ministry of Environment and Energy (BUE) – the responsible ministry for waste management planning and control in Hamburg – may be the one closest to the promoter role as it may have a strong interest to solve the problem as related to its waste management planning commitment. The limits in this case may be that, just like BSW, it may be too much focused on one specific policy field i.e. environment and energy, and therefore it may lack the status for promoting an innovative cross-cutting policy-making. Following this reasoning, also the rest of the actors here considered (civil society organisations, SAGA, Association of Garden Friends, MVB, MVR, BioWerk, private composting firm, BdB FHH/DEU) do not fulfil both requirements at the same time. It should be stressed at this point that all this argumentation follows the content of the decision in the given status quo framework conditions at place in Hamburg, where the aim in this case is to rise the topic at the political level, and tackle the issues in a collaborative governance model involving a range of actors from of different fields of competences (public, private and civic actors), all contributing to the solution of the identified problem.

Therefore, all the actors here above briefly analysed, may be willing on the other hand to contribute to the common goal if involved in the process and if their interest is considered within the stake, but they mainly lack at least one of the required criteria, defined here as essential for promoting a local public policy aiming towards closing the organic material cycle in Hamburg. In addition, these actors are not considered for the role of policy promoter also because they generally may lack a vision – generally a task of public authorities – as well as instruments to maintain the network and arise the interest of crucial actors which could make an innovation policy possible. As a result, it is argued here that within the city-state of Hamburg as related to the case study of this master thesis, the actor which is most likely able to fulfil at the same time both the aforementioned requirements and therefore promote a CE commitment for the organic material stream is represented by the Senate of Hamburg, i.e. the government of the city-state of Hamburg.

Concerning to the first identified requirement, i.e. the status for promoting an innovative cross-cutting policy which connects the waste management as well to other policy areas, the Senate of Hamburg as the government of the city and the Federal State at the same time, would be able to mobilise all the required resources – partly in coalition with other public agencies and partly in collaboration with other private and/or civic actors – to activate all the necessary actors and reduce potential obstacles within the case study of this master thesis. With regard to the second requirement, i.e. the interest in the solution of the problem, here it is argued that the Senate of Hamburg at the moment may not have a strong interest, as long as the topic is not in the policy agenda. Said that, the actors mostly interested in finding a solution to the identified problems as identified from the empirical research, in particular SRH, could rise the topic through its reference ministry (i.e. Ministry for Environment and Energy BUE), which afterwards could push it in the policy agenda of the Senate of Hamburg. This could be facilitated also through the contribution of the Senat Chancellery³⁰ which is already aware of the topic and already involved in pilot projects

³⁰ Senate Chancellery: Coordinating point of government policy. As a hub of government policy, the Senate Chancellery supervises and coordinates the work of the Senate in Hamburg. The Senate Chancellery plans the government program of

on the topic of Circular Economy (e.g. FORCE project). The reasons for SRH and BUE in pushing the issue towards the policy agenda would be the following: 1) BUE and SRH through this issue would be able to activate at the local level the national commitment towards a Circular Economy, in particular for the fulfilment of waste management targets (Section 1.2, Part V); 2) increase of collection rates of the organic waste within Hamburg is expected to become relevant within the context of new infrastructural investments undertaken by SRH with regard to bio-waste treatment, such as the new Centre for Resources and Energy (*Zentrum für Ressourcen und Energie, ZRE*) to be opened by 2023 (Section 4.2, Part V). In addition to these interests (i.e. content related goals) expected to be put forward by BUE in this case, it can further be argued that the Senate of Hamburg – in a context of upcoming legal requirements from EU currently pushing forward the topic of Circular Economy (Section 1.2, Part III), national perspectives on the topic (Section 1.2, Part V), and local pilot projects where city’s public agencies are already involved within the topic of Circular Economy (e.g. FORCE and REPAiR projects) – could take the role of the leader in promoting strategies, policies and/or projects in exploring CE principles for the organic material stream in Hamburg. This presumed interest from the side of the Senate of Hamburg can be interpreted also as an opportunity to the city’s commitment to the ‘smart specialisation’ topic through the Regional Innovation Strategy 2020 and the integrated Cluster Policy as a model of modern economic policy and collaborative governance, all these as crucial framework conditions for Circular Economy practices (Chapter 3, Part III). This aspect is further explained in Subsection 2.5.7.

To conclude, the goals of Senate of Hamburg in promoting an innovative cross-cutting policy on the organic material stream in the name of the Circular Economy commitment, which connects the waste management as well to other policy areas, could be summarised as:

- promoting for innovative solutions to the “waste management problems” – as related to the City’s commitment on sustainability practices (Section 1.2, Part V);
- follow the EU commitment to a CE policy in the near future which calls for a long-term involvement of different actors at all levels, including regions and cities. From this perspective, Hamburg could catch up and further increase its competitiveness with other European cities already involved in promoting the Circular Economy within their local policy framework³¹;
- further enlarge the content of innovation practices – currently ongoing and promoted by the City of Hamburg itself through the Regional Innovation Strategy 2020 and the integrated Cluster Policy (Subsection 1.2.4, Part V) – by including a new topic to deal with, i.e. circular economy.

2.2.2 The Director and the goals

The second role within the decision-making network of actors to be further considered for the next chapters of this work is the director. In policy making theory the role of the director is considered also as a core role. It is considered as the actor more interested to facilitate the interaction in reaching decisional success by overcoming decisional hurdles and unintentional consequences. With regard to the promoter, the director can have content related or process related goals (Dente 2014). As related to the aforementioned stake, among the actors that are part of the empirical network (Section 2.1) it is argued that the Ministry of Environment and Energy (BUE) would be the one more concerned to address the issue of facilitator and coordinator of the decision-making process. This because (as in the previous Section described) after reaching the goal of setting the issue in the City’s policy agenda, BUE is the actor most likely expected to claim a return, e.g. the assignment of the direction of the process. Its expected goals in this case would be:

- find solutions to the waste management area (content-related goal);
- increase the budget and personnel (process-related goal); and
- potentially increase its reputation with regard to other local public agencies (process-related goal).

A possible limitation to the assignment of the role of the director to the Ministry of Environment and Energy (BUE) – as the governmental agency responsible for the waste management planning in Hamburg – would be a narrow

Hamburg, implements the policies of the mayor, takes over the investment planning and coordinates specialist authorities (Offizielles Stadtportal für Hamburg n.d.).

³¹ Examples from European cities involved in Circular Economy practices include Amsterdam, Bristol, London, Paris, Peterborough and Stockholm. These are extensively reported in Williams (2016).

perspective on the topic: indeed the risk is linked to a potential influence in the content of the decision by this actor whose main area of interest concerns strongly the waste management as related to the environmental commitment. This aspect is further considered in the Subsection 2.5.6.

2.3 Analysis of actors and network

This Section states the actors involved in the decision-making process for the identified stake as derived from the empirical research, followed by the introduction of the decisional network and the analysis of its properties.

2.3.1 Actors' analysis

The actors' analysis focuses first of all on presenting the goals that these actors can pursue in this case. Further, the resources expected to be mobilised by the different actors in the interaction are identified, which lead to the classification of the types of actors involved. Afterwards, the roles that the actors can play within decision-making process are assigned as related to results from the empirical research performed and presented in Part V. Hence, with regard to the roles – defined as the function that the actors play in decisional processes with regard to the problem and other actors and that implies limits to its behaviour and that of the other actors – beyond the roles of promoter (Senate of Hamburg) and director (BUE) covered in the previous Section, here the roles are assigned also for the other involved actors.

The Association of Garden Friends is considered as a Filter with regard to the stake as it is expected to have no interest on the content of the decision at this point. Instead, it may have process related goals – which concern essentially the actors' relations with the other actors – and is part of the decisional network to represent the interest of its members i.e. citizens involved in garden or allotment activities. The same argumentation is valid also for other civil society organisations, the Chamber of Agriculture and the Chamber of Commerce, which as well represent the interests of their members. On the other side, the association of tree nurseries BdB FHH/SH and other farmers associations do represent their members as well, but they are expected to be actively involved in the process as concerned to the solution. Therefore, BdB FHH/SH and other farmers associations are seen here as coping with the roles of Filter and Ally at the same time. The public waste management company SRH is the actor mostly concerned by the problem(s) and the related solution(s). SRH goals concern the increase of collection rates of the organic waste as related to its environmental friendly commitment, and as result this actor is expected to share with the promoter and director the interest to the solution of the problem. Hence, SRH is to be considered as an Ally within the decision-making process. Other Ally-s to the steering coalition are to be found in other involved actors: bio-waste treatment plant BioWerk, local private composting firms and the City Districts. BioWerk and the local private composting firms would be expecting to increase their competitiveness in the market through the adoption of the solution. Whereas the seven Districts of Hamburg – as entities whose role in the local governance imply fulfilling Federal State and communal tasks assigned by the Senate of Hamburg – in this case are involved in supporting the promoter and director on reaching a decision and further on its implementation. In this context, opposition towards the definition of the problem and/or the choice of the solution is expected from the public housing company SAGA, and the two incineration plants (MVB and MVR). SAGA role as Opposer is related to avoid the costs and potential conflicts with their tenants expected from the adoption of the decision. Finally, MVB and MVR in the short-term might be seeking to avoid the decrease on material inputs (i.e. organic) for their incineration plants, whereas in the long-term they might find themselves obliged to close their activity, as more material streams may be diverted from the residual waste stream in the future. The Table VI.2.20 represents the categorisation of the actors with regard to the goals, resources, types and roles that they pursue within the decisional network.

ACTOR	CATEGORISATION				
	Goal	Goal specification	Resources	Types	Roles
Ass. of Garden Friends	Process	Represents the interests of its members	Cognitive	General interest	Filter
C. of Agriculture	Process	Represents the interests of its members	Economic	General interest	Filter

BdB FHH/SH	Content/Process	Participate actively in order to receive technical solutions to their business (e.g. high-quality compost)	Cognitive, Economic	Special interest	Filter, Ally
Other farmers associations	Content/Process	Participate actively in order to receive technical solutions to their business (e.g. high-quality compost)	Cognitive, Economic	Special interest	Filter, Ally
Other civil society organisations	Process	Represent the interests of their members	Cognitive	General interest	Filter
SAGA	Content/Process	Avoid costs and potential conflicts with their tenants	Legal	Special interest	Opposer
C. of Commerce	Process	Represents the interests of its members	Economic	General interest	Filter
SRH	Content/Process	Increase the collection rates of the organic waste as related to its environmental friendly commitment	Legal, Cognitive	Bureaucratic, Special interest	Ally
MVR	Content/Process	Avoid the decrease on material inputs (i.e. organic) for the incineration plants	Economic	Special interest	Opposer
MVB	Content/Process	Avoid the decrease on material inputs (i.e. organic) for the incineration plants	Economic	Special interest	Opposer
BioWerk	Content/Process	Increase their competitiveness in the market through: higher rates of organic waste as input for their plant	Economic	Special interest	Ally
Pr. composting firms	Content/Process	Increase their competitiveness in the market through: higher rates of organic waste as input for their plant	Economic	Special interest	Ally
Senate FHH	Content/Process	1. find innovative solutions to the waste management problems; 2. follow the EU commitment to a CE policy, catch up and further increase its competitiveness with other European cities; 3. enlarge the content of innovation practices already active in the City's policy framework.	Political, Legal	Political, Bureaucratic	Promoter
BUE	Content/Process	1. find solutions to the waste management area; 2. increase the budget and personnel;	Political, Legal	Political, Bureaucratic	Director

		3. potentially increase its reputation with regard to other local public agencies.			
Hamburg Districts	Process	Support the promoter and director on reaching a decision and further on its related implementation.	Political, Legal	Political, Bureacratic	Ally

Table VI.2.20 - Actors' analysis (Own 2018).

2.3.2 Network analysis

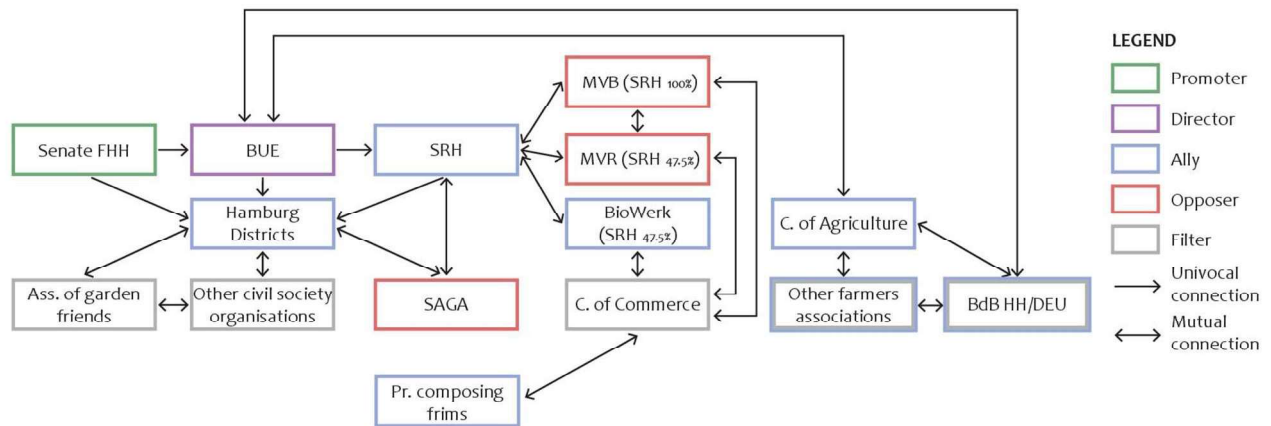


Figure VI.2.9 - Network of actors with categorisation (Own 2018).

Figure VI.2.9 represents the empirical network proposed in Section 2.1 after the categorisation. According to the scheme in Annex B, two natures of relation are individuated: a cooperation-like, which can be formal and informal, and a confrontation one. These two types will be taken in consideration when strategies will be deployed to modify the network with the aim of improving the chances to move the process to a successful decision. However, since it is not relevant for the scope of the analysis performed in this Section, the scheme in the Figure VI.2.9 limits itself to show if the relations between actors are mutual or univocal. Most of the actors present in this network have a mutual relation with the others: this means that the elements of the network are dialogue oriented when it comes to communication between them. In few occasions these connections are univocal, depicting a bottom-up like relation: this is the case of the relationship between Senate of Hamburg and its ministry (BUE), which then has the power to influence the operations of SRH and of the Districts. This scheme is the base for the network analysis performed in the next paragraphs: this foresees the study of the actors' network through the calculation of three different parameters, namely complexity, density and centrality.

Network analysis – Measuring the complexity

The first index that the methodology of Dente (2014) requires, aims to understand the level of complexity intrinsic of the network. This serves to quantify the plurality of points of view within the process. The Table VI.2.21 below fulfils this scope by providing an overview of the dimension of the interest of each actor in play (i.e. its level) in relation to their type. The calculation of the index is rather simple, requiring the multiplication between the number of rows and the number of columns.

MEASURING NETWORK COMPLEXITY		TYPES				
		<i>politicians</i>	<i>bureaucrats</i>	<i>experts</i>	<i>special interests</i>	<i>general interests</i>
DIMENSION OF THE INTEREST	<i>international</i>					
	<i>National</i>				BdB FHH/SH; Other farmers associations	
	<i>Regional</i>	Senate FHH; BUE	SRH; Senate FHH; BUE		SAGA; SRH; MVR; MVB; BioWerk	C. of Agriculture; C. of Commerce
	<i>Local</i>	Hamburg Districts	Hamburg Districts		Pr. Composting firms	
	<i>sub-local</i>					Ass. Of garden friends; Other civil society organisations

Table VI.2.21 - Matrix for network's complexity calculation (Own 2018).

This table presents a 4x4 matrix, which results in a Complexity Index of 16 on a maximum of 25 (5x5). This number represents a network which has a medium-high degree of complexity. Due to the high complexity of the topic to be dealt (i.e. Circular Economy), one might assume that this result could be further increased: in fact, there might be the possibility that this network could not be able to handle the innovative process that this issue requires at the political sphere. Moreover, Circular Economy appears as an emerging topic and still rather theoretical (see Chapter 1, Part II). This might see the necessity of involving actors who deploy knowledge resources to be able to tackle the experimental feature of this topic.

Network analysis – Measuring the density

This second index quantifies the intensity of exchanges between the actors involved in the network. The lower the number, the less interactions are observed. It is important to say that this index does not consider the quality of the interactions, but it limits itself to a mere quantitative information. The index is calculated by the mean of the following formula:

$$D = \sum ki / (n^2 - n) \quad (1)$$

where ki is the number of exchanges (i.e. arrows in the Figure VI.2.9) and n indicates the number of actors involved. Therefore, the density index is:

$$D = 41 / (15^2 - 15) = 0.195$$

The result measured for the present network gives an index of ca. 0.2 in a range between 0 and 1. This number is rather low, describing a network of actors with few direct connections between its components. This means that making a decision could be wields since a small group of actors is directly involved in the process on one side, but on the other its implementation might encounter problems because it underestimates or even does not consider other actors' interests, meaning a high probability of generating conflicts. A possible strategy aiming to modify this index should push to increase this number, considering a more comprehensive and collaborative approach.

Network analysis – Measuring the centrality

The last index considered by this methodology is the centrality and it is used to define which of the actors in the network holds the most number of connections, indicating it as the most central actor. This also reflects the level of relative power that each actor can exercise on the others within the decisional process. In the case that a network presents more than one actor with a high centrality index, it can be considered a polycentric system: those with the highest values are most likely to be the director or to fulfil a relevant role in the decision. The formula to calculate this index is the following:

$$C = k_i / \sum k_i \quad (2)$$

where k_i represents the number of exchanges (i.e. arrows in the Figure VI.2.9). The calculation is shown in Table VI.2.22 below.

ACTOR	CENTRALITY	ACTOR	CENTRALITY
Ass. of garden friends	$C = 2 / 41 = 0.048$	MVR	$C = 3 / 41 = 0.073$
C. of Agriculture	$C = 3 / 41 = 0.073$	MVB	$C = 3 / 41 = 0.073$
BdB FHH/SH	$C = 3 / 41 = 0.073$	BioWerk	$C = 2 / 41 = 0.048$
Other farmers associations	$C = 2 / 41 = 0.048$	Pr. composting firms	$C = 1 / 41 = 0.024$
Other civil society organisations	$C = 2 / 41 = 0.058$	Senate FHH	$C = 2 / 41 = 0.048$
SAGA	$C = 2 / 41 = 0.048$	BUE	$C = 4 / 41 = 0.097$
C. of Commerce	$C = 4 / 41 = 0.097$	Hamburg Districts	$C = 3 / 41 = 0.073$
SRH	$C = 5 / 41 = 0.120$		

Table VI.2.22 - Calculation of the centrality index for each actor in the network (Own 2018).

The highest number obtained represents the centrality index of the entire network as well:

$$C = 0.120 \text{ (SRH = Ally)}$$

In this case, the centrality index expresses a value of 0.120 in a range between 0 and 1, and it is referred to SRH: because this actor has been characterised as Ally (see Subsection 2.3.1), this means that the decision must pass through it and therefore Promoter and Director must take in high consideration its interests. This is due to the fact that already many activities concerning the organic material are carried out by this public company. Other central actors are BUE and the Chamber of Commerce. The ministry is already actively involved in waste management policy making, meanwhile the Chamber plays a representative role for the several businesses part of the network. In any case, a higher value of centrality from the current one would mean that the power over the decision is concentrated, which is not the case of this network. Due to the complexity of the issue object of the decision (i.e. CE in this case), a possible strategy should lead to an increase of the number of central actors encouraging them to collaborate resulting in a higher distribution of power.

