Exploring the epistemic politics of circular economy in European cities: a research agenda with relevance for the governance of urban sustainability transitions

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Introduction

This paper presents the preliminary finding of a study, which aims at exploring the 'Circular Economy' (CE) imaginary as a 'matter of concern' to develop a research agenda with relevance for the governance of sustainable urban transitions in Europe. Our hypothesis is that knowledge producing activities are vital in making urban governance processes for social and environmental justice possible (Voss & Freeman, 2016). As a consequence, our research interest draws towards understanding those situated processes that are enabling the institutionalization of governance concepts, such as that of 'circular economy', which have potentials for driving changes in urban context. Inspired by Voss & Freeman (2016)'s book on "knowing governance" we would like to draw attention on the interrelations existing between the politics of urban change, the ways and the places in which knowledge about governance concepts evolves in a process of continuous translations across time and space. As Stirling (2016, p. 259) writes, our hypothesis is that "knowledge of all kinds is necessarily value-laden – not least in the knowing of governance. (…) The question is therefore not about whether any given effort at knowing governance is normative, but what this normativity is – and in what ways this is explicitly accountable. For the above focal priorities in the knowing and doing of governance, then, key accountabilities rest not on any particular disciplinary framework or academic mission, but on the extent to which associated knowledges are judged to aid or impede those kinds of progressive global transformations".

Aim and research questions

The aim of this study is, therefore, to understand what roles do European cities play when it comes to translate the circular economy into political action. In particular, our on-going research builds on the following questions:

1. What is the state of the art on circular economy theorizations in support of sustainable transitions in European cities?

2. Which governance arrangements (regulations, policies, institutions, technologies) underpin the translation of the circular economy framework in European cities?
3. How can the circular economy imaginary represent an opportunity for socially inclusive and environmentally desirable urban transitions?

The results of this study are expected to foster reflexivity on how urban theorizations and application of the circular economy notion is being advanced in support of durable transition pathways for socially inclusive and environmentally desirable value creation in cities. The final goal of our research is the democratization of circular economy implementations in European cities by: "broadening out" social appreciations for the potentialities of the circular economy imaginary for progressive urban transformations; the "opening up" of spaces for political actions across scales and sectors; and the "letting go" of overly standardized material commitments for urban circularity in favour of a larger diversity and flexibility in the development of strategies, practices, institutions and technologies.

Why the Circular Economy?

Circular Economy is certainly a fast-developing concept, which is today increasingly used as the overarching strategy of municipal, regional and international plans to foster sustainable transformations and support the green economy. Over the past decade there has been a dramatic increase in the number of published papers– in scientific journals and popular press – on the importance of 'closing the loops', developing a 'sharing economy' and a 'circular economy'. There is wide spread recognition of the importance of the need for developing new policies, technologies and methods for stakeholders' involvement (Prendeville, Cherim, & Bocken, 2018). Yet, much of the literature is mostly technical (i.e. focusing on technical fixes to physical problematizations of resources flows) and for the large part focuses on China. Thus, the implementation of the circular economy concept in post-industrial contexts e.g. Europe and USA, remains largely un-explored (Ghisellini, Cialani, & Ulgiati, 2016).

According to the Ellen Macarthur Foundation's latest publications (2013a; 2013b; 2014; 2015a; 2015b; 2017a; 2017b), the circular economy is a way of rebuilding capital, whether this is financial, manufactured, human, social or natural; thus, ensuring enhanced flows of goods and services by the re-design of business and development models following three basic principles: 1) Preserve and enhance natural capital by controlling finite stock and balancing renewable resource flow; 2) Optimize resource yields by circulating products components and material in use at the highest utility at all times in both technical and biological cycles; 3) foster system effectiveness by revealing and minimizing negative externalities. The circular economy is consequently described as "a continuous positive development cycle that preserves and enhances natural capital, optimises resource yields, and minimises system risks by managing finite stocks and renewable flows" and more, it is expected to "works effectively at every scale". Therefore, the Ellen MacArthur foundation has made the institutionalization of the circular economy concept their central goal as they believe it to be the way forward for fostering sustainable development; therefore, this philanthropic organization is today funding projects and disseminating knowledge in order to facilitate the implementation and diffusion of the circular economy across sectors and scales.