2.4 Content of the decision

One of the characteristics of public policy analysis is the fact that it assumes that the outcome of a decisional process depends not only from the actors, their resources, goals and their patterns of interaction, but also from the type of issue that is decided. According Dente (2014), the content of the decision can be analysed in two different ways:

- by evaluating whether it is a zero-sum game or a positive-sum game in the perception of the main actors; and
- by evaluating each participant's level of concentration of costs and benefits.

Here, both methods are considered for the analysis of the content of the decision. With regard to the type of game that the actors of the decisional network are supposed to be involved – as related to the perception of the main actors – it can be stated that in these conditions the content of the decision results in a positive-sum game. This means that the main actors (Senate of Hamburg, BUE, SRH, Districts, etc.) – considering also the low number and importance of opposers – may perceive it as such. Hence, it can be stated that to reach an agreement is the only rational behaviour of the actors in this case, because the cooperation is a lot easier. The Table VI.2.23 shows a brief assessment of the perceived dominant concentration of costs and benefits as related to the content of the decision.

ACTOR	COSTS	BENEFITS	ACTOR	COSTS	BENEFITS
Ass. of garden friends	-	-	MVR	x	-
C. of Agriculture	-	-	MVB	x	-
BdB FHH/SH	-	x	BioWerk	-	x
Other farmers associations	-	x	Pr. composting firms	-	x
Other civil society organisations	-	-	Senate FHH	-	x
SAGA	x	-	BUE	-	x
C. of Commerce	-	-	Hamburg Districts	-	x
SRH	-	x			

Table VI.2.23 - Concentration of costs and benefits (Own 2018).

On the other side, the **concentration of costs and benefits** among the participants is used as a second method offered for the analysis of the content of the decision. The most relevant benefits are expected to be distributed among the majority of actors that are part of the network (namely the Promoter, Director and Ally-s). The costs with regard to the adoption of a decision lie on the Opposers whose position is seen to be damaged in this case. These involve the public housing company SAGA, and the two incineration plants MVB and MVR. As a result, main benefits are expected to be distributed whereas main costs concentrated among the actors (Table VI.2.24).

		COSTS	
		<i>concentrated</i>	<i>distributed</i>
BENEFITS	<i>concentrated</i>	Redistributive policies	Distributive policies
	<i>distributed</i>	Regulatory policies	Constituent policies

Table VI.2.24 Content of the decision analysis (Own 2018).

Because in this case benefits are distributed and costs are concentrated, the content of the decision falls on the category of regulatory policies, i.e. those policies that “aim to modify individual behaviour mainly through prohibitions, obligations and sanctions (typically: the anti-monopoly legislation, a great deal of the environmental policies, etc.)” (Lowi 1972; cited in Dente 2014; p.68). In this context, the steering coalition should pay attention to reduce potential conflicts coming from the opposers of the decision.

2.5 Obstacles to the decisional process

This Section describes the main obstacles that may arise with regard to the decisional process and the network of actors previously outlined. In the end, a vision for the Promoter opportune for overcoming parts of these obstacles is described.

2.5.1 Lack of necessary know-how precludes a clear definition of a complex problem

The first obstacle is linked to the intrinsic complexity of the concept of Circular Economy and consequently, the actions that aim in implementing its principles. This is maybe one of the most important and urgent obstacles to overcome. This reflects a problem of know-how that is currently lacking in the present network due to the fact that CE is an emerging and still too theoretical approach (see Chapter 1, Part II). For this reason, the figure of the expert is supposed to play a relevant part in the network, although none of the actors of the current network presents this characteristic. This role is not simply linked to the solution, but rather to the problem, i.e. its individuation and definition. The way in which the problem is identified and structured plays a relevant role in the direction to give to the decisional process and in the definition of the solutions (Dente 2014). A research institute can fulfil all these functions. These can also play an additional role in this game, i.e. to individuate the key actors necessary for the

development of solutions and bringing them together in the name of the promoter (Expert HCU_2 2018; Expert BdB FHH 2018). This action is called brokerage (Part II). Therefore, it is crucial the involvement of this actor since the initial phase of the decisional process. In the present case, this role can be covered by local universities thanks to their research-oriented attitude and current involvement in pilot projects on the topic of CE in Hamburg (FORCE and REPAIR). Moreover, currently the City of Hamburg has many cooperation projects with the local HafenCity University, and this topic is being pushed forward in particular from the City itself (Expert FHH 2018). In this case, the Department of Urban Planning is in charge of the collaboration: this an evidence of the importance of the planner when it means tackling with Circular Economy.

2.5.2 Limited number of central actors leads to partial solutions

The result coming from the network analysis for what concerns its centrality has revealed SRH as the most central actor together with BUE (Subsection 2.3.2). This fact means that SRH and BUE will probably play an important role in the decision. The concern here is that these two actors have a sectoral view of the problem and its solution, exclusively related to waste the first, linked to waste management policy and other environmental issues the second. Moreover, SRH, as a public company, has specific tasks to fulfil with tiny possibilities to diverge from these. The point is that with such specific perspective, the problem would be tackled taking into consideration only certain aspects, i.e. the issues deriving from the waste management sector. Even if already stated in Part IV that waste management is the phase of the cycle with more data available and therefore, the easiest to tackle, it is opinion of the authors of this work that a broader view is necessary to be able to consider all the possible aspects that CE embraces (Part II; Part IV). Hence, because of the complexity of this issue, it is necessary to both involve actors specialised on the other sectors of the cycle and rise the importance of the ones already existing to trigger dialogical actions between these, encouraging a more collaborative approach. It must be said, however, that such approach is not new in Germany and it is already used, for example, to make decisions within waste management sector (see Chapter 1). However, the present network in dealing with CE issues, is most likely to make and take a decision within a small number of actors (SRH, BUE, Senate of Hamburg) without involving sufficiently other relevant actors of the cycle. To do so, strategies that point to involve other actors and rise their importance in the network are needed. These are linked to the last obstacle (see Subsection 2.5.6) and comprehend the rise of importance of some of the actors of the network belonging to other phases of the cycle. These actors are:

- Chamber of Agriculture, as representative of the interests of agriculture the sector, i.e. the local production phase of organic matter in Hamburg and surrounding; if its importance is increased, it can deploy several resources (among all economic, but also cognitive) to influence agriculturists to participate in initiatives started by the promoter; this measure is also linked to the obstacle explained in Subsection 2.5.4;
- Districts of Hamburg, as the closest governmental representors of citizens in Hamburg, i.e. the biggest share of the consumption side of organic matter; more power to the Districts can contribute – for instance together with local civil society organisations and SRH (see Subsection 2.5.4) – to the rise of awareness among households on waste separation issues as related to CE topic.

In terms of numbers, the strategy or strategies that are going to be undertaken by the promoter should lead to an increase of the centrality index of these two actors.

2.5.3 Indirect connections means limited collaboration

Relatively linked with the obstacle object of the Subsection 2.5.2, it is argued that the current network presents a rather low number of direct connections between the actors. It describes therefore a situation in which the decisions are bounced from an actor to another without a real collaboration and/or confrontation. Due to the high complexity of the topic, it is necessary to gather as more actors as possible at the same time to discuss about the problem and to find eventually a solution. This is translated into favouring more direct connections among the actors in the network to improve coordination in the activities with regard to the organic matter stream management (Part V). The actors that are supposed to be more involved are:

- Composting firms, as actively involved in the collection of organic waste; they should dialogue directly with SRH in a more structured and coordinated way (e.g. by creating an association);
- Districts of Hamburg, as the closest governmental representors of citizens; their involvement in the decisions should become more direct to convey local knowledge;

- Civil society associations, as officially recognised groups of citizens with their interests; these should be called at the table as important link between citizens and administrations.

For what concerns the numerical value, a strategy pointing to this direction should result in an increment of the overall density index.

2.5.4 Essential actors are not actively involved

From the actors' analysis performed in Subsection 2.3.1, a relevant obstacle identified concerns actors considered crucial for the decisional network due to their resources and importance for the policy design and implementation phases, who are currently on the position of Filter i.e. a secondary role: an indirect actor or a non-actor because he/she has no goals towards the process or the content, but intervenes in the process on behalf of some other actor whose interests or claim he/she represents and by mobilising his/her resources. Therefore, this actor/role is not relevant in influencing the outcomes of the decisional process (Dente 2014). As a result, these actors are to be considered from the Promoter and Director by means of strategies which should rise their interests in participating actively in the process. These actors are the Chamber of Agriculture, the Association of Garden Friends and other civil society organisations. The Chamber of Agriculture is to be actively involved due to the resources and the crucial role it could play with regard to the entities on the production phase that it represents in the decisional process. On the other side, the Association of Garden Friends and other civil society organisations in Hamburg are to be as well actively involved as bodies which could play a crucial role with regard to the awareness on waste issues among households. This due to their proximity to local issues, a vital resource in grasping the roots of the problem; and due to the particular civil character, which generally relies on the trust of citizens, a crucial element for delivering results in the theme of waste separation but not only. Hence, in a new format and in coordination with actors such as the Districts and the local waste management company SRH, these civil society organisations could develop a concrete plan of actions for tackling the separation problems – based in e.g. social events and incentives for the households – and manage its implementation as well.

2.5.5 Opposers

Another obstacle to the decisional process is related to the range of Opposers identified within the network of actors as seen in Subsection 2.3.1. In this context, opposition towards the definition of the problem and/or the choice of the solution is expected from the public housing company SAGA, and the two incineration plants (MVB and MVR). SAGA role as Opposer is related to avoid the costs and potential conflicts with their tenants expected from the adoption of the decision. Finally, MVB and MVR in the short-term might be seeking to avoid the decrease on material inputs (i.e. organic) for their incineration plants, whereas in the long-term they might find themselves obliged to close their activity, as more material streams may be diverted from the residual waste stream in the future. These two last actors can be considered as not relevant to the process and its outcomes, because their activities as incineration plants are planned to be excluded from the organic material stream management. Therefore, strategies employed by the Promoter should point towards their exclusion. On the other side, SAGA is still to be considered as a necessary actor for the outcomes of the process and its importance is linked also to a potentially solvable problem. Strategies from the Promoter should target to change the behaviour of this actor and convert it into an active Ally of the steering coalition.

2.5.6 BUE as Director is a limitation

As already described in Subsection 2.2.1 (Part II) of this work, the role of the Director within the process is foreseen as the one more interested to facilitate the interaction in reaching decisional success by overcoming decisional hurdles and unintentional consequences. In addition, this role generally requires an actor who is able to deal with difficulties along the process, such as conflicts, unexpected events or lack of interest of essential actors, which are cases expected within the current network of actors. Hence, the presence of an actor who facilitates the interaction and stimulates the other actors to adopt the decisions is essential in this case (Dente 2014). As already described in Section 2.2, the role of Director to be covered by the Ministry of Environment and Energy (BUE) at this point, may present restrictions with regard to these commitments and as a result to the decisional process. This because this actor in the role of Director can be considered as a limitation for the process: indeed, it is possible that the content of the decision may concern mainly the waste management sector, as the ministry responsible for policy making in this area. Hence, at this point it is argued that a new actor is to be assessed for this role, based also on the policy framework conditions and perspectives at place in Hamburg (Chapter 1, Part V). As a result of these dynamics, BUE

is expected to become an Opposer to the decisional process. This is to be further considered by means of decisional strategies by the Promoter.

2.5.7 A vision for the obstacles

This last obstacle, together with the above-mentioned ones (Subsections 2.5.1 → 2.5.6) are interpreted here as resulting in a demand for a model of strict and systematic collaboration of the actors composing the network, which could afterwards lead to the overcome of the same. In addition, this systematic collaborative model would further lead to the generation of practical solutions including the stake as well (Chapter 1) of the current decisional process. The intensified collaboration can occur through the instrument known as clusters: these “are geographic concentrations of interconnected companies and institutions in a particular field” (Porter 1998: p.78; 2000: p.15). Being grouped in a cluster is not sufficient for dealing with highly complex issues which demand for high innovation thinking. Therefore, theorists describe types of collaboration formed following the Triple Helix model (Etzkowitz & Leydesdorff 1995) which implies the presence of research institutes, politics and industries. This configuration is claimed to be the base for any innovation (Etzkowitz 2003; 2008). The complexity of CE, extensively discussed in Parts II and VI, requires the involvement of a fourth actor, namely the civil society. As a matter of fact, obstacles 3 and 4 see the necessity from the Promoter to include this type of actor as key for the reaching of its objective: this is suggested as well by the EU as a possible approach to the topic of Circular Economy. This model is known with the name of Quadruple Helix which theorises, indeed, the civil society as fourth fundamental component of the collaboration (Carayannis & Campbell 2011; Carayannis & Rakhmatullin 2014). In the policy framework at place in Hamburg there is already this approach (i.e. clusters in the model of Quadruple Helix) as a strict and systematic collaboration between government, private sector and other civic actors (see Part V).

As a matter of fact, the City of Hamburg is already committed towards this direction through its Regional Innovation Strategy 2020 launched in 2014. The strategy mainly consists in strategic initiatives, known as thematic clusters (Senat FHH n.d.) aiming towards integration of their activities and outputs with the urban governance issues through the Quadruple-Helix model. The cluster policy development and coordination is a task of the Ministry of Economics, Transport and Innovation of Hamburg (BWVI). The government, beyond the funding provision and decision-making tasks, sees itself also as a long-term partner, moderator and stimulator of new ideas for the clusters (Senat FHH n.d.). The basis for the cluster policy lies in a tight, well-functioning network of companies, science, politics and civil society, in the form of the Quadruple-Helix.

Based on this framework at place in Hamburg – long tradition of clusters, active role of the Senate of Hamburg and other city-state agencies within the regional innovation strategy and cluster policy, etc.– it is argued here that a crucial role is to be played by the Senate of Hamburg in integrating future Circular Economy initiatives within the commitment of Regional Innovation Strategy 2020, by launching a new cluster on the name of CE to be established in the near future. The utility of a new cluster within the topic of Circular Economy, as already mentioned above, is linked to the Quadruple-Helix approach embodied in such arrangements, where companies, research institutes, politics and civil society actors come together in initiating and developing joint strategies for the city. As argued also in Part III this aspect is to be considered as crucial for CE practices also from the EU perspective which claims for the active involvement of civil actors. Therefore, a new cluster in the near future embodying the name/topic of CE – in particular the organic material stream as the ‘local material stream’ – is to be considered with regard to the network of actors, which is expected to change the dynamics and the starting conditions of the current decisional process.

As a result, the vision of the Senate of Hamburg in launching a new city cluster for CE practices would be in line with this actor’s current goals as the Promoter of the decisional process: find innovative and systematic solutions to problems emerging from waste management also in the future; follow the EU commitment to a CE policy, catch up and further increase its competitiveness with other European cities already involved in the topic; further enlarge the content of innovation practices – currently ongoing Regional Innovation Strategy 2020 and the integrated Cluster Policy – by including a new topic to deal with (i.e. Circular Economy).

2.6 Promoter’s strategies for the decision-making process

The strategies here presented have been drawn on the base of the model that Dente (2014) presents in his book. Its approach presents four different types of strategies. The first type includes all those strategies that point to an alteration of the distribution of the resources in play: this means that the Promoter can either provide new resources

to the actors for incentivising them to come to its side and get therefore their resources, sharing the burdens of the project among more actors, or moving a certain resource from an actor to another respectively reducing and increasing the power of these. The second set of strategies are deployed to change the content of the decision: this implies either the enlargement of the stake, when the problem requires the introduction of further actors, or its reduction, in the case the problem requires to be broken down in smaller decisions. The other two are usually a consequence of one of these two just explained. The first set points to modifying the pattern of interaction by applying strategies either of inclusion, i.e. by arising the transparency of the project through the adoption of participatory processes, the call of a mediator, or the promotion of public debates; or of exclusion, i.e. by taking out of the network some actors. Exclusion strategies happen normally for the Opposers, the involvement of which is considered rather irrelevant for the resolution of the problem. The fourth and last type of strategies are related to any change to the network characteristics, i.e. to the complexity, density, or centrality indexes. Increasing the complexity might be required when the problem needs one or more types of actors that are not included to be solved; on the other side, decreasing it might be necessary to reduce the difficulty of the decision. The density can as well be either reduced by stopping communications which are considered unnecessary or increased by include more actors which speak directly. Lastly, strategies which change the centrality are deployed either because the power in the network seems to be too concentrated on one actor, or because the power is too shared, risking running into a stall situation.

Hence, the strategies here proposed are the ones to be deployed by the Promoter to overcome the obstacles to the decisional process (Section 2.5) as related to the stake depicted in Chapter 1. It is important to state that these strategies are guided by the vision of the City of Hamburg for the establishment of a cluster dealing with current and future problems related to the organic material stream within the perspective of Circular Economy. Therefore, the entire decisional process has been divided into two major steps, each of them consisting in further sub-steps. The first step points to the creation of the what has been called the Steering Coalition; the second step focuses in particular to address the stake individuated in Chapter 1. Each sub-step refers to one of the obstacles individuated in the previous Section 2.5.

2.6.1 Step 1

To overcome the obstacles described in the Subsections 2.5.6, 2.5.1 and 2.5.2 (in this order) is the goal of this first step, which has the final goal to establish the steering coalition illustrated in Figure VI.2.10 below.

Steering coalition

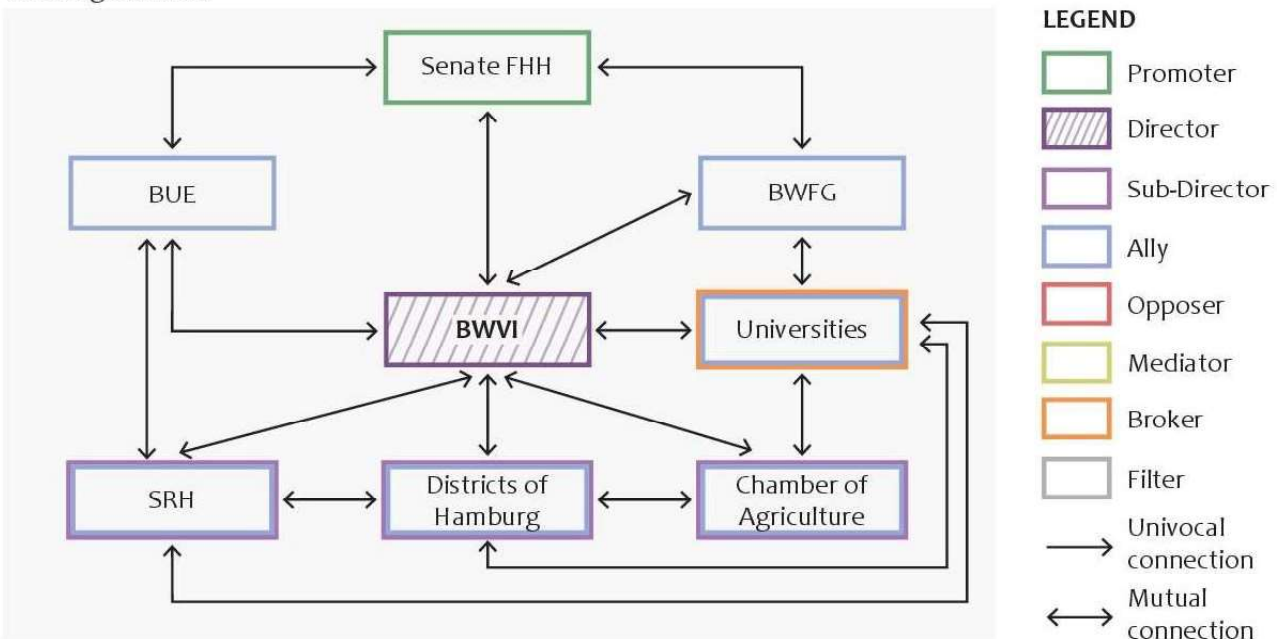


Figure VI.2.10 - Structure of the steering coalition (Own 2018).

The new Director – BWVI (obstacle 2.5.6)

In the attempt to create a coalition that should be able to cope with all current and future problems within the organic material stream in Hamburg, it has been previously argued that the creation of a cluster might be a suitable solution for the present case study. In the City-State of Hamburg, the task of establishing a cluster is to be fulfilled by the Ministry of Economics, Transport and Innovation (BWVI) as the responsible agency for the cluster policy development and coordination. Therefore, the set of strategies that the Promoter must deploy at first extent should point to invest this Ministry with the role of Director. This particular action is rather tricky because, as already stated in the previous Subsection 2.2.2, the Ministry of Environment and Energy (BUE) is expected to oppose this decision, since it implies a decrement of importance and prestige of this last. Moreover, with the actual stake described in Chapter 1, BWVI does not see any reason why it should take this role. Hence, the set of strategies described here must solve these two issues, namely convincing BWVI to become Director and compensating BUE for the apparent loss of power.

The first strategy that the Promoter should activate has to point to convince that BWVI has some interest in participating in the project. This requires a change in the stake described in Chapter 1, by including the new vision of the cluster creation: this corresponds to the strategy related to the enlargement of the stake (i.e. **Changing the content of the decision**). Secondly, the Promoter must also provide some subsidies, which can be also economical (e.g. through EU funding programmes for innovation). A new task for the Ministry means more budget and personnel, other than an increase in its importance and prestige within the Senate and internationally (due to the feature of the cluster policy to push seeking opportunities beyond the boundaries). This action corresponds to the strategy called **altering the distribution of resources**. Linked to this, the Promoter must take provisions also to reduce the possibility that BUE perceives this decision as penalising for itself. This because the Ministry of Environment and Energy will surely play a relevant role in the process, but in the role of an important Ally of the Promoter and Director. The promise of leaving some important tasks exclusively in the hand of BUE and that all activities within the process will be co-led by the same together with the new Director should at least be considered by the Promoter. Because of this, the already existing connections between the Districts, SRH and BUE have been maintained: hence, BWVI will not take the policy tasks of the Ministry of the Environment and Energy. The inclusion of this additional actor triggers consequently a combination of the other two strategies, namely **modifying the pattern of interaction** and **transforming the decisional network**. Respectively, an inclusive approach in the direction of a participatory decision-making is the strategy to deploy (for the first), in order to move the highest value of centrality from SRH to the new Director (for the second). This last is pursued by establishing direct contacts between BWVI and the closest actors (see Figure VI.2.10), e.g. by allocating a specific office in charge of communication in BWVI and in every related actor.

Universities as Broker (obstacle 2.5.1)

As extensively argued in Subsection 2.5.1, the role of research institution is extremely relevant when it comes to work with an emerging and still strictly theoretical issue such as Circular Economy. Therefore, the second strategy that is suggested here is the direct involvement of the universities in the network of actor for the reasons already exposed in the aforementioned Subsection. These actors are supposed to work in parallel with the Director as a Broker. The inclusion of the universities can occur through the creation of funded positions for research in the field promoted by the Ministry of Science, Research and Equality (BWFG): these funds can be provided by EU, by the Senate of Hamburg, but they can also come from regional Foundations, practice that is relative common in Germany (Expert HCU_2). Hence, this action corresponds to the strategy called **altering the distribution of resources**. The inclusion of this actor leads to a **modification of the pattern of interaction**, fostering consequently a larger participation in the decision. The addition of this actor has also another important effect on the complexity of the network, due to its 'Expert' type, resulting in an important **transformation of the decisional network**.

More central actors – Chamber of Agriculture & Districts (obstacles 2.5.2, part of 2.5.3 and 2.5.4)

The Chamber of Agriculture and the Districts of Hamburg have been identified as relevant actors which present, however, a low value of centrality. Hence, strategies from the Promoter should point to rise their importance in the network favouring their connections with the other actors. This because both of them embody, together with SRH, the entire cycle of the material, namely production, consumption and waste management. In order to bring this actor in a more central position, the Promoter is supposed to act into two different ways for the two actors. For what concerns the Chamber of Agriculture, the actual stake does not reflect a great interest, but linked to the

promise of being part of the future cluster should be a valuable offer for this actor to accept the collaboration. Moreover, this actor is already in contact with BUE and other actors like BdB as related to other projects' collaborations (Expert BdB FHH 2018). Therefore, the strategy of **changing the content of the decision** adopted for BWVI should be valid for the Chamber as well. The involvement of this actor implies the deployment of an inclusive approach that **alters the patterns of interaction** which leads to rise this actor to a central position (**transformation of the decisional network**). On the other side, the Districts of Hamburg can play a relevant role concerning citizens involvement in governmental activities (Expert FHH 2018). To do this, funding should be provided to foster local actions in collaboration with other civil society organisations and SRH which involve citizens, for instance (**altering the distribution of resources**). Since the goal for this actor is the same as for the Chamber (i.e. to become more central) the strategies linked to the **patterns of interaction** and the **transformation of the decisional network** are the same. With this action, the obstacle in Subsection 2.5.2, and partly the ones of the Subsections 2.5.3 in relation with the Districts of Hamburg and 2.5.4 for what concerns the Chamber of Agriculture are as well tackled.

2.6.2 Step 2

This second step includes all those strategies that the steering coalition just built in the first one should deploy in order to solve the current problem at stake explained in Chapter 1. The network resulting from the strategies belonging to this step is represented in the following Figure VI.2.11.

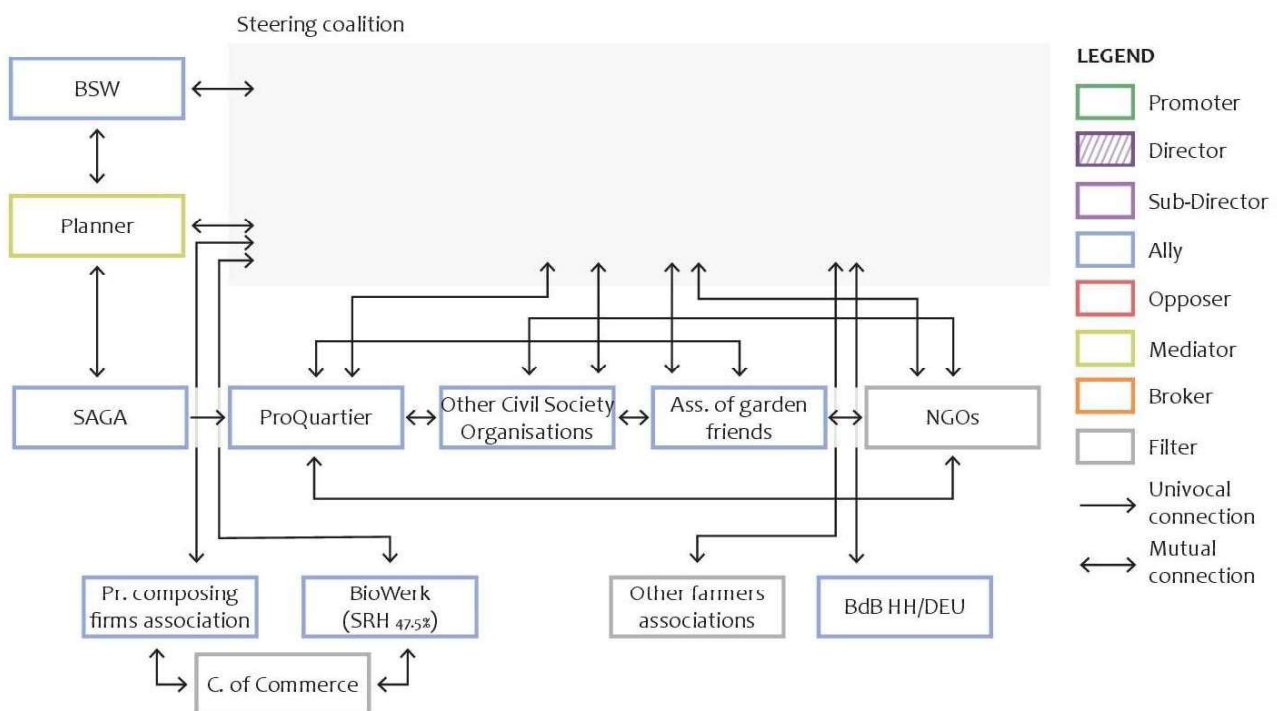


Figure VI.2.11 - Decisional network for the second step (Own 2018).

The Association of Garden Friends and other Civil Society Organisations as important Ally (second part of obstacle 2.5.3 and 2.5.4)

It has been argued that the civil society organisations can play a relevant role in the connection between households and the government. They group citizens and represent their interest related on one or more issues. In particular, the Association of Garden Friends gathers people who have to do with gardening, therefore, with organic matters. This association together with the others have to be considered in the decisional process more involved as just representors of others' interests. The **enlargement of the stake** already deployed for BWVI should again represent an attracting opportunity for them to join the cluster. This action consequently brings to an **alteration of the patterns of interaction** by including additional actors in a participatory manner, increasing the number of relations between the actors in the network, i.e. its density (**transformation of the decisional network**).

Establishment of an organisation for the private composting firms (third part of obstacle 2.5.3)

This strategy is designed *ad hoc* for the private composting firms. In Hamburg there are many different companies beside SRH that carry out the activity of composting organic matter. These enter in play in the case citizens do not have a bio bin and cannot deliver the organic waste to the recycling stations; or again, some private companies rely on these firms for taking care of their organic rests. Thus, these activities do not happen within a certain structure but rather disorganised. The suggestion for the Promoter is to favour the creation of an Association of private composting firms, which should be able than to join the new cluster. This will ensure more power to these companies and will allow a more systematic collection of the waste and consequently a bigger quantity of compost generated (**altering the distribution of resources**). Like for the actors in the previous paragraph, the inclusion of these firms under one association implies strategies aiming to **alter the patterns of interaction** and to **transform the decisional network** by increasing its density.

Dealing with the Opposers – MVR, MVB, SAGA (obstacle 2.5.5)

For what concerns the Opposers, the actions can be divided into two categories. For the two incinerators, MVB and MVR, the contribution that they can bring to the network is almost equal to zero even if turned to Allies (Expert MVB 2018). Therefore, the strategies should be simply pointing into an exclusive action (**alteration of the patterns of interaction**).

The conflict between SAGA and SRH is, to the contrary, not easy to solve. This company is the biggest social housing company in Hamburg and in entire Germany, making it a rather powerful actor in the game. The issues related to SAGA and SRH are the lack of space for the collection scheme (bio-waste bins) and of the claim that tenants' behaviour on separation will not lead to any improvement (see Section 4.2, Part V). Therefore, to tackle both problems it might be necessary to involve additional actors namely the Ministry for Urban Development and Housing (BSW) as planning authority for the space issues, and the ProQuartier for the behavioural one.

The current conflict between SAGA and SRH in these issues, illustrates a situation where two strong actors disagree on a common solution to the same. Therefore, this situation is expected to involve longer times, but its solution is rather urgent for the content of the decision. In these conditions, a Mediator is suggested by the Broker (universities) to facilitate a solution in the short term. The goals of this role include only process related goals because he/she has no preferences about the solution (Dente 2014). Since the Ministry for Urban Development and Housing (BSW) is expected to be interested on the solution (i.e. content related goal), another additional (impartial) actor is called for this task by the Broker. Because of the space issues, beyond the mediation it is required also a generation of technical solution: it is argued that the planner can play the role of the Mediator between SAGA and SRH in quality of a third party professional able to 1) find technical alternative solutions, and 2) providing metrics for the choice of the best one. The Ministry for Urban Development and Housing (BSW) is conceived as the policy actor responsible for spatial issues who is required to support and guide the implementation of a shared solution between these actors. Moreover, problems and solutions to this particular case could further be transferred and integrated into the current spatial planning framework for the city of Hamburg. This would avoid this problem in the future for the new urban development projects. In the end, this model of mediation which sees the planner covering this role could be further applied in the future whenever other spatial conflicts issues will emerge.

In relation to the second issue, the activity carried out by the Broker should lead to find the actors able to start an awareness campaign for the tenants of SAGA. As argued in the previous Subsection 2.6.1, civil society organisations together with the Districts revealed themselves to be able to fulfil this task. ProQuartier has been suggested as additional actors as a sub-company of SAGA and has already experience in involving tenants in social activities. In the case, NGOs can play a relevant role in moving masses of people, due to the trust that they possess.

To sum up, the set of strategies that the Promoter should deploy consist on the following steps:

- Involve universities for brokerage
- BSW as framework designer for the spatial issue and Planner as Mediator
- Districts, ProQuartier, and Civil Society Organisations (and eventually NGOs) to tackle to problem related to citizens behaviour.

To bring all these actors together, economic resources must be provided: these can be provided by the Senate of Hamburg which creates funding programmes (**altering the distribution of resources**) to be delivered through the

Ministry for Urban Development and Housing, and the Districts of Hamburg, respectively. The inclusion of these actors leads consequently to an **alteration of the pattern of interaction**, acting also on the density index of the network.

2.7 Final actors and network analysis – After the strategies

This Section aims to show the changes to the network after the application of the strategies from the Promoter. Firstly, the additional actors are described. Secondly, the categorisation of the actors is proposed with the proposed modifications from the strategies. These result in the final network of actors which maximises the probability to reach a decision and its implementation for the defined stake. Lastly, assumptions on complexity, density and centrality of the network are proposed and verified through recalculation of the same.

2.7.1 Additional actors

The Table VI.2.25 below presents the additional actors that the Strategies deployed by the Promoter illustrated in Section 2.6 include.

Name	Description	Relevance for the material flow
Ministry of Economics, Transport and Innovation - Behörde für Wirtschaft, Verkehr und Innovation (BWVI)	Goals of the Ministry are linked to economic growth and technical progress. It is in charge to the cluster policy, to facilitate the development of infrastructures and support innovation (Offizielles Stadtportal für Hamburg n.d.).	As in charge of establishing the cluster
Ministry of Urban Development and Housing - Behörde für Stadtentwicklung und Wohnen (BSW)	The ministry in charge of the policies in the field of Urban Development and Housing for the Hanseatic City of Hamburg (Offizielles Stadtportal für Hamburg n.d.).	Asked to coordinate the actions that the Planner will undertake to solve the space-related issue
Ministry of Science, Research and Equality - Behörde für Wissenschaft, Forschung und Gleichstellung (BWFG)	It is the ministerial administrative body for all state institutions related to science, research and equality (Offizielles Stadtportal für Hamburg n.d.).	As coordinator and financing of the universities
Universities	Local universities: in particular HCU	Able to identify and structure the problem. In addition, it can cover the function of brokerage.
ProQuartier	Sub company of SAGA responsible for social activities in the building owned by the social housing company (Netzgestaltung n.d.).	Involved in social activities concerning awareness with SAGA tenants
Planner	Professional figure of the planner in a private company, i.e. not part neither of universities nor of the government.	Able to give alternative solutions, metric for decision, and it is impartial

Table VI.2.25 - Additional actors' description (Own 2018).

2.7.2 Actors' analysis 2.0

After the strategies, the table of actors' categorisation changes slightly, both in relation to the inclusion of additional actors and to some alteration of the characteristics of the old actors (see Table VI.2.26).

ACTOR	CATEGORISATION				
	Goal	Goal specification	Resources	Types	Roles
Ass. of Garden Friends	Process	Represents the interests of its members	Cognitive	General interest	Filter Ally

C. of Agriculture	Process	Represents the interests of its members	Economic	General interest	Filter Ally, Subdirector
BdB FHH/SH	Content/Process	Participate actively in order to receive technical solutions to their business (e.g. high-quality compost)	Cognitive, Economic	Special interest	Filter, Ally
Other farmers associations	Content/Process	Participate actively in order to receive technical solutions to their business (e.g. high-quality compost)	Cognitive, Economic	Special interest	Filter, Ally
Other civil society organisations	Process	Represent the interests of their members	Cognitive	General interest	Filter Ally
SAGA	Content/Process	Avoid costs and potential conflicts with their tenants	Legal	Special interest	Opposer Ally
C. of Commerce	Process	Represents the interests of its members	Economic	General interest	Filter
SRH	Content/Process	Increase the collection rates of the organic waste as related to its environmental friendly commitment	Legal, Cognitive	Bureaucratic, Special interest	Ally, Subdirector
MVR	Content/Process	Avoid the decrease on material inputs (i.e. organic) for the incineration plants	Economic	Special interest	Opposer
MVB	Content/Process	Avoid the decrease on material inputs (i.e. organic) for the incineration plants	Economic	Special interest	Opposer
BioWerk	Content/Process	Increase their competitiveness in the market through: higher rates of organic waste as input for their plant	Economic	Special interest	Ally
Pr. Composting firms association	Content/Process	Increase their competitiveness in the market through: higher rates of organic waste as input for their plant	Economic	Special interest	Ally
Senate FHH	Content/Process	1. find innovative solutions to the waste management problems; 2. follow the EU commitment to a CE policy, catch up and further increase its competitiveness with other European cities; 3. enlarge the content of innovation practices already active in the City's policy framework.	Political, Legal	Political, Bureaucratic	Promoter
BUE	Content/Process	1. find solutions to the waste management area; 2. increase the budget and personnel; 3. potentially increase its reputation with regard to other local public agencies.	Political, Legal	Political, Bureaucratic	Director Ally

Hamburg Districts	Process	Support the promoter and director on reaching a decision and further on its related implementation.	Political, Legal	Political, Bureaucratic	Ally, Subdirector
BWVI	Process	Coordinate the actions in the view of creating the cluster.	Political, Legal, Economic	Political, Bureaucratic	Director
BSW	Content/ Process	Create a urban development vision for the city of Hamburg which includes principles of CE.	Political, Legal, Economic	Political, Bureaucratic	Ally
BWFG	Content/ Process	Foster research on CE.	Political, Legal, Economic	Political, Bureaucratic	Ally
Universities	Process	Do research on CE, define the problem, bring actors together.	Cognitive	Expert	Ally, Broker
ProQuartier	Content/ Process	Improving the quality of the life for the tenants of SAGA.	Cognitive	Special Interest	Ally
Planner	Process	Solve the problem for what is hired for.	Cognitive	Expert	Mediator
NGOs	Process	Defend the general interests.	Cognitive	General interest	Filter

Table VI.2.26 - Actors' analysis after the strategies application. The changes are outlined in bold (Own 2018).