At the same time, the European Commission's commitment to the circular economy became visible with the "Roadmap to a resource efficient Europe" aiming at a recycling and recovery society by 2020. Consequently, in December 2015, the circular economy package "created an important momentum to support the transition towards a more circular economy in the EU". In January 2017, the EU Report on the implementation of the

Circular Economy Action Plan stated[1]: "The transition towards a more circular economy brings great opportunities for Europe and its citizens. It is an important part of our efforts to modernize and transform the European economy, shifting it towards a more sustainable direction. There is a strong business case behind it which enables companies to make substantial economic gains and become more competitive. It delivers important energy savings and environmental benefits. It creates local jobs and opportunities for social integration. It is closely interlinked with key EU priorities on jobs and growth, investments, the social agenda and industrial innovation".

Ghisellini et al. (2016), points out how such narratives celebrate the circular economy as "an alternative growth discourse" rather than an "alternative to growth discourse". And this is an interesting development given that the earliest narratives of the circular economy, dated in the 1960s, aligned the circular economy with de-growth and steady state economic models, rather than to the predominant neoclassical framings of economic development. Despite the neoclassical underpinning, the promoters of the circular economic model present it as a "radical agenda" able to support large scale societal transformations. Hobson and Lynch (2016) view such translations of circular economy to be largely problematic pointing at "its inability to address many deeply embedded challenges around issues of consumption and the consumer, echoing as it does the problematic (and arguably failed) agendas of sustainable consumption/lifestyles" and Valenzuela and Böhm (2017) warn about the possibility that the consolidation of functional interpretations of the circular economy (e.g. zero-waste circular economy) might result in the de-politicization of the circular economy imaginary, as it is often the case for "growth capitalism" discourses. Furthermore, Gregson et al. (2015) demonstrate how "the idea [of a circular economy] is more often celebrated rather than critically interrogated" and discusses how despite being largely supported by European policy documents its implementation is rendered difficult by "the actuality of forging circular economies within the EU entails challenges born of conjunctures of politically created markets, material properties and morally defined material circuit".

On these premises, it becomes clear that further research on the governance arrangements characterizing the institutionalization and implementation of the circular economy imaginary in post-industrial European cities has become timely.

Why focusing on the governance of urban sustainability transitions?

In parallel to the fast-growing interest on the circular economy concept, we are witnessing an increasing attention to the role of cities in the facilitation of societal transformation to sustainable production and consumption patterns (Vergragt, Dendler, de Jong, & Matus, 2016). In light of meagre results of sustainable development principle on urban transformations, there is a growing discussion on the need of changing governance practices and business models of urban utilities to increasingly integrate demand side dynamics and facilitate changes in urban lifestyles and consumption patterns. Cities are largely recognized as growth engines, which can easily lead to unsustainable development if not properly monitored and assessed; but at the same time cities are often acknowledged as productive places for experimentations of alternative modes of public governance and service provision. Nevertheless, the rapid growth of urban population introduces a number of additional environmental challenges such as resources scarcity, pollution, aging infrastructures etc. Consequently, studying the governance of urban sustainability transition become imperative. Vergragt et al. (2016) show that "transitions towards sustainable consumption and production can hardly be imagined to be driven by one actor alone; but necessitate the collaboration of many. Grassroots innovations, government

[1] Available at: http://ec.europa.eu/environment/circular-economy/implementation_report.pdf (accessed 07/05/2018)

programs, a growing sense of responsibility among corporations, consumers and science all play important roles in changing institutional structures within the major domains of energy housing, food, waste and transport as well as macro foci on economic growth and consumerism. (…) If the ambitious dream of multi-level change towards sustainable consumption and production is to become reality, sustainability debates have to move beyond academic circles and reach a wider audience, ranging from urban planners, across businesses, educators and NGOs to, not least, the individual 'consumers' in cities".

Yet, Frantzeskaki, Broto, Coenen, & Loorbach (2017) emphasized that "most theory in sustainability transitions has paid until very recently relatively little attention to the role of space and place in transitions which leaves it ill-prepared to understand and explain its geographically uneven development", and that "there is a lack of insight on the possibilities and limitations in governing sustainability transitions at the level of the city". In particular, they demonstrate that "urban sustainability transitions are empirically and conceptually distinct from sector-specific transitions (…) because they involve the alignment of resources and actor constellations across domains within a given geographical setting" and that studying sustainability transitions in urban contexts contribute to identify "shortcomings in existing conceptual frameworks in transitions research, thus contributing to their further development". We believe that cities represent a particularly productive geography in which to study how socio-technical imaginary, such as that of circular economy, can be govern to drive societal transitions. Urban contexts are, indeed, characterized by both emergent varieties and spatial proximity of systems, strategies, practices, institutions and technologies, and therefore, are inevitable loci of creative potential for knowing and doing transition governance "beyond incumbent domains" and for capturing and understanding the situated politics of sustainability transitions in the making (Grin, Frantzeskaki, Broto, & Coenen, 2017).