2.7.3 The final network

The additional actors bring radical modification in the existing network, creating a brand-new structure. The new network presents a much more complex structure with regard to the numerous relations between the actors which is the result of a collaborative governance approach required for the current case study. This network is represented in the Figure VI.2.12 below.

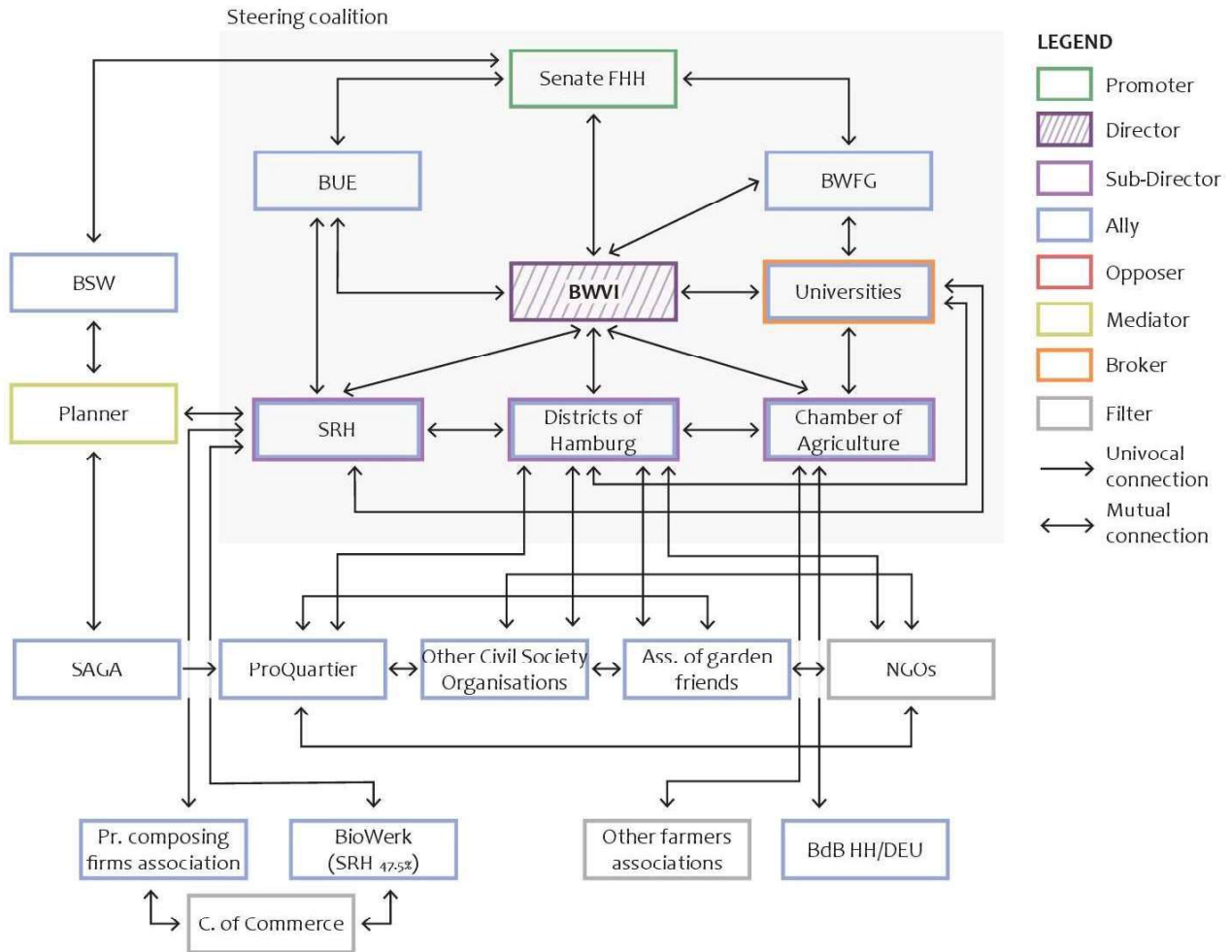


Figure VI.2.12 - Final network (Own 2018).

2.7.4 Network analysis: expectations and test

After the application of the strategies described in the previous Section 2.6, the indexes of the new network are supposed to vary from the ones of the original network in the following way:

- Complexity is increased, as consequence of the introduction of new type of actors (i.e. experts)
- Density is increased, as consequence of the increase of communications between the actors of the network
- Overall centrality is decreased, because of a bigger share of actors that are central, as linked to the previous point; therefore, the centrality of Chamber of Agriculture and Districts of Hamburg, as the new Sub-Directors should be increased.

Complexity

The Table VI.2.27 below proposes again the complexity with the additional actors in the decisional network. With the addition of the experts, the complexity index of the new network is now increased to 20. This is in line to what was expected.

MEASURING NETWORK COMPLEXITY		TYPES				
		politicians	bureaucrats	experts	special interests	general interests
DIMENSION OF THE INTEREST	international					
	National				BdB FHH/SH; Other farmers associations	NGOs
	Regional	Senate FHH; BUE; BWVI; BWFG; BSW	SRH; Senate FHH; BUE; BWVI; BWFG; BSW	Universities	SAGA; SRH; MVB; MVB; BioWerk;	C. of Agriculture; C. of Commerce
	Local	Hamburg Districts	Hamburg Districts		Pr. Composting firms Association	
	sub-local			Planner	ProQuartier	Ass. of garden friends; Other civil society organisations

Table VI.2.27 - Matrix for network's complexity calculation. Changes are in bold (Own 2018).

Density

The new density index is calculated below:

$$D = 77 / (20^2 - 20) = 0.202$$

This index is higher than the one of the old network (0.195). The little increase in the value should not be misleading. As a matter of fact, since the number of actors is at the denominator of the formula and it is even elevated to the power of two, a small increase in this number generates a huge effect on the index. In this case, the fact that the value is bigger, it means that the overall density of the network is in proportion extremely increased.

Centrality

The Table VI.2.28 below represents the centrality calculated for each actor of the new network.

ACTOR	CENTRALITY	ACTOR	CENTRALITY
Ass. of garden friends	$C = 4 / 77 = 0.052$	BioWerk	$C = 2 / 77 = 0.026$
C. of Agriculture	$C = 5 / 77 = 0.065$	Pr. composting firms association	$C = 2 / 77 = 0.026$
BdB FHH/SH	$C = 2 / 77 = 0.026$	Senate FHH	$C = 4 / 77 = 0.052$
Other farmers associations	$C = 2 / 77 = 0.026$	BUE	$C = 3 / 77 = 0.039$
Other civil society organisations	$C = 4 / 77 = 0.052$	Hamburg Districts	$C = 8 / 77 = 0.103$
SAGA	$C = 2 / 77 = 0.026$	BWVI	$C = 8 / 77 = 0.103$
C. of Commerce	$C = 2 / 77 = 0.026$	BSW	$C = 3 / 77 = 0.039$
SRH	$C = 7 / 77 = 0.091$	BWFG	$C = 3 / 77 = 0.039$
Universities	$C = 5 / 77 = 0.065$	Planner	$C = 3 / 77 = 0.039$
ProQuartier	$C = 4 / 77 = 0.052$	NGOs	$C = 4 / 77 = 0.052$

Table VI.2.28 - New values of centrality for each actor (Own 2018).

The new overall centrality index is therefore:

$$C = 8/77 = 0.103$$

The value is lower than the old one (0.120) retracing the expectations. Moreover, the connections between the Sub-Directors, namely Chamber of Agriculture, SRH and Hamburg Districts have seen their relations being increased with respect to the old network.

3. Timing and instruments

Another important task that the Policy Designer has to take in consideration is to choose the right moment for starting the decisional process. It can indeed happen that the best designed process can drive to decisional failure when some contextual conditions are not present (Dente 2014).

For the present case study, however, it is argued that today might be the right timing for the following reasons:

- Action plan from the European Commission suggests starting as soon as possible with the transition to a Circular Economy, providing guidelines and funding to foster it
- The high commitment of the City of Hamburg towards innovation practices, as already discussed (Part V)
- Two Circular Economy-related projects funded by the European Union are currently running in the city of Hamburg (FORCE and REPAIR)
- Several actors are already involved in projects related to sustainability (Hamburg green capital 2011)

Once stated that this period is the right time to start the transition, the Policy Designer has to define the temporal development of the process and the correct order in which the Promoter should deploy its strategy to increase the possibility for the network to reach the decisional success. This Chapter is therefore divided into two main parts aiming to describe the temporal development of the network and the instruments for the implementation phase.

3.1 Network (from the project...) and vision (... to the cluster)

Since the problem identified in Chapter 1 is mainly perceived as such within waste management sector, it is expected that SRH already aware of the problem, brings it to the attention of the Senate of Hamburg through the Ministry of Environment and Energy (BUE). Once received the proposal, BUE decides to bring it in the discussion within the Senate of Hamburg: Senate Chancellery is in charge to organise the agenda of the City and to handle policies implementation. It will consequently introduce the topic in the discussion which after assessments and in competition with other policies, it is inserted in the City agenda. The senators are expected to take the decision to start the process, with Senate FHH as Promoter. According to the policy cycle described in Howlett et al. (2009), with this action the phase called agenda setting is concluded (Annex B). When convinced that the creation of the cluster might result in high chance of success and, at the same time, represent a good opportunity for the City, the Promoter will then designate the role of Director to the Ministry of Economics, Transport and Innovation (BWVI), convincing it to join deploying the strategies explained in Section 2.6 and to form a strong coalition with BUE, already active and acknowledged of sustainability-related topics and waste management as well. BWVI is now the Director and needs Allies to start the process of cluster creation and, simultaneously, to solve the problem at stake. It has been extensively argued that, due to the difficulties of the topic of Circular Economy, the involvement of research institutions could be of great importance (Chapter 2). Therefore, the universities enter in play as an actor able to identify the problem, define it and individuate potential actors and bring them together (brokerage). Consequently, the Ministry of Science, Research and Equality becomes Ally of the Director as representor of the research partners as well. The universities are supposed to notify to the Director that the current network is too waste management concentrated: this is rather restricted if the goal is to tackle the problem from the perspective of Circular Economy. Therefore, representors of the other sectors of the cycle are necessary to be involved more actively: these are the Chamber of Agriculture for the production phase, and the Districts of Hamburg for the consumption one. These two together with SRH have been called here as Sub-Directors: these are supposed to fulfil the role of Director in their specific sector, but to take the decisions they are as well asked to dialogue with the other two through the guidance of the main Director. This is an important point because projects related to Circular Economy are characterised by a high level of complexity which needs the most diverse point of views (thus the strategies to increase complexity of the network). This set of actors that it has been called “steering coalition” for

the current project, will then form the core of the cluster. Conflicts might emerge within the network that sees together the actors below the steering coalition, because of the diversification of interests. Since the problem is characterised by a high complexity, the role of Mediator is to be considered in the case actors in a confrontation approach hold strong power. As for the case of SAGA and SRH, the planner has been called to fulfil this role. It has been argued that, with its competences, the planner is able to see through the local and narrow perspectives of the actors and grasp the overall vision. Therefore, it has been stated that, whenever a spatial-related project would emerge, the planner will play a relevant role in solving eventual conflicts. Moreover, it has been already discussed the importance of the bottom-up projects to be fostered and sustained until they become institutionalised. The planner can also act as advocate for those projects to become more visible. This is believed to be a good model also because it remedies the well-known anti-change approach that characterised public administrations and the difficulties to initiate transitions. This entire process is illustrated in the Annex B and refers to the phases of Policy Formulation and Decision-Making of the policy cycle framework.

Once having demonstrated that the current network is able to find one or more solutions for the present stake, the creation of the cluster is the second important goal to reach. From now on, it can be assumed that the process enters in the next phases of the policy cycle framework, namely Policy Implementation and Policy Evaluation. This cluster and its actors are supposed to be able to face any kind of problem that may arise concerning the organic material stream in Hamburg. The cluster structured in this way is also supposed to guide and maintain this network of actors with the aforementioned capabilities. This is a long-term vision which can become later on a platform for knowledge sharing: as matter of fact, once this material will reach the highest degree of circularity possible, the only function of this cluster will be to keep the circle under control, with monitoring activities. Lessons can be of course drawn from this experience and used for the handle of other materials.

3.2 Instruments

As described in Subsection 2.2.2 (Part II) with regard to ‘implementation styles’ (i.e. instrument preferences), Howlett et al. (2009) argue that it is the complexity (deriving from the nature of the Policy Subsystem³²) and the possibility of failure which lead the implementers to develop distinctive preferences for substantive and procedural instruments. These factors are considered as relevant in defining the choice of both procedural (i.e. instruments manipulating the policy processes associated with the delivery of those outputs) and substantive (i.e. instruments affecting the substance of policy outputs) governing instruments (Saward 1992; Rhodes 1997; Howse et al. 1990; Bennett 1992; cited in Howlett et al. 2009). With regard to the severity of the constraints and the nature of the policy subsystem, Howlett et al. (2009) offer a model which illustrates the implementation instrument preferences in relation to the above-mentioned variables (see Table II.2.5, Subsection 2.2.2, Part II). Following this classification, it is argued that the complexity deriving from the nature of the Policy Subsystem of the final network of actors of the current case study is high. This because of the numerous types of actors involved, varying from governmental agencies, private sector companies and associations, research institutions, to civil society organisations. On the other side, the possibility of failure or severity of constraints with regard to the stake in game is considered as low. This because also as previously argued, the probability of a successful adoption and implementation of the decision on the identified stake is maximised by means of strategies deployed by the Promoter in this case. As a result of these two statements – based on Howlett et al. (2009) implementation instrument preferences matrix – the implementation instrument preferences in the current case study should focus on subsidy instruments known also as treasure-based policy instruments. These range of tools include: 1) Subsidies Grants, Tax Incentives, and Loans); 2) Financial Disincentives (Taxes and User Charges); and 3) Advocacy, Interest Group, and Think-Tank Funding.

With regard to the current case study and with no distinction among substantive and procedural, these instruments can be involved as follows:

Subsidies are to be involved for the cluster establishment in the form of grants by mainly the Senate of Hamburg, in collaboration with the Chamber of Agriculture and/or the support from innovation and Circular Economy funding programmes at EU level. The Senate of Hamburg is already one of the main funding actors within the cluster policy,

³² i.e. existing range of policy actors present in the policy subsystem, available resources, the nature of problem they are trying to address and the ideas on how to address it, all in the context of a policy regime (Bressers & O’Toole 1998; 2005; Bressers 1998; cited in Howlett et al. 2009).

whereas the Chamber of Agriculture could enjoy advantages from the continuous exchange between the cluster and the government from policy participatory processes with the Senate and other relevant regional actors. For the inclusion of the university as an active actor, first within the decisional process and afterwards within the new cluster, grants are to be provided from the Senate of Hamburg and/or EU research and innovation funding programmes and/or regional Foundations. Grants are to be provided by the Senate of Hamburg also for: 1) Districts which should bring forward together in strict collaboration with SRH and other sub-local actors systematic waste separation campaigns; and 2) Ministry for Urban Development and Housing which should frame the mediation by the planner of the conflict between SAGA and SRH.

Financial disincentives in the form of taxes and user charges are other types of instruments to be systematically applied on the waste collection schemes for households and commercial sector through the Districts and SRH who oversee also the implementation and guarantee a higher control of the system over the time.

In the end, **interest group creation/funding** is the instrument to be involved by the Chamber of Commerce and/or the Senate of Hamburg for the private composting firms' association, with the aim of facilitating the representation of its members within the decisional process and the new cluster.

4. Reflections and results

The results of this Part VI represent the attempt to define the network able to initiate and maintain a cooperation for the organic material stream in Hamburg with reference to the reconstruction of decisional process linked to the empirical research conducted in Part V. The first Chapter has illustrated a way how to analyse and structure complex problems which is afterwards used for the network building. It is followed by the methodological approach which outlines the way for identifying and analysing the different elements of the decisional process, with the aim to identify the final network of actors which should be able to handle the current stake and further dealing with other similar issues in the future. Finally, the timing issue and possible instruments to be involved complete this frame.

The starting conditions of the current case study present a situation where only few actors (namely SRH and BUE) are concerned from the problems related to the organic material stream in Hamburg as related to their competence policy area. As confirmed in the case study, these problems are interconnected with – or can have an impact on – the other phases of the material stream other than waste management (namely production and consumption). The topic of Circular Economy in the current policy framework in place in Hamburg is not perceived as conceived in this Part, but rather as a commitment within the waste management policy area only (Part V). This premise has been proved as not sufficient in this case. Instead, a more comprehensive approach considering all the phases of the material stream cycle is required to deliver the expected results. The present case study showed a methodology – based on the empirical research and theoretical and practical implications on the topic of Circular Economy – for the development of a strategy/policy for the organic material stream in Hamburg and where its implications are transformed into a comprehensive materials flow management also in the future within the framework of the cluster.

With regard to the actors involved in here, the innovative actor promoting CE practices is conceived as a steering coalition headed by the city-state government (Senate of Hamburg) and other public/private actors in a strict collaboration with the university as know-how body in this context: it carries the tasks of problem identification and framing, and performs the function of brokerage in bridging the communication and matching interests between the necessary actors for the solution. The decision to be reached in this case involves the creation of a shared interest in solving the current problem which then leads to the establishment of a governance structure (i.e. cluster): this would guarantee the systematic control over the organic material cycle in Hamburg and beyond through a collaborative governance model built on the trust and continuous exchange between the involved political, industry, research and other civil society actors (Quadruple-Helix model). The importance of the research is hence stressed again within this model. In Hamburg, this approach already exists, seeing the involvement of the HafenCity University (HCU) in two EU funded projects on CE topic (e.g. FORCE and REPAiR).

To conclude, the whole process is expected to lead to a long-lasting network based in the Quadruple Helix model, between companies, science, politics and civil society actors able not only to deal with the current identified problems but also future ones concerning the organic material flow management. Due to the versatility of the problematics related to Circular Economy, the network of actors should present a certain degree of flexibility as well, given some fixed elements. In general, it can be stated that the actors composing the steering coalition together with civil society organisations should be able to face all the issues once involved additional actors from production, consumption and waste management, to the network to tackle the specific situation. This dynamicity is guaranteed by the brokerage activities of the research institution (e.g. HCU) which seeks for the necessary actors. This is to be understood as a cycle which extends also beyond administrative borders – the case of tree nurseries proves this – and therefore it may require the involvement of other actors outside the city-state of Hamburg. In this context, the new cluster acts as a platform for further problems in the future concerning the organic material stream. Lessons learnt from the case of organic material stream policy can be further developed into a framework for similar projects of other cross-cutting policies in the future under the overall topic of Circular Economy as emerging policy from EU governmental body.

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*A story really isn't truly a story until it reaches its climax
and conclusion.*

(Ted Naifeh)

PART VII

Conclusions

1. Circular Economy conceptualisation

The literature review on Circular Economy performed in Part II confirms that CE concept gleans in very diverse theories with the peculiarity in the attempt of merging ecology with economy: this happens in the try of emulating the environment for redesigning production activities (see Ghisellini et al. 2016). Generally, CE can be defined as an alternative, restorative or regenerative model by intention and design to the current linear one with a focus on sustainability aspects aiming to a closed-loop model of the economy which is based on the 3R principles. Indeed, sustainable development and economic growth represent the background from which CE takes its principles: both contribute to identify CE as an optimistic perspective which points to a greener, healthier and richer future. Main critiques come from steady-state and de-growth scholars which call for a reverse trend of the infinite growth model. Moreover, it has been argued that CE theoretical conceptualisation focuses extensively on production patterns, suggesting approaches like industrial ecology and cleaner production, while living aside consumption and waste management practices. To conclude, theoretical Circular Economy conceptualisation is understood to embody several elements (e.g. moderating consumption, an end to a fossil economy, output utilization, emission reductions) put forward from other emerging models (e.g. green economy, de-growth economics and bio-economics) integrating them in a single holistic system: all concepts put forward also by the sustainable development paradigm.

Speaking about the relation between CE and sustainable development, it is argued here in this work that the difference lies on the fact that CE has a more action-oriented approach than the sustainable development. Moreover, both aspects have revealed themselves unable to include social aspects. In this sense, a CE framework for urban policy and praxis might be eligible to take the place of sustainable development framework. However, this theme lies outside the purpose of the present work and therefore this issue is posed for further researches. From this perspective CE is to be understood as an idea, a potential guiding paradigm, to reach the goals of sustainable development keeping in mind that its principles should be taken with a grain of salt to avoid disillusionments.

However, it can be stated that the theoretical conceptualisation of CE as it is currently depicted still underestimates the social aspect. As a matter of fact, due to its complexity of intents and the different spheres which the CE concept involves, it can be stated that to foster circular practices it is as well necessary to refer to the social environment. Part III shows how EU stands back from this perspective, concentrating first of all in the waste management stage – when it comes to legislative proposals – and secondly on initiatives which point to awareness rising and good practices promotion.

Hence, from the EU body perspective, Circular Economy as a practical implication connects the waste management to other policy areas (i.e. production, consumption, and general policy frameworks), which is seen as a policy innovation at the EU level (see STOA 2017). EU approaches the Circular Economy also by promoting the idea of innovation, which several other initiatives refer to, among all, the Research Innovation for Smart Specialisation Strategy (RIS3) (Foray 2015). Status quo of the Circular Economy topic introduction in Germany, illustrates also partially the approach proposed by EU, where waste management has been strategically chosen at this stage as the area to deliver the first objectives for the transformation of the current linear economy.

It is clear that international bodies like EU cannot work alone towards a more circular European economy, and this transition will need a long-term joint effort from different actors at all levels, from Member States, regions and cities, to businesses and citizens. Moreover, the Circular Economy paradigm calls not only for the involvement of institutions and public/private stakeholders, but also for a coordination and integration of different policies at every level (Dell’Olmo 2017): from the international to the very local - being it municipality and/or region.

2. Circular Economy implications for cities and regions

As seen also in Part II, CE concept has its roots in the local context with its various applications around the world of business and industry. What has been of concern here in this work are the Circular Economy implications for the urban agenda and its potential benefits. As cities are likely to experience greater rates of urbanisation in the coming decades, they are as well expected to pay more importance and attention towards their urban development. Therefore, the issue of growing urbanisation rates in the future calls for new and more sustainable models of urban development. Several negative impacts that characterise the current linear model of cities development have arisen particular concern from urban policymakers in recent years, especially concerning the environmental issues. These include air, water, and noise pollution, the release of toxic substances, and greenhouse gas emissions (all negative externalities of the application of this model). These challenges are making it always difficult for cities to remain competitive, in terms of being able to attract people, businesses, and diverse economic activities. Moreover, these are seen as at the base of a fragile socio-economic situation, faced nowadays in different cities and countries around the world (see EMF 2017).

Thanks to their high concentration within a small geographic territory of resources, capital, data, and talent, makes cities at the same time the hotbed of innovation. From this perspective, cities are seen as on the frontline for the change of the current linear model, through city governments which can generally move faster than their national counterparts towards the transition to the Circular Economy (see EMF 2015). In addition, cities or even regions have a deep knowledge of their local territories and potentials. Consequently, they are in the best position to create the favourable framework conditions, deploy targeted policies, mobilise regional stakeholders and boost synergies between economic sectors (see Dell’Olmo 2017). Moreover, the benefits at the city/region level claimed by the CE paradigm involve a range of issues varying from the ones more traditional and already well developed – stimulation of an innovation-rich urban economy, reduction of carbon emissions, minimization of pressures on municipal services and budgets on waste management, and the increment of disposable income for citizens (through the reduced cost of products and services) – to the less explored ones – the increasing of liveability standards, and impact on employment opportunities in the cities (see EMF 2017). At this phase, where the CE has high priority in the political agenda of EU but has not yet taken its final shape, the local level can already play a crucial role for more efficient and sustainable local economies, cities and regions, anticipating thus EU Directives.

An emerging concept in the last years involving the application of the concept of CE at the local level is the ‘circular city’. As observed by Williams (2016) based on real case studies adopting circular strategies, the main goal of cities-regions in adopting this approach is to reduce resource consumption (i.e. land, energy and water as well as materials) and waste production. Moreover, it is seen as the way from the cities-regions to ensure the long-term sustainability of their natural ecosystem and urban infrastructure. Finally, the approach covered in this master thesis from the ‘circular city’ perspective can be framed as “a city that practices CE principles to close resource loops, in partnership with the city’s stakeholders (citizens, community, business and knowledge stakeholders), to realize its vision of a future-proof city” (Prendeville et al. 2017: p.17).

3. Circular Economy implications for the urban planning discipline

The discipline mostly concerned about city development issues from an integrated and coordinating point of view is urban planning. As a result, the reasons adduced here in this work for this discipline to be interested in Circular Economy implications on cities are the following:

- Its comprehensiveness allows a systemic vision of the elements and their inter-relations in networks necessary to understand and describe the complexity of the urban system;
- an interdisciplinary perspective helps to broaden the interpretation of problems and to enlarge the alternatives to choose among;
- actions towards circularity occur and have spatial effects at the city level and even beyond, calling for a multi-scale approach.

Furthermore, the urban planning discipline can contribute to ‘circular strategies’ in cities in the following ways:

- Support in the decision among spatial development alternatives and warn about impacts and opportunities;
- Create a vision and drive changes towards it;
- Translate and bridge between different levels and sectors.

Finally, another aspect with regard to urban planning contribution towards CE practices regards the instruments that it deploys. Through these instruments, in particular spatial planning should aim at facilitating the material flow management activities by enlarging its perspective also towards such processes. This obstacle has been faced also in the current case study in Hamburg (i.e. spatial issues between SAGA and SRH).

4. Public policy mechanisms and Circular Economy practices

Looking back at the theoretical conceptualisation of Circular Economy, the question in the policy-making sphere is: what kind of framework would make possible such a radical transformation from a linear towards a circular system? (see STOA 2017). As a matter of fact, CE points to address several tangible issues as well which can be considered at the same time global and local collective problems (see Part II). As these problems involve several actors at different levels – both on the public and private sector and concern several issues in the overall objective of ‘closing the loop’ – it is argued here that public policy can offer a hypothesis to change the status quo by defining the problem, offering solutions, implementing the chosen one and evaluating its results for further eventual adoptions. To conclude, the attempt here has provided evidences to support the affirmation that public policy represents part of the solution when one decides to tackle a collective problem by taking advantages of the elements derived from the theory presented in the previous sections. Due to the complexity of the CE as practical intervention, in other terms a public policy is needed to:

- crystallizing a definition of the problem, useful to reduce complexity and develop CE practices;
- reducing uncertainty, connecting different actors and the needed resources (e.g. know-how, etc.)
- reducing conflicts, through cooperation interactions, *ad hoc* instruments, etc.

5. Transferability of the methodology

The case study of this work has seen the development and application of a methodological approach for investigating issues and stakeholders concerning the organic material stream, and further for the development of the network of actors able to deal with the material flow management activities and ensure the ‘closing the loop’ objective. It is argued that this can represent the transferable part of the current master thesis. This is outlined as follows:

1) S-MFA starting from waste management. The first step consists on grasping the picture of the material stream ‘circularity’ or ‘leakages’ starting from the waste management phase by means of stakeholders material flow analysis (S-MFA). This phase is considered strategic for the analysis due to the data availability, although the analysis goes beyond the waste management phase by exploring its relations as well with production and consumption side. This results on the identification – within the waste management stage – barriers and factors of success as well as the implication of the other phases (namely production and consumption) on these problematics. Further, the S-MFA performed within the waste management area allows also for the identification of the relevant stakeholders within the material stream management activities. Therefore, this first step results in the identification of the actors and their activities/responsibilities, and the problematics that prevent the action of ‘closing the material cycle’.

2) Frame the problem. The second step comprises the problem framing of the afore-mentioned issues, in other words in constructing the content of the decision (stake) for the network of actors to deal with.

3) Conduct interviews. The third step consists in interviews conducted with the previously identified stakeholders with the objective to capture views and perceptions on the barriers and opportunities of collaboration within the network aiming on reducing the leakage and increase the circularity of the material stream.

4) Build the decisional network. The fourth step focuses on structuring the decisional network of actors required to deal with the issue or stake concerning Circular Economy theoretical and practical implications. This is conducted by means of a conceptual framework from public policy sciences which combines quantitative and qualitative methods for understanding the elements and dynamics of the decision-making processes (Dente 2014). The utility of this methodology in this case – combined with the empirical research previously performed – lies in building the network of actors through the identification of potential obstacles and definition of the so-called strategies for overcoming them, and thus maximise the probability of a successful adoption and implementation of the decision on the identified stake.

5) Think at the timing and the means of implementation. The fifth step consists in considering the timeframe of the decisional process described in the fourth step and the instruments choice for the decision-making and implementation phase.

6. Answer to the research question and hypotheses

Following the course of this master thesis, its results have led to the answer of the research question:

Which are the necessary conditions to build and maintain a network of actors capable of developing ‘circular solutions’ and implementing them within the organic material stream in Hamburg?

The following argumentation presents these necessary conditions as results of the current work. As a first condition, the **presence of one or more initiator(s)** willing to take on the network building commitment is considered crucial for initiating the practice of network building. This/these initiator(s) (in other words the Promoter in the case study) should be able to create a vision for the city and to bring together the necessary actors and resources. In the current case study the actor able to promote a CE commitment for the organic material stream is represented by the Senate of Hamburg, i.e. the government of the city-state of Hamburg. Moreover, due to the complexity of the CE topic, another condition concerns the **objectives and sound approaches** which **should be clearly defined** since the very beginning. In the current case study, the objective to close the organic material loop through a partnership/collaborative approach has been demonstrated. Additionally, **obstacles/issues** which impede the achievement of these objectives **must be identified and framed** in this context. These obstacles may regard to a) regulatory frameworks at place in Hamburg, and/or b) interests of actors to be engaged. With regard to regulatory framework obstacles, actors able to carry on modifications of the same should be involved since the initial phases. This depicts the case in which stakeholders want to participate but they are limited by these obstacles (e.g. SRH). On the other side, with regard to stakeholders’ engagement, actors able to move the relevant stakeholders to participate should be present in the network. This depicts a situation in which stakeholders are not interested in participating, but their contributions are needed (e.g. households). This could happen by means of participatory instruments, grants (e.g. cluster establishment), incentives, EU funding, etc. Another condition concerns the **presence of know-how actors** who are demonstrated in this work to be relevant for the aforementioned conditions (i.e. objectives and sound approaches, and obstacles/issues) in terms of definition of objectives and individuation of the necessary actors to be involved to fulfil these tasks. Therefore, the type of know-how that must be deployed is both specialized (e.g. S-MFA) and general (e.g. brokerage). The urban planning discipline is the most suitable for this role as related also to its interdisciplinary nature and city scale commitment. With regard to the complexity of the topic, the condition for building the network capable of developing and implementing ‘circular solutions’ is the **inclusion of politics, industry, research and civil society actors** with reference to the **Quadruple Helix model**. In addition, with regard to the organic material cycle management, another condition for building the network capable of developing and implementing ‘circular solutions’ is **the inclusion of actors belonging to the production, consumption and waste management sectors**. Finally, the condition for maintaining the network of actors capable of developing ‘circular solutions’ and implementing them within the organic material stream in Hamburg is to

explore synergies and further integrate the actions with other (current and future) local policy areas (e.g. Cluster Policy).

With reference to Part I, this section presents the verification or denial of the hypotheses of the current master thesis.

With regard to the first hypothesis [*Circular Economy is a local issue which requires actions occurring at and generating impacts on the local level (i.e. city scale). In the case of Hamburg, local and regional scale coincide.*], it is argued that Circular Economy is also (but not only) a local issue, as here in this work demonstrated with the case of organic material stream in Hamburg. This because the concentration of resources, capital, data, and talent makes cities a hotbed for innovation. Moreover, at this level governments can create the favourable framework conditions generally faster than their national and international counterparts, deploy targeted policies, mobilise regional stakeholders and boost synergies between economic sectors (see Part IV).

The second hypothesis [*To address the goals of Circular Economy the role of local public authority is not only central but also sine qua non to initiate and direct the decision-making process, coordinating actors and overseeing the design and implementation of a public policy.*] has been verified for the case study of Hamburg (see Part VI). As a matter of fact, the local public authority is conceived to be actively involved in a strong collaboration with the other actors of the steering coalition in initiating and directing the entire process, from the decision-making until the implementation.

With regard to the third hypothesis [*Public policy outcomes should aim at constituting (establishing) new organisations (e.g. public agency) able to guide Circular Economy practices and to address the expected outcomes.*], results from the current case study illustrate that the establishment of a new organisation in guiding the transition to a Circular Economy is not a necessary output of the public policy at place. Instead, a strong partnership with the characteristics of the steering coalition considered in this case study (see Part VI) is required to fulfil these tasks.

Finally, the last hypothesis of this work [*Planners as experts on urban issues have a role in bridging the gaps between the plurality of disciplines involved in a Circular Economy strategy for the local level.*] has been verified. In fact, results of this master thesis show that the research institution, in particular specialised in the urban planning discipline, is most likely to cover this role. Instead, the planner – as a freelance professional – can play the role of Mediator with regard to spatial and social related issues (see Part VI).

7. Caveats for the drafting and further research

The range of issues covered in this master thesis is explored until a certain level in comparison to what it could have been done in other research contexts: this because of time restriction which has limited the number of interviewees, lack of accessibility to all required data, limitations attributable to language barriers, and the emerging characteristic of the Circular Economy concept. All these given, a deeper analysis could have been (and can still be) performed with regard to:

- Local policy framework with reference to the production and consumption phases of the organic material stream, to identify legal barriers which impede practical CE projects. At this point, this legal barriers could be framed and addressed, allowing thus for new innovative collaboration arrangements between actors from all phases of the material cycle and different policy areas able to develop solutions following the principles of the Circular Economy concept;
- Potential of instruments for citizen involvement and participation. This aspect, as introduced in this work, is proved to be crucial with regard to issues such as households' awareness on the topic of waste separation. Such contribution can offer new tools of citizen involvement and participation – other than waste separation issue – from the perspective of Circular Economy, where consumers are seen as a crucial point towards the claimed transition;
- Possible local waste prevention initiatives within the production and consumption phases for the organic material stream. This is another relevant aspect/action – not considered in the present work – with regard to reduce the material leakage and thus work towards closing the material loops;

- Data collection for the S-MFA with regard to the production and consumption phases for the organic material stream. This could allow for a wider perspective on the issues and as a result more comprehensive actions for the improvement of the organic material circularity;
- Connections and synergies which go beyond the city boundaries with regard to the organic material stream management activities. This aspect comprises materials/products flows which concern the relations between cities and/or cities and their hinterland;
- Potential synergies with other organic-related material stream (e.g. packaging materials). This can involve issues such as eco-design principles for the packaging of organic products;
- Other international case studies (cities and regions) committed to CE practices/principles. From this perspective, lessons can be derived and further explored from the knowledge transferability perspective;

In the end, from a methodological point of view, the method proposed by Dente (2014) and used in this work for the network building task is rather comprehensive for all the variables within decisional process, although it has its own limitations: these are, for instance, the impossibility to investigate the type of relations between the actors involved, remaining only at a general definition of the same. Alternatively, the Actor Network Theory (ANT) represents another method for network analysis which focuses on the explanation of the relations that actors weave between each other when it comes to deal with a problem. This approach to social theory considers the constant shifting of networks (dynamicity) and attempts to explain relations also among human and non-human elements, particularly relevant for fields in which to the natural environment and its evolvments is asked to play a role in the game.

All these aspects can be considered as starting points for further advancements in achieving a more comprehensive understanding of the research question, and therefore to better justify the necessary conditions to build and maintain the network of actors capable of developing ‘circular solutions’ and implementing them within the organic material stream in Hamburg adduced as the results of this mater thesis.

Appendix A – Interview framework

Interviews with local stakeholders and experts are based on a general interview guide approach. Main reasons in this method application are to find out firstly the relations between these stakeholders, and secondly to understand the main interests in play. Therefore, the objective of the interviews is to capture the views and perceptions of different actors on the barriers and opportunities of collaboration within the network with the aim of reducing leakage and increase the circularity of the organic material stream in Hamburg. The general interview guide approach chosen for deriving the interviews is developed based on two theoretical models:

1. CONCEPTUAL FRAMEWORK ON DECISION-MAKING PROCESSES – (Dente 2014). The focus through this theoretical background has been in understanding the composition of the subset of actors and the other conditions or elements of the decisional processes, which are determinant in achieving decisional success. The set of questions here is derived from the elements of the framework from Dente (2014), i.e. actors, goals, resources, types, roles, stake, and the patterns of interaction (see Chapter 2, Part II).
2. COLLABORATIVE GOVERNANCE THEORY – (Ansell & Gash 2007; Emerson et al. 2011). The focus through this second theoretical background has been capture the perspectives or conditions necessary to collaborate within the network of actors. Here the set of questions is derived from scientific literature which identifies different variables within the framework of collaborative governance.

A.1 Conceptual framework on decision-making processes

The conceptual framework suggested by Dente (2014) aims to be used both as a tool in understanding how public policy decisions are taken and for designing strategies able to overcome obstacles that make policy change difficult. Questions from this framework should aim towards:

- capturing the actors` goals and interests in engaging the network
- capturing potential alliances, patterns of interaction, and oppositions
- capturing resources that actors are willing to mobilize
- understand/verify the roles the actors could potentially play within the collaborative governance model

Variables for successful decision-making – (Dente 2014)	Expected findings	(Draft) interview questions
1) Actors		
- The actors are only those who act in a purposive way and those who are absent cannot be considered actors	- Will to participate in a decisional process concerning changes in the <i>status quo</i> of the activities along the organic material stream the actor belongs	- Do you see governmental bodies decisions on the organic management as affecting also your organizations' activities? - Did it happen in the past? - If yes: How did it affect your activities? Were you engaged in the decisional process? How? - If no: Would you be willing to engage – if you would have access to such decisions – in order to try to reach your organizations' objectives?
2) Actors' Goal(s)		
- Actors take actions with the aim of reaching an objective related to their interests (e.g. earn money, improve their reputation, implement values that contribute to the definition of their identity)	- Will to participate in a decisional process as concerned to the solution of the problem and/or as concerned to the	- Would you be interested – if you would have access to governmental bodies decisions – to contribute to the solution(s) of identified problem(s)? Or for other reasons?