Research design

To respond to our research questions, we developed a tree-folded research design. Firstly, we carried out an in-depth review of the academic literature mapping the emergence and developments of the circular economy concept in time and space, with a specific focus on studies carried out on urban contexts. Secondly, we made a comparative analysis of documented translations (e.g. plans, white papers, policy briefs, etc.) of the circular economy imaginary across three European metropolitan cities (i.e. Amsterdam, Paris and London) to explore which socio-material arrangements i.e. political commitments, institutions and material engagements characterize such translations reflecting on how they diverge and/or produce innovative elements in respect to reference point framework e.g. by the EU Commission[2] and the Ellen Macarthur Foundation[3]. Thirdly, we are developing an analytical framework to explore the relation among socio-material arrangements, processes of knowledge co-production and normative dimensions of existing translations across scales and places to support future empirical investigations on whether and how the circular economy imaginary can support transition pathways for socially inclusive and environmentally desirable value creation in cities.

The exploratory mapping exercise was carried out seeking to understand the interrelation between the rapidly developing research field underpinning the concept of the circular economy and its translation into practice. Our exploratory approach had the intention to investigate the circular economy as applied to urban context. Thus, we have performed literature search in Web of Science and Scopus, combining the search on "circular

[2] Available at: http://ec.europa.eu/environment/circular-economy/index_en.htm [Accessed 29/01/2018]
[3] Available at: https://www.ellenmacarthurfoundation.org [Accessed 29/01/2018]

economy" with that of cities and its synonyms such as (cities OR city OR urban OR metropol*). Our sample is based on a search started in October 2016. The selection of published studies was performed following a number of selection criteria: 1) we only considered paper published in the last 15 years, 2003-2018; 2) we favoured academic sources such as journals and book chapters; 3) we only selected article written in English and with focus on the post-industrial context, this means that publication from China and other countries whose economic development is characterized by mid-industrialization stage performance were excluded. 4) In addition, papers from medical and material sciences were omitted. Further screening was obtained by reading the abstracts. To conclude, 102 papers were selected as core data for our academic review. Our sample should probably be held up against a sampling targeting papers published before 2003, different type of databases and a larger variety of geographical perspectives. The sample was, however, augmented with various forms of secondary literature to take into account framings of the circular economy developed by international governmental and non-governmental organizations such as the World Economic Forum, Ellen Macarthur Foundation, European Commission etc.

Each article was characterized according to the objects of enquiry – i.e. the framing of circular economy and its translation by material engagements and governance arrangements. Based on this characterization a systematic discourse analysis of the material is carried out to characterize the chronological and geographical development of the circular economy concept.

In order to document what European cities have accomplished or are doing within the realm of circular economy the review of a number of policy and planning documents have been carried out. The selection of cities is today still in development and, for the purpose of this paper we have focus on the material developed/commissioned by urban authorities in Amsterdam, Paris and London, which on paper appear to be at the European forefront in the translation of circular economy within their jurisdictions.

The third phase of the study is, however, not being concluded yet; therefore, this paper will introduce the state of the art on the role of cities in Circular Economy and present the discourse analysis of the translation of circular economy in Amsterdam, Paris and London. The research agenda and analytical framework to guide future research will be added on a following version of this paper and consequently presented at the IST 2018 Conference.