<ul style="list-style-type: none"> - The goal(s) of an actor can be content related (regards the problem itself and/or the solution to adopt) or process related (linked to the actors' relations with the other actors) 	<p>positions of the other actors involved</p>	
<p>3) Actors' Resources</p>		
<ul style="list-style-type: none"> - The author highlights four types of resources that are easy to distinguish and are the most common in public policy processes: 1) political resources, 2) economic resources, 3) legal resources and 4) cognitive resources 	<ul style="list-style-type: none"> - The type of resources that the actors would be willing to mobilize in order reach their objective with the solution of "closing loops" 	<ul style="list-style-type: none"> - How could you contribute within a governmental bodies decisional process concerning the organic material stream? - E.g.: what are the main capabilities of your organizations in this field?
<p>4) Actors' Types</p>		
<ul style="list-style-type: none"> - Based on the nature of the legitimacy the actors claim the actors can be divided into five basic types: 1) political actors, 2) bureaucratic actors, 3) special interests, 4) general interests and 5) experts. - The legitimacy is important because it defines the rationality of an actor, the ways in which is likely to define the problem as well as the type of resources is most likely to appreciate. 	<ul style="list-style-type: none"> - Understand the nature of the claim to intervene in the process of the actors 	<ul style="list-style-type: none"> - Do you believe that your intervention in solving the organic management problem(s) would be necessary? - If yes: Why? How could you contribute?
<p>5) Actors' Roles</p>		
<ul style="list-style-type: none"> - The roles can be defined as the function that the actors play in decisional processes regarding the problem and other actors, and that implies limits to its behaviour and that of the other actors. - The actors can play different roles within the decisional process: 1) promoter, 2) director, 3) opposer, 4) ally, 5) mediator, 6) gatekeeper, 7) filter, + 8) broker 	<ul style="list-style-type: none"> - Understand the position (in favor, contrary, or...) of the actor with regard to the solution. 	<ul style="list-style-type: none"> - How do you judge the solution(s) with regard to your organizations' interests? Could it affect your activities? How?
<p>6) Content of the decision (stake)</p>		
<ul style="list-style-type: none"> - The content of the decision can be analysed in two different ways: 1) by evaluating whether it is a zero-sum game or a positive-sum game in the perception of the main actors; and 2) by evaluating each participant's level of concentration of costs and benefits, by assessing the perception of the individual actor against some "objective" benchmark. 	<ul style="list-style-type: none"> - Perceptions on the collective benefits and losses with the adoption of the proposed solution - The positive and negative aspects from the adoption of the solution 	<ul style="list-style-type: none"> - Do you perceive the solution(s) generally as positive or negative with regard to all actors involved in the organic material stream? Why? - Could you mention some positive and negative aspects on the actors' side concerning the solution(s)?
<p>7) Patterns of interaction</p>		
<ul style="list-style-type: none"> - The interaction can be defined by the rules (legal procedure) or can be freely decided by the actors - The second possibility of interaction between the actors is explained through a classification into three possible alternatives: 1) confrontation, 2) bargaining, and 3) problem solving. In problem solving actors put resources together to solve the collective problem, in bargaining they exchange them and in confrontation each actor uses his own resources against others to impose his own goal and definition of the problem - The choice of the patterns of interaction depends from the perception of the distribution of resources, which does not necessarily represent the reality. 	<ul style="list-style-type: none"> - The perception on the distribution of resources between the actors 	<ul style="list-style-type: none"> - Who is in your opinion the actor (among the ones that are part of the network) that has more power in influencing the outcome(s)? Why? - Can you describe the main partnerships in this field? And in particular, actors that share their interests and objectives? - Can you underline the main conflicts among the different interests involved? - Can you describe the strategies of the different actors involved in the last 5 years?

- The more they are seen as concentrated, the more likely confrontation will be used; the more they are shared, the more likely problem solving will be the solution. Bargaining should prevail in intermediate cases.

Table V.3.29 – Questions derived by Dente (2014) theory (Own 2018).

A.2 Collaborative governance theory

As Ansell & Gash (2007) argue, a new form of governance – known as *collaborative governance* – has emerged over the past few decades to replace adversarial and managerial modes of policy making and implementation. This model of governance is known to bring public and private stakeholders together in collective forums with public agencies to engage in consensus-oriented decision making.

Further, based on a meta-analysis of 137 case studies of collaborative governance across a range of policy sectors, Ansell & Gash (2007) identify four variables of the collaborative process: 1) starting conditions, 2) institutional design, 3) leadership, 4) collaborative process. For each of these variables, more fine-grained variables can be derived from literature.

Based on Ansell & Gash (2007) and other authors, and following a broader understanding of collaborative governance, Emerson et al. (2011) develop another framework for collaborative governance. It differentiates 1) system context (broad political, legal, socioeconomic, environmental and other influences), 2) collaborative governance regime (sets of implicit and explicit principles, rules, norms, and decision-making procedures for public decision making in which cross-boundary collaboration represents the prevailing pattern of behaviour and activity), 3) collaborative dynamics and actions (interactive components principled engagement, shared motivation, and capacity for joint action). These result in impacts (specific outcomes on the ground) and potential adaptation (i.e. the transformation of a complex situation or issue).

In the following table, only the variables concerning the actors are considered for deriving the questions and overlapping categories of variables are excluded as well.

Variables for successful collaborative governance – (Ansell & Gash 2007)		
1) Starting conditions	Expected findings	(Draft) interview questions
Resources and power imbalances		
<ul style="list-style-type: none"> - Capacity, organization, status, resources of actors limit their ability to participate on equal footing - Imbalances produce distrust and weak commitment - Organizational infrastructure (i.e. organized stakeholders to represent interests in collaborative governance processes) - Actors' skills and expertise required to engage in discussions about highly technical problems - Time, energy, liberty to engage in time-intensive collaborative processes 	<ul style="list-style-type: none"> - Internal constraints (of the actors) to engage in cooperation processes with other public/ private actors along the material stream (i.e. organization and skills; time; status; resources). 	<ul style="list-style-type: none"> - Are there constraints for being engaged in a cooperation process with the municipality and/or other actors along the organic material stream? - If yes: Which? (e.g. organization and skills; time; status; resources) How could these be overcome? By whom?
Incentives to participate		
<ul style="list-style-type: none"> - Understand the incentives that stakeholders have to engage and the factors that influence these incentives 	<ul style="list-style-type: none"> - Perceived needs to cooperate with other public/private actors along the material stream 	<ul style="list-style-type: none"> - Do you see the cooperation with the municipality and/or with different actors along the organic material stream as necessary? Why (not)?

<ul style="list-style-type: none"> - Stakeholder expectations about meaningful results of the process (in balance of the time and energy needed for cooperation) - Participation to result in concrete, tangible, effectual policy outcomes - No alternative venues or means to reach goals available - Collaborative process as exclusive forum for decision making - Respect and honour of the outcome of the collaborative process needed - Achievement of stakeholder goals dependent on cooperation - Interdependence of actors (cooperation fails when stakeholders find it easier to achieve their goals unilaterally) - Cooperation is more likely to be successful when stakeholder perceive achievement of their goals depends on cooperation - Perceptions of interdependence depend on the local context (“shadow of the state” => threat of court, regulation) 	<ul style="list-style-type: none"> - Goals and interests in cooperation which cannot be reached individually - Expectations about the outcomes that can be reached by the cooperation process - Alternative ways to reach their goals and interests 	<ul style="list-style-type: none"> - If yes: With which actors do you see the need for cooperation? On what? For what purpose? - What do you hope to reach by cooperating with the municipality and/ or with different actors along the organic material stream? - Do you think you can reach these goals on other ways? <ul style="list-style-type: none"> - If yes: How? - If not: Why?
Prehistory of cooperation		
<ul style="list-style-type: none"> - Prehistory of antagonism or cooperation between stakeholders hinders or facilitates collaboration - High level of interdependency and conflict can result in powerful incentive for cooperation - Collaboration as alternative to policy deadlock especially when deadlock imposes high costs on stakeholder - High conflict is not necessarily a barrier for cooperation - Stakeholders have learned that they cannot reach their goals without cooperation - Prehistory of conflict is likely to result in low levels of commitment, trust, strategies of manipulation, dishonest communications - History of successful cooperation can create social capital and high levels of trust 	<ul style="list-style-type: none"> - Experiences made with (informal) cooperation with other public/ private actors along the material stream - Conflicts with other public/ private actors along the material stream - Perceived dependency on other public/ private actors along the material stream 	<ul style="list-style-type: none"> - Have you ever cooperated with other public/private actors along the organic material stream? - How is the responsibility shared concerning the final results, or different levels of responsibility? <ul style="list-style-type: none"> - If yes: Which experiences did you make? Did it help you reach your goals in that situation? Did conflicts occur? Why? - Do you see the activities of your organization as depending also on the other public/ private actors along the organic material stream? <ul style="list-style-type: none"> - If yes: How? - If not: Why?
2) Leadership		
<ul style="list-style-type: none"> - Necessary to bring parties to the table and steer the process => facilitative leadership needed - Facilitator’s role to ensure the integrity of the consensus-building process - Leadership needed to set and maintain clear ground rules, build trust, facilitate dialogue, explore mutual gains - Involve and empower stakeholders and to enable them to move collaboration forward - Empower in particular weaker stakeholders (with less resources and power) - Leadership becomes more important when incentives to participate are weak, power 	<ul style="list-style-type: none"> - Role of the public authority (or others) as potential leader of the cooperation process 	<ul style="list-style-type: none"> - Which actor would you expect to initiate and maintain a cooperation process with the public/ private actors along the organic material stream? - How would you describe your relationship to the municipality? Which role do they play in your daily work? - What could the municipality do to get you (and stay) involved in a collaborative process concerning improvements in the organic material stream activities?

and resource imbalances are high, distrust and prior antagonisms are high		
- Role of an honest broker (or mediator when conflicts are high) necessary		
Variables for successful collaborative governance – (Emerson et al. 2011)		
3) Drivers for cooperation (emerging from the context of the coop.)	Expected findings	(Draft) interview questions
Consequential incentives		
<ul style="list-style-type: none"> - Include internal (problems, resource needs, interests, or opportunities) and external (situational or institutional crises, threats, or opportunities) drivers for collaborative action. - Positive or negative incentives must exist to induce leaders and participants to engage together. 	<ul style="list-style-type: none"> - Perceived needs to cooperate with public/ private actors along the material stream - Goals and interests which cannot be reached individually - Expectations about the outcomes that can be reached by the cooperation process - Perceived dependency on other public/ private actors along the material stream 	<ul style="list-style-type: none"> - Do you see opportunities in cooperating with other actors along the organic material stream? - If yes: Which opportunities? Which actors would you most interested in cooperating with? Why? Are there threats?
Uncertainty		
<ul style="list-style-type: none"> - Dealing with “wicked problems”. - Uncertainty cannot be resolved internally, and it can drive actors to cooperate in order to reduce, diffuse, and share risk. 	<ul style="list-style-type: none"> - Resources (knowledge) needed about the value chain 	<ul style="list-style-type: none"> - What kind of knowledge/ information about the organic material stream would be most beneficial for you to obtain? Why?

Table V.3.30 – Questions derived by Ansell & Gash (2007) to investigate possible cooperation (Own 2018).

A.3 Draft questions

The both tables presented in the previous Section 3.2 have led to the draft questions explained in this section. This draft consists of general questions which should afterwards be specified and adopted to the actor to be interviewed. The first group (category) of questions is an attempt to grasp the awareness of the stakeholders on the issues covered by the project. The other groups (starting from the second one) are instead derived from the theoretical framework explained above. The wording ‘problem(s)’ and ‘solution(s)’ are referring to the project idea that will be presented in Part VI.

1. **Awareness about the organic material management activities and on the existence of a problem and/or a proposed solution**
 - Are you aware about the Circular Economy concept and its presumed benefits? Are you interested in this topic? Why?
 - How do you judge the performance of the waste management sector as related to the organic material stream? Are there issues/problems you are aware? Which ones? Are there related projects (solutions)? Which ones?
 - Do you see (our identified problem(s)) as a problem to be considered for the improvement of the bio-waste management and for the organic material stream in general? How could this be addressed?
 - Do you think (our identified solution(s)) can address this problem properly? Why?

2. Actors and the cooperation experience

(Prehistory of cooperation - starting conditions)

- Have you ever cooperated with other public/private actors along the organic material stream?
- If yes: Which experiences did you make? (Did it help you reach your goals in that situation? Did conflicts occur? Why?)
- Shared responsibility concerning the final results, or different levels of responsibility?
- Do you see the activities of your organization as depending also on the other public/private actors along the organic stream?
- If yes: How?
- If not: Why?
(Actors or not)
- Do you see governmental bodies decisions on the organic management as affecting also your organizations' activities?
- Did it happen in the past?
- If yes: How did it affect your activities? Were you engaged in the decisional process? How?
- If no: Would you be willing to engage – if you would have access to such decisions – in order to try to reach your organizations' objectives?

3. Actors' interests/goals and incentives to cooperate (project related questions from now on)

(Incentives to participate - starting conditions)

- Do you see the cooperation with the municipality and/or with different actors along the organic material stream as **necessary**? Why (not)?
- If yes: With which actors do you see the need for cooperation? On what? For what purpose?
- What do you hope to reach by cooperating with the municipality and/or with different actors along the organic material stream?
Do you think you can reach these goals on other ways?
- If yes: How?
- If not: Why?
(Uncertainty - drivers for cooperation)
- What kind of knowledge/information about the organic material stream would be most beneficial for you to obtain? Why?
(Goals)
- Would you be interested – if you would have access to political decisions – to contribute to the solution(s) of identified problem(s)? Or for other reasons?

4. Actors' resources and the cooperation perspectives

(Resources and power imbalances - starting conditions)

- Are there constraints for being engaged in a cooperation process with the municipality and/or other actors along the organic stream?
- If yes: Which? (e.g. organization and skills; time; status; resources) How could these be overcome? By whom?
(Consequential incentives - drivers for cooperation)
- Do you see **opportunities** in cooperating with other actors along the organic material stream? - If yes: Which opportunities? Which actors would you most interested in cooperating with? Why? Are there threats?
(Resources)
- How could you contribute within a political decisional process concerning the organic material stream? E.g.: what are the main capabilities of your organizations in this field?

5. The cooperation perspectives: leadership and roles

(Leadership)

- Which actor would you expect to initiate and maintain a cooperation process with the public/private actors along the organic material stream?
- How would you describe your relationship to the municipality? Which role do they play in your daily work?

- What could the municipality do to get you (and stay) involved in a collaborative process concerning improvements in the organic stream activities?
(Types)
- Do you believe that your intervention in solving the organic management problem(s) would be necessary?
- If yes: Why? How could you contribute?
(Roles)
- How do you judge the solution(s) with regard to your organizations' interests?
Could it affect your activities? How?

6. Content of the decision & Patterns of interaction

(Content of the decision)

- Do you perceive the solution(s) generally as positive or negative with regard to all actors involved in the organic material stream? Why?
- Could you mention some positive and negative aspects on the actors' side concerning the solution(s)?

(Patterns of interaction)

- Who is in your opinion the actor (among the ones that are part of the network that is represented in the graphic) that has more power in influencing the outcome(s)? Why?
- Can you describe the main partnerships in this field?
- Can you underline the main conflicts among the different interests involved?
- Can you describe the strategies of the different actors involved in the last 5 years?

Appendix B – Interview transcripts

In this Appendix, the short versions of the interview transcripts for each stakeholder/expert interviewed within the scope of this work are presented. All the transcripts here included have been approved by the related interviewee, to assure the veracity of the information gathered. The interview questions are derived from a common structure (see Appendix A) which has been further adapted to each interviewee according to the position he/she covers. The duration of the sessions with the stakeholders/experts has varied between 30 minutes and 2 hours. Except for one (i.e. BdB Hamburg), all the other seven interviews consisted on a face-to-face session. The transcripts in this Appendix follow the alphabetical order.

Expert interview – Tree nursery representative of Hamburg (in text: Expert BdB FHH 2018) – 21st February 2018 – Interviewer: Alessandro Arlati & Donald Alimi

How many tree nurseries are present in Hamburg? Where are they located in the region?

Hamburg has not so many tree nurseries, just 5-6. They are quite small. But in the north-west outside Hamburg, in Pinneberg we have much more: it is a concentration of tree nursery area, with around 250 units. These are medium-size tree nurseries.

Are you aware about the Circular Economy concept and its presumed benefits? Are the tree nurseries interested in this topic? Why?

For me personally this is a very important topic, and we are aware of the topic and its presumed benefits. We should consider our resource consumption from this perspective. In some cases this model is already taking place with visible results. For the tree nursery activities the topic is also very important, since we produce sustainable products, i.e. trees. We want as well the sustainable production, so this is very important. I think we did already much in the past, but we should continue this way also in the future.

How do you bring your products to citizens/retail/wholesale? Private transport firms? Wholesalers themselves? People come directly to you?

Our customers are landscape architects and landscape constructors, not really citizens. These companies visit us and order the products without any type of contract.

We know these problems from other tree nurseries in the region (from the project REPAiR):

- a. Incineration on the ground of the wood waste from the tree nurseries, resulting in losses of potential resources and emissions.
- b. Tree nurseries import peat from abroad, resulting in transport emissions, etc.

What is the situation with the tree nurseries in Hamburg?

Tree nurseries may import peat from abroad. There are two different ways of production for the tree nurseries: a. container tree nurseries, which do need peat, and b. field production tree nurseries. Our tree nurseries apply to the second way of production which does not require for peat. Some container tree nurseries use a lot of peat and therefore the demand is high in this case. In the past tree nurseries were also burning the waste on the ground. But today, we separate the parts of the organic waste, so these can be used in different ways, such as heating purposes and composting which is as well used in the tree nurseries. This can be seen as a CE within the tree nurseries activities.

Is this compost you generate by yourself enough or do you need to buy in the market as well?

This is enough for us.

With whom do you work (as organisation) to represent the interests of the tree nurseries in the political sphere (if this happens)?

In Germany we have the tree nursery association called BdB, and they make the lobby work in the political sphere. They take care of problems that the tree nurseries have, such as the tax system. They have a legal power. They make a good work for the tree nurseries.

Have you ever cooperated with other private/public actors in a common project linked to environmental sustainability issues? If yes, which ones (within the production, consumption and waste management sector)?

We have some cooperation. For example, the City of Hamburg provides a green certificate, sort of labelling. Sometimes we work also with the Ministry of Economy, but this is not related to the agriculture activities, but rather bureaucratic issues.

Is it compulsory for all tree nurseries register to BdB organisation?

Tree nurseries should register to both, BdB and the Chamber of Agriculture. Then the BdB works with political issues. About 1000 tree nurseries are represented by the BdB.

Which is the relation between BdB organisation and the Chamber of Agriculture? Can you explain us this body? And with Behörde für Umwelt und Energie BUE?

There are different branches in the agriculture, where tree nurseries are just a part of it. Other examples include farmers associations, vegetable producers and so on. Responsible for all these is the Chamber of Agriculture. We meet every year and we discuss about problems and of course waste. Chamber of Agriculture aims to rise issues of agriculture and also push for solutions.

BUE: I don't know these guys but the BdB should be in contact with them.

In a project aiming to improve the circularity (i.e. the efficiency usage) of organic resources within the tree nurseries, would you be motivated in participating? How? With whom do you think it would be necessary to cooperate?

We are motivated. I think it is relevant to talk with other actors about the topic. There are many of these actors who have the know-how concerning the topic. It is very relevant to have a round table and to discuss with these guys. From this perspective we need some know-how partners. For example BUND, NABU, BdB association, FHH, the Chamber of Commerce. The Chamber of Commerce are our partners for a lot of issues. Cooperation with them is crucial for us within this topic. Through these cooperation we can improve production ways into more sustainable models. Alone this is not possible.

Among the actors in the list along the organic material flow: which one do you expect to initiate such process? Which is the one with most power in influencing the outcomes?

We have something like a round table in Hamburg and the partners are the green branch: FHH, landscape companies, vegetable farmers, fruits farmers, tree nurseries etc, where we discuss together. It's very new, since 2017.

Who is in your opinion the actor (among the ones that are part of the network that is represented in the list) that has more power in influencing the outcome(s)? Why?

The City of Hamburg, but they do not have the best know-how. For this aspect I would say the private companies, BioWerk, Landscape Constructor Associations, etc.

In terms of innovation I would say the private companies and of course the universities. They are very important in this game, e.g. HCU, TU Harburg, because they bring knowledge and sometimes we had as well projects. The practice of cooperation between the private companies and the universities is very common and successful in the US. Therefore I believe that the cooperation among universities and private sector should increase.

Are you aware of some conflicts that might arise among the actors in the list?

BUND and NABU for example, they don't like some parts of the products from agriculture and tree nurseries, because of the pesticides. Also because some fertilisers are not sustainable.

Expert interview – Senate Chancellery officer of Hamburg (in text: Expert FHH 2018) – 26th January 2018 – Interviewer: Alessandro Arlati & Donald Alimi

Why is the City of Hamburg interested in the concept of CE? Is there a vision/strategy/policy of the city concerning CE? If yes: What does it consist of? What role does waste management play within it? Is it enough (with regard to *Abfallwirtschaftsplan Siedlungsabfälle Hamburg 2017*) towards a CE in FHH?

The City of Hamburg has a long tradition of green practices. For example, in 2011 the city received the Green Capital award and this is not only an honour or award, but we want to fulfil this commitment even longer. With SRH we have a great partner in the city towards this commitment. In my division in the Senate Chancellery we focus a lot on projects dealing with the green spaces: e.g. we won a new European Horizon 2020 called CLEVER (about green roofing and nature based solutions). So we have a strong interest in doing this which is not only because of laws but also on our interest.

Concerning if the actual CE plan is enough: From my perspective I can say we can always do more, but its depending on laws and the economy. Within FORCE we do already something within the CE topic and try to influence decision-makers, but my opinion is that we should have included since the very beginning of the project the education or rising the awareness topic for the citizens. This stays in the roots of the CE. If we want to something like this we have to grab the roots, such as through education (e.g. teaching how we can avoid generating waste and not how to treat it). So a topic such as CE should consider as well the consumption phase. In addition, incentivising and disincentivising is a good strategy to the waste generation topic. We have to charge the ones who produce waste.

Do you think that thanks to REPAiR and FORCE the awareness on this topic has risen and will rise within the City of Hamburg? How?

At this point, the level of awareness thanks to such projects is still low (because the projects are new) and my expectations were higher with regard also to the society. I think that the project will have in the end an impact, I am confident about this. This concerns also the work communication, which in the case of FORCE is not the task of the City of Hamburg. The projects did not have a big impact as well as in the political level at this point.

Do you see obstacles in the current policy framework in Hamburg towards a CE strategy/policy or will?

I am not aware about this topic. I would like to forward this question to SRH.

Considering the phases of CE theory (i.e. design, production, consumption, waste management): On which of these sectors can the City of Hamburg influence more through its policies? How?

We have generally an influence in different sectors, but what concerns the national laws we cannot change them alone. Within FORCE we are working with a big industry actor. But with the industries, they have the vision of making money and it is not always easy to bring it together for example with SRH.

Our projects (not at this point but by its end) aim to influence as well the political level towards a more comprehensive view towards the whole value chain. Nevertheless, we have to admit that the project is an experimental one and these kind of influence is a very tough process.

Do you think that cooperation with private actors is necessary in a CE perspective? Why?

Within FORCE project we have a very good relation to everyone, but we had as well other projects where we had problems with industries. You can still see that some of these actors are very motivated but others no. The issues with the industries do not concern CE projects but SMARTCITIES and there are very big players who are the ones who really can influence the national laws. In comparison to them we are 'flies'.

Do you think that cooperation with public actors is as well necessary in a CE perspective? With which category it is more important the cooperation (Bezirke, SRH, University, etc.)? Why?

With regard to the Districts (i.e. Bezirke), we need to communicate with them about common projects. With regard to issues such as rising the awareness among local actors, Bezirke could play a crucial role. At the moment this is a weak point. On the other side, concerning the Universities, FHH has already many cooperation with the university, which I would evaluate as very active and very good from our perspective. Also because we have a very active second Mayor, who is responsible for education and she is pushing this topic a lot, not only with regard to CE.

Who is in your opinion the actor (among the ones that are part of the network that is represented in the list) that has more power in influencing the outcome(s)? Why?

Maybe the City of Hamburg and/or the Ministry of Urban Development (BSW). Because they have an influence on all the other actors. I would add also the Ministry of Environment and Energy (BUE), absolutely.

Among the above-mentioned actors, which one would you expect to initiate and maintain a cooperation process with the public/private actors? Why? Or should there be a new organisation (e.g. public agency) yet to be established? How should it involve the other relevant actors?

It's not so easy since it depends on the actions. Then it is the Ministry of Urban Development (BSW) who also belongs to the City of Hamburg.

The city has to listen to the households and their interests. If the initiating actor wants to achieve something, he/she are depending a lot on the households. Households are a very important actor, because if they do not use the innovation coming up from the City for example, or SRH, then it is useless. It can involve the other actors also through laws, and then the others have to deliver.

Are you aware of some conflicts between these actors?

Natural conflicts which are normal issues, not big problems. This within FORCE.

**Expert interview – Research Associate of HafenCity University (in text: Expert HCU_1 2017) – 15th December 2017
– Interviewer: Alessandro Arlati & Donald Alimi**

Who are the partners involved by the project in Hamburg within the bio-waste stream? How was the case study (bio-waste stream) of Hamburg developed and by whom was it initiated?

Bio-waste according to the AWP 2017 is a weak part. BUE had required SRH to take actions on bio-waste some years ago. SRH wanted to focus on bio-waste stream for REPAiR, Delft HCU and SRH chose this waste stream together. I knew already people from Focus Area (Pinneberg and Altona) thanks to another project that they conducted in 2014 and he had already their contacts → tree nursery situation, Pinneberg county major, chancellor of FHH, major of Altona, SRH.

Which were the initial challenges identified and the foreseen solutions at this point? By whom were they identified?

Not yet solutions now, from February on in Pinneberg and from March in Altona. Problems have been identified by the stakeholders themselves and communicate to us (HCU).

Do you see these problems and the related solutions as relevant for the improvement of the bio-waste cycle? How?

The project is not come with solutions yet.

What is the role of the REPAiR project for the initiation of Hamburg bio-waste project? Were there foreseen interventions before REPAiR in the bio-waste stream?

It is an occasion for SRH and the other stakeholders because of the budget of the project and learning purpose (SRH and HCU receive money from EU, others not).

Have you ever cooperated (UPC) with other local public/private actors outside EU programs?

a. If yes: How would you evaluate the cooperation experience? Did it help you reach your goals in that situation?

Which experiences did you make? Did conflicts occur? Why?

b. If not: What might be the reasons?

Yes. The experience was negative and positive, depending on the project. Conflicts happened because of different interests.

Have you ever participated (UPC) in processes for the design/implementation of public policies?

a. If yes: How were you engaged in the decision process?

b. If no: Would you be willing to engage/contribute – if you would have access to such decisions – to reach your institutions' objectives?

Yes. By contract.

Do you see the cooperation with the municipality and/or with different actors as necessary?

a. If not: Why?

b. If yes: With which actors do you see the need for cooperation? On what? For what purpose?

Yes. With the 4-helix actors.

What do you hope (i.e. goals) to reach by cooperating with the municipality and/or with different actors? Do you think you can reach these goals on other ways?

a. If yes: How?

b. If not: Why?

Improve processes of urban development.

No. Cooperation is vital, for inputs.

Could there be motivations for HCU/UPC in being engaged in decision processes within the bio-waste material stream? Which ones?

Interest in Urban Metabolism topic. Moreover, it is important to establish contacts with other actors for possible future partnerships.

From the internal perspective of your institution are there constraints for engaging in a cooperation process with the municipality and/or other actors? Which? (e.g. organization and skills; time; status; resources) How could these be overcome? By whom?

It depends on many reasons.

Do you see opportunities in cooperating with other actors? Which? Which actors would you most interested in cooperating with? Why?

As university, we privilege 4-Helix approach.

How could HCU/UPC contribute within decision processes concerning bio-waste material stream?

To bring together spatial planning and the waste management. Provide information and serve as a bridge between different sectors.

Which actor would you expect to initiate and maintain a cooperation process with other public/private actors along the bio-waste material stream?

SRH might be one.

What could the municipality do to get you (and stay) involved in a collaborative process concerning improvements in the bio-waste stream activities?

The City of Hamburg hires us with a research Programme and we are supposed to follow its dications, although we have some degree of freedom.

Do you believe that your intervention (HCU/UPC) in solving the bio-waste management problem(s) would be necessary? Why? How could you contribute?

I believe that with the intervention of the university we can make the process faster.

Do you perceive the solution(s) generally as positive or negative with regard to all actors involved in the bio-waste material stream? Why?

Our current proposals seem ok to me, but at the moment I cannot personally judge until this level.

Who is in your opinion the actor (among the ones that are part of the network) that has more power in influencing the outcome(s)? Why?

The ministry of environment. Because of legal powers of compelling stakeholders to implement their will.

Do you perceive you (UPD) as an actor within the REPAiR project?

Yes.

Expert interview – Research Associate of HafenCity University (in text: Expert HCU_2 2018) – 15th February 2018 – Interviewer: Alessandro Arlati & Donald Alimi

Have you ever cooperated (as the Urban Planning chair) with other local public/private actors outside EU programs concerning urban environmental issues? If yes: How would you evaluate the cooperation experience? Did conflicts occur? Why?

Yes, usually nationally funded, locally at Landesebene. We always depend on getting funding for projects: we are paid to teach and to do research. For research we depend on additional funding. It is not covered by our regular budget. Most of the projects are with public actors, like the City of Hamburg. Regarding the private actors it is not so often because we are not a technical department but interested in more social issues (like urban development). In general it works well; it is also a matter of getting used to. Of course, collaborating with people with other perspectives and knowledge is always a challenge: “I would not work here if you would not like this”.

Do you see the cooperation with local public/private actors outside EU programs concerning urban environmental projects/policies as necessary or an opportunity?

a. If not: Why?

b. If yes: With which actors do you see the need or opportunity for cooperation and why? Which would be the goals of the Urban Planning chair as a research institution to participate in these types of cooperation projects? Do you think you can reach these goals in other ways? If yes: How? If not: Why?

It is an opportunity because what we do cannot be just theoretical, but we need results in real life, they “have to be applicable in the real world”, i.e. orient our results to people that really need and are willing to apply them. So, it is important to involve them since the beginning and giving them the chance to influence and participate. It is also necessary, because research must be applicable. It depends also on the topic: public sector must and can do just what they are responsible for, they cannot invent really a lot, because of resources. The private actors can play a good role in this, but they will only do this when there is money to make with that.

With regard to conflicts some issues can be mentioned such as the terminology, the time frame (for public actors → long term; for private ones → short term; while universities are in between), the gap between theory and practice; here universities can act as a bridge. But we do not know how to implement, because our knowledge is too broad, too general and therefore not specific enough to guide implementation.

No, there is no other way we can reach these goals: this is the only way to get information and knowledge on real life. Reaching a new kind of knowledge!

How could HCU (in particular the Urban Planning chair) contribute within urban environmental projects/policies in particular regarding the organic material stream in Hamburg?

It is interesting the role of observer, i.e. not act but just report what is happening because it gives us the opportunity to see things from inside but also as outsider at the same time and thus keep our role neutral (non-political). This because we do not have any economic interest and we can give the overall picture while the private actors do their own business.

It can be that we are the ones, in case that something is really new for instance, and we could bring in the knowledge. Universities can sometimes define the goals in case of projects regarding something innovative (for the public actors it is generally difficult to innovate: no time, no resources, no will).

From the internal perspective of your institution are there constraints for engaging in these types of urban environmental projects/policies? Which? (e.g. organization and skills; time; status; resources) How could these be overcome? By whom?

If we do not get funding, we would most likely not participate in such projects. There is the possibility to apply for funding to other organisations, but more often we receive funding from EU or from the national level, which are the ones that define the goals and for what the money should be used for. The national level normally funds projects that follow the EU goals, often with targets that go beyond EU dictations, and also more related to local issues. Getting funding is a competitive field is a really competitive field; you need the staff, the experience, even though it is most often a learning-by-doing process! It is also a matter of cooperation, of connections, of networking. You have to start working on it, try and see what is happening, in the meantime correcting your path. In Germany there are few professors and a large staff under them. In Netherlands for example they have a lot of contracts for researchers, with also more stable contracts, more positions, to become then professors and therefore increase the number of the staff. In Germany this is not the case. Researchers have limited contracts

depending on external funding, meaning it is hard to become professors because of the low number of positions. This results in unstable contracts, which brings people to move on after a while. The system at the national and federal level must be changed. And this could lead also to more public funding.

Who is in your opinion the actor (among the ones that are part of the network represented in the graphic) that has more power in influencing the outcome(s) of a project concerning the organic material stream? Why?

The Ministry of Urban Development has the legal power to implement the solution. Not to underestimate are the Chambers, as networks of people that have money, able to influence decisions as opinion leader and opinion maker. These are generally networks of businesses who exchange and influence policy making in their direction. Chamber of Commerce especially, but maybe they are not so interested in CE related projects. SRH and SAGA are influenced from the ministries.

Among the above-mentioned actors, which one would you expect to initiate and maintain a cooperation process with the public/private actors for improvements in the organic material stream? Why?

Probably the universities could initiate, in the case we are paid for that and we have also a strong interest in doing that. We are also qualified for that and the most open to work with new topics as well: but this is just if we are asked to do it, and if yes, just in the period in which we are paid for doing it. SRH could also initiate, if it is in their interest and power to do it. The ministries generally would say no. They would do it if it would contribute to politically approved goals and is supported by the head(s) of the ministry. Currently, they usually don't do that. They always say that there is no time and funds, just more work to do.

Regarding maintaining the cooperation, most likely in the long term, it could be a public institution, one that has the most interest in pursuing circularity and maintaining the cooperation. In this context, SRH could have a strong but specific interest; if it is about having a more general network and goal, then it could be one of the ministries (i.e. the City). BUE, NABU, or BUND could have resources to do it, and the status as well: people would expect something specific from these. Also, the two chambers are likely able to do that, because of their money, status and network they represent.

What could the initiator actor do to get (and stay) HCU involved in a collaborative process with other actors outside waste management concerning improvements in the organic material stream?

We need funding opportunities. We would prefer to have anyway some freedom in defining the topics and we develop projects when the municipality or others provide funding for that. If the topic is new we might have some flexibility when it comes to research questions: of course there are some requirements to fulfil, but in this case we are freer. The transition idea should push for some pioneer that funds at the beginning, and later it will be the private and the system itself that pays (example of PVs). This pioneer is more likely to be the public sector, which generally funds things that cannot be financed by the market. There is always the question: transformation is always more than an economic return, because times are too slow, and EU is too soft and too economic-oriented.

Are you aware of some existing conflicts among the actors here involved? Or potential conflicts that might arise in this context?

Conflicts between SRH and the ministry that coordinates them, because they do the rules and SRH must follow that. There can be some conflicts, but not much. Chambers, BUND and NABU have their own interests and they might have a conflict among goals and targets.

Expert interview – Employee of MVB incinerator plant (in text: Expert MVB 2018) – 19th February 2018 – Interviewer: Alessandro Arlati & Donald Alimi

What is the difference between MVB and MVR plants? What is their relation?

MVB plant is completely owned by SRH (100%) whereas MVR plant is 45% owned by SRH and 55% by Vattenfall. Both plants were built by HEW which was a public company and in the beginning both plants were run by Vattenfall. Since 2014 MVB belongs 100% to SRH, but it still is an independent company (i.e. GmbH): it has its own CEO and it has the decision-making power over the plant. The technical differences between MVB and MVR are really small. Both plants receive the same input (i.e. residual waste). The only difference may be on the share of the origin of residual waste e.g. households, commercial sector and the area, where the waste comes from. At the moment we receive a quantity of 500,000 t/year from Hamburg. There is no competition between the plants, instead we have a contract that they (MVR) should handle 180,000 tons of residual waste from SRH each year (the left over capacity is used for waste from Lower Saxony State) and MVB handles around 320,000 t/year of residual waste.

The supply for the incineration plants is based on long-term contracts (around 20 years contracts). Hence, SRH has to react because the contract with MVR will be ending in around 2/3 years.

Are you aware about the Circular Economy concept and its presumed benefits? Are you interested in this topic? Why?

Regarding this topic, Hamburg T.R.EN.D was a waste forum organised by SRH which took place some days ago. Many different people, companies and SRH discussed about the state of the art, not only about the waste management but also on topics such as Circular Economy, Zero-Waste.

What do you do with fractions, like glass or plastic, which are present in the residual waste? Do you have your own sorting facility? How efficient is it?

In our plant (MVB) we receive residual waste from households and commercial sector. We do not only incinerate residual waste, but also separate it. This does not happen before the burning process but afterwards, because at the moment it is not possible an automated separation process concerning the residual waste (and manual sorting would be very unhygienic). This material fractions after incineration consist on metal, ash, etc, and it follows a sorting process for the remaining materials after the incineration. These materials are further recycled and inserted in the production process. There are different projects and ideas for better exploiting the value of these materials. At the moment we have around 4 or 5 projects, where e.g. Stilbruch GmbH is involved in one of these projects, concerning the inserting of the furniture waste back in the cycle.

How does the organic waste quantities (around 41%) influence within the residual waste incineration process?

The organic waste within the residual waste does not influence the incineration process. In the end also the organic waste gets incinerated and there are no technical problems about that. But when talking about the Circular Economy concept this is something to be avoided, since we receive materials which can be better used and exploited rather than incinerated. The only materials we cannot burn and therefore generate energy are the metals.

In a hypothetical diversion of organic material from incinerator to compost, with consequent reduction of input quantities for your plant, what would this change bring to your activities?

Not much, we could for example stop our contract with MVR concerning the quantity of residual waste that we currently send to them for incineration. This can be a concrete scenario within SRH, also because the intention is towards investing in innovative plants like the new Centre for Resources and Energy (Zentrum für Ressourcen und Energie, ZRE) currently under construction, and also because the contract with MVR is ending in around 2/3 years. Another long term option can be also the closing down of the incineration plant itself (where the direction of MVB GmbH is expected to oppose it), like it has happened in the past with the other incineration plant (MVA Stelling Moor was closed, and the contract with MVA Stapelfeld was not prolonged.) and invest in more innovative plants, like for example ZRE.