Circular economy and urban sustainability transitions: state of the art

Attempted definitions of 'the' circular economy come in many forms, shapes and sizes, and despite having gained a wider success in the latest years, the circular economy thinking is not a new concept. It can be traced back to the notion of "stewardship of objects" which dated back to before the industrial revolution and which "has been the prevailing practice with the primary purpose of maintaining possessions by performing reparations, repurposing or recycling leaving disposal scarcely as an option" (Lieder & Rashid, 2016). There is general agreement in placing the industrial revolution as the time in which "linear-consumption behaviour" (ibid) started to be stimulated, resulting in the disastrous environmental predicaments we are experiencing today. However, in the time of mechanization i.e. "through steam engines, railways and electrical equipment" (ibid) a new approach to product recovery emerged: "remanufacturing in which durable products are restored to a like new condition" (ibid). "The birth of remanufacturing can be traced to the times of world war two (WW2) when resources became scarce (…). [A]fter times of war the remanufacturing industry experienced continuous growth over the years driven primarily by the economic and competitive advantages" (ibid). The first study on "closed systems" and critical reflection on the interactions between economy and environment can be traced back to 1966 (ibid). Furthermore, already in

1981 “an economy based on a system of product loops consisting of reuse, repair, reconditioning and recycling activities has been promoted (…) in order to minimize material flows, energy flows and environmental damage to support a transition towards a sustainable society which is consistent with the resource limitations” (ibid). The use of the term “circular economy” can be traced back to Pearce and Turner (1990; cited in Lieder & Rashid, 2016), who developed a balanced model integrating three economic functions: resources supply, waste assimilation and utilities. The circular economy has, then, been associated with a number of co-evolving discourses: e.g. “industrial symbiosis”, cradle to cradle thinking, urban and circular metabolism, zero waste; closing the loops through landfill and urban mining, materials recycling, resource recovery and waste minimization; extended product life etc. Furthermore, in the circular economy discourse a number of metaphors are at play: geometric ones, such as circles, cradle to cradle and loops; biological ones such as symbiosis and metabolism. Of all these associations, the Cradle to Cradle and Ellen Macarthur Foundation’ s definitions and illustrations are among the most predominant.

Within this literature, cities are described as productive sites for developing new interrelations with the purpose of: closing loops, being smarter, creating competition in which the circular economy is a post-crisis reaction in support of socio-technical innovations and economic growth. They are also seen as a breeding ground for the development of new conceptualization of the circular economy via the creation-association of new meanings as the “sharing economy” (Cohen & Muñoz, 2016), “settings of hope”, laboratories for resilience (Meerow, Newell, & Stults, 2016). More in general, cities are seen as pre-existing places, containers in which the meaning of circular economy and its related activities unfold.

Not much attention is given to the processes needed to translate the circular economy in political action, and to the active role that cities can play. Some emphasize the role that cities (and particularly municipal administrations/administrators) can play as facilitators, e.g. as brokers working to close the loops through e.g. waste management and ‘mining’ activities. The literature gives a general impression that many of the circular of activities presented in the literature appear to be ‘old wine in new bottles’ in the sense that e.g. waste minimization is something European municipalities/cities has been engaged with for years, and that the circular economy mostly provides a new performative ‘branding’ label for principles which have being promoted and in some cases even successfully actuated.

Nevertheless, very few articles go into much depth on the combination cities and the circular economy (12 in total). There are a few prescriptive articles, i.e. in which emphasis is given to describing what cities are doing and/or could do e.g. describing the emergence (and diversity) of sharing activities in cities and their contribution to a transformation of urban economies (Cossu & Williams, 2015) or proposing eco-cultural innovations with a focus on neighbourhood-based activities that reinforce the local economy or introduce small-scale technology for water, renewable energy or waste (Dieleman, 2013). Ghisellini et al. (2016) suggests that “CE comes from the involvement of all actors of the society and their capacity to link and create suitable collaboration and exchange patterns (…) [and] point out the need for an economic return on investment, in order to provide suitable motivation to companies and investors”. Hobson (2016) proposes a designer-consumer-user-repairer-citizen contract “where roles, competencies and responsibilities are redistributed and reconfigured throughout the lifetime of products and services, recalibrating the social relations and arrangements that currently favour the purchasing-ownership-disposal model of citizen-consumer practices”. Gregson, Crang, Fuller, & Holmes (2015) discuss of decouple economic growth from primary resource consumption, while Gutberlet (2015) present cooperative recycling as “a form of organized urban mining”, which generates “an obvious, short to long term, win–win situation for communities, governments, urban miners/recyclers, and the environment”. Uyarra & Gee (2013) present a successful urban transformation through circular economy principles, “characterized by a mix of political vision, stakeholder

engagement, economies of scale, and the ability of waste disposal managers to gather expertise, resources, political influence and commitment at multiple levels of governance".