Who should take the initiative (i.e. diversion of organic material from incineration to composting) to start this initiative and how?

The BUE (Behörde für Umwelt und Energie) because they already are in the policy arena and can move the things within this topic.

Thanks to a better recycling rate, in 2015 the MVA in Stelling Moor was closed. Together with this, and also according to Circular Economy perspective, materials at the end of their life cycles should be inserted again as raw materials for other cycles: this does not concern incineration, considered also one of the last option to undergo by the EU. If the trend goes on like this, it seems that there will be no more need for incineration. What do you think about it?

That is almost right. But still you will always have products or material which are contaminated and cannot be recycled, e.g. hospital's waste and also hygienic waste from households. Said that, incineration plants - in case of no residual waste from Hamburg or even outside necessary for the plants to work - most likely will oppose the decision. In any case, one day when no more reasonable quantities of residual waste will be generated, incineration plants will not be needed. This has already happened in the past when the MVA in Stelling Moor was closed and with the re-opening of the new plant for the bio-waste treatment.

Further information:

We do not force citizens to separate but rather stimulate and incentivize them to do so, e.g. different fees for different bins. The organic-bin is provided by SRH with the request of the landlords or households. It is quite new the obligation to provide the organic-bin (since 2015) therefore it will require time until all households are completed with one. There is no deadline for this process. SRH sends letters to the ones they know who do not have the bin yet. SRH provides also lots of info related to the separation. General perception towards the separate collection involves thoughts from the people who think that even after separation the waste gets all incinerated in the end, so why should I separate waste. On the other side, others complain about having many bins in their kitchen which takes a lot of space. The number of citizens of Hamburg is high and tackling their awareness is not an easy issue. SRH is tackling the issue also with the children, through a project called MüKi where a teacher teaches about the topic of waste to the children but this is not easy because in schools it is not supposed to be taught about this issue. Lots of schools come also here to learn about the topic but they are not required to do so. Ministries are as well doing awareness campaigns regarding the waste topic. Environmental NGOs are already active also with the children concerning the topic of waste. We also have issues such as concerning the space for the bins, e.g. Altona. So citizens cannot separate in this case because we are not able to provide the bin. Issues, such as space for the bins, are to be previously thought and required in the project phase of buildings. I think an important topic on raising the awareness towards separation is the microplastics, because people understand that if they throw the plastic in the environment they will have it back into their food. But this issue is a hard job!

Expert interview – Representative of SRH (in text: Expert SRH_1 2018) – 17th January 2018 - Interviewer: Alessandro Arlati & Donald Alimi

What is your role within SRH?

I am working in the Innovation section of the department called “innovation and communication” and am in charge of research and international development projects and also of international relationships - since September (projects like REPAiR, , e-cargo bikes).

Why is SRH interested in the Circular Economy topic?

From national law, tradition of FHH to be vanguard with the sustainability issue, also political will (green party in the supervisory board of SRH)

Do you see obstacles in the current policy framework in Hamburg to implement CE in the biodegradable material stream? Or other sources (e.g. cultural, technological, etc.)?

No, but main problem is cultural and awareness of different areas (from households to commercial sector, etc.). You are investing a lot in awareness campaigns (websites, in the U-Bahn, famous characters on billboards). When the plastic bag, for instance, is full, they throw the plastic into the bio bin. “I found a cooking pan in the bio waste bin”.

Considering the phases of CE theory (i.e. design, production, consumption, waste management): Have you ever cooperated (or are you currently cooperating) with actors (public/private) outside the waste management stage? Specifically concerning improvements of the biodegradable material stream?

Yes, but more on the consumption side and basically on citizens’ awareness and speak with landlords. EU funded project are occasion to go a bit beyond and learn more: this because we live on citizens fees, we cannot use their money for doing something else. We are a public company and in the board we have people talking constantly with the municipality, we do have contacts with public.

Why is the cooperation between SRH and private actors (within and outside the waste management) necessary?

We struggle in collaborating with private landlords of large housing estates because they are often not easy to convince to do what we ask for (providing separate bins for 4 fractions, etc.). Main obstacles are costs and will. For what concerns other companies in production, design and consumption, we do not have any relation, because of our mandate. We know that it is important to dialogue with them because some of their decisions affect heavily their work, like for the new project that we have carried on some years ago which consisted on providing biodegradable plastic bags in the supermarket. At that time, we have dialogue with the wholesale, but in a very limited scale.

On the other side, can you describe the relation of SRH with other public actors (FHH/ and Bezirke)?

SRH is owned 100% by the city of Hamburg. We do participate in the draft of the Waste Management Plan (Abfallwirtschaftsplan) with the City of Hamburg. Hamburg is also a federal state and therewith differs from other municipalities. Bins are usually to be placed on private land. In some inner city quarters with high density like Altona and Eimsbüttel, there is no space on private land to place 4 different bins. In the Bezirk Altona we could reach an agreement to install underground bins on public land. In the Bezirk Eimsbüttel this has not been possible until now.

Would have been constraints (e.g. organization and skills; time; status; know-how) for SRH in such cooperation? If yes: How could these be overcome? By whom?

If there is a common interest, we do not have any problem. Only constrain is budget, but EU project can help.

With which actors (within and outside waste management) do you (SRH) see potential in cooperating with? Why?

Consumers/ users, because we can influence them: That’s our aim but there is no direct power line from us to users, so it all depends in our success to motivate them. With the production side, we are affected by their decisions in terms of products that we receive and we have to handle them as waste. Anyway, they have a pure economical way of reasoning, which is not our case: for this reason, difficult to speak with them.

Who is in your opinion the actor (among the ones that are part of the network that is represented in the graphic) that has more power in influencing the outcome(s)? Why?

FHH. Also NABU, and Chamber of commerce and agriculture can do their part.

Among the above-mentioned actors, which one would you expect to initiate and maintain a cooperation process with the public/private actors for improvements in the biodegradable material stream? Why?

Is not easy, she named an umbrella organization, which has the overall perspective. Then FHH, and BUE.

What could this actor do to get (and stay) SRH involved in a collaborative process with other actors outside waste management concerning improvements in the biodegradable material stream?

There is general interest in participating in projects with the municipality and with universities and private businesses, but what we miss is the financing. Since we are a public company, we get paid by fees and we have to do just what the law tells us. In the case of REPAiR and FORCE, we can use the money from the budget of these project, therefore they can be considered as occasions both for getting money and for getting in contact with other partners outside waste management. Normally, financing comes from national level.

Why is relevant to increase the quantity and quality of bio-waste collection for SRH? Is there more demand in the market for outputs of bio-waste recycling or for other reasons (e.g. national targets)?

Our plants need full capacity to work, otherwise it is not feasible. This is also a reason why we push for having a good separation at source, so that we can have more input and therefore produce more outputs. Waste is there, it is better to use it, and we do this: produce gas, compost, etc. from it. Our plants do not work if the quality is not good (see biodegradable bags).

Are the financial incentives and other information campaigns for the households still running? Did they achieve until now the expected results? If not: Why?

Yes, citizens pay less fees for organic waste. Residual waste costs more. But incentives did not had the expected results. More awareness is needed (see question 3).

Outer areas of Hamburg are not all covered by the bio-waste bins (Abfallwirtschaftsplan 2017). What is the status and the plan to cover these areas?

By law all households must have 4 different bins. 3 campaigns for providing bio-waste bins, first letter to say you need it, second to have answers again, third informed the citizens that the bio-bins will be distributed. The percentage of households with organic waste bins: 95% of the households in the old quarters of Hamburg, who have space for an organic waste bin, have a bin (95% der anschlussfähigen Haushalte).

Why landlords refused to place the bio-wastes bins? Are there still problems with them regarding the placement of bins/containers for separate bio-waste collection? What kind of problems? How could these be overcome?

They are reluctant because they do not want to pay more in case the tenants don't separate their waste correctly, they do not have someone dedicated to waste, residents do not separate anyway, "no please, not another stuff", no space.

How can the 'lack of space for bins' problem be overcome? Are there solutions considered by SRH at the moment?

Some houses have the bio bins in basement, some outside in a common place, but problem of the space anyway. They tried with underground bins also for organic waste, but it did not work out because there was no social control at all. Indeed, for bio bins collectors check at the beginning if in the bin there is effectively bio waste, if not (even with 20 % not bio) they cannot take it and force to come another day with the residual waste collection: as a result, citizens have to pay extra for the special service.

Further information:

- Possibility of compost on their own plot (for households)
- Compost is aerobic process, gas anaerobic
- Biowerk no compost, it uses the wet kitchen waste from restaurants and hotels for biogas production
- We are also in competition with private waste management companies for commercial waste collection.
- "Interesting that you as planner are tackling waste issues"
- For us is important to cooperate with universities, for learning something new and see problems from other perspective and find new solutions

Expert interview – Representative of compost generation plants for SRH (in text: Expert SRH_2 2018) – 31st January 2018 – Interviewer: Alessandro Arlati & Donald Alimi

What is the status of BioWerk since 47,5% belongs to SRH? Can it be considered more as private business company than a public one?

It is fundamentally a private company, business oriented. The other two are Bio-cycling and ETH. SRH is in charge of the treatment, Bio-Cycling for the collection of the bio-waste and ETH for marketing the product of the fermentation process. SRH is regulated by public law and in this way it financed by fees of the citizens and the support of the state, BioWerk is in the free market.

Are you aware about the Circular Economy concept and its presumed benefits? Are you interested in this topic? Why?

In Hamburg we have a long tradition of dealing with waste. The first incineration in Germany was built here in the last part of the 19s century (1896) to tackle the Cholera disease that hit the grand part of the population. At that time, the waste that was produced was mainly organic. Later, other chemical wastes have been resulted from human activities and they were firstly disposed. The contamination of the soil and the water, consequently, has raised the awareness towards this topic bringing to the resolution of “composting everything”, a normal practice already active (50s). The problem was that every kind of waste must be treated, so the compost could not be obtained from every type. In Hamburg the story started in the 80s from the university, but the quality at that time was not good enough. The waste is then separated in plastic, bio, glass, etc. like today, a great success especially after the green point and the Extended Producer Responsibility. In this century Germany have started to produce biogas from bio-waste before the composting process.

The biogas is produced anaerobically with low temperature (less than 55°). Compost is produced after aerobically with high temperature (more than 60°, which is important for the hygenisation) after some weeks. Both processes happen in nature already, every day.

Which are the receivers (buyers) of the compost from BKW?

70%-80% goes to agriculture, 5-10% is used to produce soil used as peat, and the rest to private gardeners.

In your opinion, would it be possible for the tree nurseries to get compost from you as well?

No, the compost produced from bio-waste is too rich of fertilizers. For example the plants would get harmful effects (leaves get brown) because of too high concentration of Potassium. They need peat or something like that, which is ground without nothing inside, that's why for them is perfect. This kind of compost is ok for agriculture. However, it is not enough for covering the demand, import of compost is necessary as well. The compost produced from green waste has a lower concentration of K, therefore it can be used for the tree nursery, but not entirely, at max 40% depending on the quantity of fertilizer components inside. The rest must be peat or something with the same characteristics. This is a non-renewable material, in the sense that it takes more than 100 years to recover: this happens in swamps, mosses, marshes. In Germany we can find them in the west part, around / in the south of the area of Bremen. The next step should be to find a way to produce something like peat to avoid import from other countries, because the demand in north Germany due to all the tree nursery activities is too high. Compost weight is also higher than peat and therefore costlier to transport (LKW with max 25 t).

Which is the difference between your compost (i.e. from waste) and the one that can be bought on the private market?

The difference lays in the nutrients, but are minimal, almost the same. Ours is ecological.

It seems that the private sector is really important in the production of compost in Hamburg. Which is your relation with them on the market side?

Yes, they are linked to them through contracts. Both for compost, digestate and biogas, once produced, the VKN is the organisation for compost marketing and ETH is the company for digestate marketing. The gas for the gas grid at BKW is sold to a gas company. The electricity and the heating of BioWerk is sold to the electricity grid and to the heating grid

What is the utility the digestate (Gärrest) from BioWerk?

The difference is the concentration of water. For digestate we have 95% of water, for compost 35-45%. The digestate is used as well to fertilize agricultural fields.

We understood that households in Hamburg can compost on their ground. Is it true? Which is your opinion on this practice?

Yes, they can do it. We suggest not to do it because of the smell (so claims from neighbours) and because they have to buy anyway a lot of peat as well to produce at the end very few: inefficient!

How does the process from green waste to compost work?

Yes, green waste is good to produce compost, also in nature (for example the leaves that fall from the tree on the ground). Biogas is produced instead in absence of Oxygen (O₂), which is inside green materials.

We have calculated that in BKW plant you handle ca. 70.000 t/a of kitchen and green waste. How will an increase of ca. 190.000 t/a of bio-waste concern your plant capacity (from 41% of current bio-waste in the residual waste)?

There is for sure the need to build a new one. But since the residual waste percentage is decreasing over time, we are aware of this possibility. As a matter of fact, the new resource and energy centre programmed in the next 6 years to be opened will have a new composting plant for that. It must be said, anyway, that the 41% of the bio-waste in the residual waste is not all good for composting (e.g. the rest from the babies).

How do you judge the performance of the waste management sector as related to the bio-waste material stream? Are there issues/problems you are aware of? Which ones? Are there related projects (solutions)? Which ones?

Very good in Hamburg. The main problems are to be located in the households' level, i.e. the separation. The worst thing are the small pieces of everything inside the bio-waste (microplastic, micro-glass especially) which are really dangerous for chemical quality the first and because you can be cut in the second case. It is also difficult to speak with the tenants (SAGA for instance) and with the commercial sector: the second one is difficult to convince because they have other problems and they will not think twice to throw everything in the same bin. SRH offered to pay for this but they are still reluctant.

Considering the phases of CE theory (i.e. design, production, consumption, waste management): beyond your relations with your clients (see above), did you have (or currently have) common projects/cooperation with other public/private actors considering improvements in the organic material stream circularity? [if yes] What are they about and why you joined this projects/cooperation?

We have a lot of projects with the other parts of the chain, especially with consumers (to cite one, 1995 definition of the quality of compost from bio-waste for agriculture, because the production was too high just for private). We are also willing to go to the design part, and the designer would also do it, but there is no law saying that they have to do it and it would be no market for that, because these products will cost surely much more. Of course, progresses have been done lately, especially because of education activities in the school that trained the new generations.

SRH is speaking with real estate companies, especially SAGA or GWG, but these did or do not cooperate. They claim that their tenants may have problems to separate, that there is no space for that, although the law of 2015 obliges to have bio bins. SRH is in contact with these companies for using the bio bin. They will organise this year some meetings with them again and they will bring them to BKW to show them how the treatment works and why it is important to do this. Will it work? We will see.

Are you willing to participate also in the future in projects/cooperation with other public/private actors considering improvements in the organic material stream circularity?

Yes, we have already done a lot in this direction, we are really interested in this topic.

Are there constraints for you to participate in this cooperation process with the municipality and/or other actors along the organic material stream? How could you contribute to the project?

Not at all. We are able to provide our expertise, technical, and our time. This is our main challenge.

Who should be involved to realize this project?

The City of Hamburg, Ministry of Urban Development and Housing, the Chamber of Commerce and Agriculture, BUND, NABU, LBV and BUE are together, SRH, BioWerk, BEGN GmbH, Private composting companies, universities and research institutions, tree nursery organisation, Baumschulen FHH, Wholesale, SAGA, Worker garden allotment association, Households.

Who is in your opinion the actor that has more power in influencing the outcome(s)? Why?

The City of Hamburg together with us and the first 7 actors in the list. Chamber of Commerce can do a lot for the compost because it can say to the tree nurseries that they can and have to use compost from bio-waste (in that quantities of max 40%). Real estate companies can also do a lot by providing the bins, but they do not have interest now, and they are the main ones that should push to motivate their tenants.

Among the above-mentioned actors, which one would you expect to initiate and maintain a cooperation process with the public/private actors for improvements in the organic material stream? Why?

The City of Hamburg.

What could the City of Hamburg do to get (and stay) Biowerk involved in a collaborative process with other actors outside waste management concerning improvements in the organic material stream?

Nothing, we are already inside and interested by our own.

Expert interview – Research Associate at UNI-HH (in text: Expert UNI-HH 2018) – 20th February 2018 – Interviewer: Alessandro Arlati & Donald Alimi

Since the interviewees until now have stressed the fact that part of the problems is to be found at households level with issues concerning awareness, we are therefore interested in understanding how does the topic that you work with relate to the waste topic?

To keep it very broadly, I try to investigate the issue of waste from an anthropological point of view, using the key of sociology. About the role of consumers: it is not only an issue of awareness, rather, many typical practices (e.g. preparing a meal etc.) are indirectly connected to waste and possibilities of more sustainable ways of shopping. Concerning the separation of waste issues of lacking awareness/information are probably relevant.

Jens Kersten defines the waste as “Kulturtechnik”. What is it exactly meant with this term? Is the conception of waste as driver for social engagement?

This term refers to the attempt of putting at the same level society and technology. This means to tackle the problem from two different perspectives, which are both important to reach a more holistic view. “Kulturtechnik” tries to put the focus on the social and cultural embeddedness of technologies, which means, they are integrated, formed and shaped through the daily practices (e.g. driving a car, throwing away waste etc.).

Are you aware about the Circular Economy concept and its presumed benefits? Are you interested in this topic? Why?

I know that it is a rather new concept, know the EU legislation and the national one in Germany. I am personally a bit critical, especially because the topic seems to be too economical and detached from social aspects, still too technical. I think that CE should be seen in a post-growth perspective.

Within the department you are part of, are there research projects ongoing on the topic? If yes, what are they about? Were public/private partners involved? How was the experience? Conflicts?

I know that the UNI-HH is involved in the project in Loksted where they investigate mobility, environment and waste.

How could Uni-Hamburg as a research institution contribute within social projects (e.g. arise awareness) in particular regarding the waste management?

UNI-HH is involved in an initiative related to transdisciplinary lectures with the focus on sustainability: the idea is to bring students from different faculties together in a series of lecture dedicated to all aspects of sustainability. Universities can also create events and bring people together. But also bring topics together, like art and waste (case of Bauhaus University in Weimar).

Further information:

- *NGOs and bottom-up initiatives*
- *NGOs can be really active in this field, because they feel the pressure from society and have to fulfil expectations: sustainability and environmental issues are more and more trendy; they have to adapt their internal policy to survive. They have therefore a high trust from citizens because they try to do what they want.*
- *Repair cafes are small initiatives, really local: they try anyway to change the mindset of people showing them the real effects of reparation instead of generating waste.*
- *C2C Verein at Hamburg level: they have NGOs in the city with many activities, like bringing in schools knowledge about waste.*
- *Food sharing*
- *Refill: a new initiative by which in some shops is possible to fill up your bottle of water.*
- *Zero-Waste shop in Altona.*

There are several reasons why initiatives start: because they want to change the things, more left wing movements, or just a matter of money saving.

Greenpeace, NABU: this kind of organisations are rather powerful, since they can push important discourses, like waste, on media, they can involve people, thanks to their status.