The circular ecology imaginary in Amsterdam

Framing

The long-term ambition of the city of Amsterdam is to develop new method of production, distribution and consumption by encouraging innovation, research and new practices while recovering resources through the separation of the 65% of household waste by 2020. It is expected that "the ability to identify and implement circular solutions at the city level will lead to job creation, a cleaner environment, new or rejuvenated industries, and competitiveness in global markets. The circular economy provides solutions for many environmental, economic and geo-political challenges that cities worldwide are facing" (CIRCLE et al, 2015).

In order to develop the roadmap for transitioning to a circular economy in the city of Amsterdam the municipality has commissioned an analysis of the opportunities which was developed following the "Circular City Scan approach", which identified "where and how to start with tangible projects, and what the impact is in terms of jobs, environment and added (economic) value" (ibid). The results from such analysis suggest that "Amsterdam has the potential to greatly reduce greenhouse gas emissions and material consumption while, at the same time, realizing economic growth and stimulating employment opportunities. The economic activity of the Amsterdam metropolitan region amounts to 106 billion euro annually, of which 47 is accounted for by the city of Amsterdam" (Ibid).

In order to transition to a circular economy, the City of Amsterdam has committed to the following seven principles (City of Amsterdam, 2015):

1. No waste: any material will end up in an infinite technological or organic cycle.
2. Energy will be entirely derived from renewable sources.
3. Natural resources will generate new financial or non-financial gains.
4. System adaptability will be supported by modular and flexible product design and supply chains
5. New business models for production, distribution and consumption will be developed in order to transition from possession to use of services
6. Human activities contribute to eco-system services and to the rebuilding of 'natural capital'.

Material arrangements

The City of Amsterdam (2012) has identified six areas in which to foster circularity and provided an idea on how and where to act:

1. **Food cycle**, which represent a third of the total greenhouse gas emissions per households, will be supported by:
    a. Minimizing import of food and increasing localize and decentralize production
    b. Minimizing food waste
    c. Waste and consume less meat
    d. Composting food waste and reuse the nutrients in local agriculture and horticulture
    e. Developing a decentralized sanitation system to recover phosphate on a large scale
2. **Phosphate cycle,** which is essential for all life on earth and thus of direct importance for the food supply, will be enhanced by:

   a. Minimizing import of phosphate by localizing and closing the loop of the production and consumption cycle
   b. Fostering efficient use of artificial fertilizers and animal manure in the agricultural sector
   c. Recovering wasted fertilizers and manure and reuse it for the production of secondary phosphate
   d. Composting or fermenting organic waste to produce biogas and a fertile soil improver
   e. Recovering phosphate from sewage water and sludge from treatment plants or other alternative treatment facility
   f. Recovering phosphate from residual waste and bottom ash at the Waste and Energy Company
3. **Waste cycle**, 70% of which, despite a partial separate collection, ends up incinerated to produce power and heat for district heating and supply a large number of households and industries, will be supported by:
   a. Organizing the separation of biodegradable waste to recover phosphate and produce biogas to be used to fuel the municipal rubbish trucks.
   b. Improving the post-separation process after incineration to recover high-grade material
   c. Reusing the remaining low-grade material into building material
   d. Facilitating citizens' contribution in the collection of pre-sorted waste by deploying new collection method and developing rewarding systems for citizens on their contribution in the waste separation process.
4. **Water cycle,** in which high quality water is supplied at a low price and thermal energy and phosphate are not recovered, will be enhanced by
   a. Decentralizing the sewage system, separating and localizing rainwater management
   b. Separating streams of grey and black water from the household
   c. Grey water reuse for flushing toilets after a light purification (maybe also for watering gardens if a more elaborate local cleansing could be used)
   d. Black water purification from chemicals, stripping of nitrate and phosphate to be reused
   e. Fermenting sludge to produce biogas and fuel motor vehicles
   f. Rethinking households' appliances to minimize water use (e.g. washing machines working on ozone)
5. **Electricity cycle,** still depending on the combustion of fossil fuels (for a large part imported) and characterized by energy loss in the transportation from producers to consumers, will be supported by:
   a. Self-sufficient energy production
   b. Increasing the share of renewable energy production
   c. Decentralising and localizing energy production to increase system efficiency
   d. Deploying smart-grid to held in balance the unpredictability of a decentralized energy system sourced on renewables.
   e. Establishing price differentiation between peak and off-peak consumption to enable smart consumption, lowering peak demand and reducing costs
6. **Heat cycle,** which is fossil-fuels and import-dependent and not efficient, will be supported by.
   1. Reaching a high level of import-independence for the generation of heat
   2. Ensuring a larger variety of sustainable sources
   3. Achieving a fully sustainable supply through district heating
   4. Decreasing the demand for fossil gas
   5. Improving home insulation in order to decrease the heat demand

6. Enhancing heat recovering from daily household practices

In order to accelerate the transition to the circular economy, the City of Amsterdam has commissioned a systemic analysis of the ongoing transformation in order to identify the domains on which to focus investments and actions. Circle Economy, TNO and Fabric were hired to develop a Circular City Scan. The City Scan method carried out for the city of Amsterdam have identified two value chains having the highest transition and value creation potentials:

1. **Construction chain**, characterized by four strategies:
    a. Smart design of buildings to facilitate repurposing and material re-use.
    b. Efficient dismantling of building and separation of waste streams to enable high-value reuse
    c. High-value recycling of material and components
    d. Developing marketplace and resources bank to facilitate commodity exchange among market players

    And three top action points to facilitate the transformation:

    a. Facilitating resource and material storage by allocating storage locations and drawing up the conditions for qualify the storage and the reuse stream.
    b. Stimulating high-value reuse developing procurement guidelines and building codes with requirements on high-value reuse and making of the public sector and important costumer for recycling and reusing building material.
    c. Stimulating material passports capturing information on material, processes and opportunities for reuse.

2. **Organic residual stream chain the** be achieved on the base of four specific strategies:
    a. A central hub for bio-refinery and the valorisation of organic residue streams
    b. Smart waste separation to increase the value of residual flow and return logistic to ensure its efficient use
    c. “Cascading of organic flow”
    d. Identify and retrieve essential nutrients to close the cycle.

    Furthermore, 3 important actions to facilitate the transformation has been identified:

1. Developing a public and virtual resource platform for organic waste. This could offer a transparent overview of the supply, demand and reuse of organic waste resources. In addition, it could also identify possible uncertainties in the relation between supply and demand.
2. Initiating circular free zones for bio-refinery in order to take away legislative barriers and enable innovation such as the use of digestate in agricultural land that is now banned.
3. Introducing criteria for public purchasing policy to stimulate locally produced grass, wood and food to create an important and constant demand to increase industrial development and professionalization in the region.

Governance arrangements

given that the transition to a circular economy in Amsterdam is mainly driven by businesses, the public sector is depicted as enabler in order to minimize barriers to the ongoing transformation: “Governments play a crucial role in facilitating and guiding the transition to a circular economy (Ellen Macarthur Foundation, 2015). Especially at the city and regional levels, the circular economy is taking shape and groups of citizens and businesses are starting all kinds of circular initiatives”. Thus, in this context, the City of Amsterdam is

expected to be the hotbed of innovation, and circularity should become a political, social and commercial agenda for the sustainable transition of the Amsterdam metropolitan area (CIRCLE et al, 2015).

In 2012, the City of Amsterdam has developed an agenda titled "Towards the Amsterdam Circular economy" as a collaboration among the former City of Amsterdam's Environmental and Building Department (Dienst Milieu en Bouwtoezicht, or DMB), the Department of Physical Planning (Dienst Ruimtelijke Ordening, or DRO), the Water Utility Company (Waternet) and the Waste and Energy Company (Afval Energie Bedrijf, or AEB). In the agenda, the municipality of Amsterdam place itself as one of the governing entity within an organizational agenda that has a multilevel nature composed of 6 levels: Global – National – Metropolitan – City – Neighbouhood – Dwelling.

CIRCLE et al (2015) call the municipality of Amsterdam to become a pioneer in the transition to a circular economy. Along the whole document "Circular Amsterdam", the municipality is depicted as the main organizational facilitator and sponsor in order to create the newly designed circular market: "The large buying power of the municipality itself can create an important and constant demand that allows local parties to further develop and professionalise" (ibid).

The municipality of Amsterdam committed to the circular economy in order to apply its sustainability policy as emerging from its sustainability agenda "Sustainable Amsterdam" (City of Amsterdam, 2015), in which circular economy is the third of five pillars (i.e. renewable energy, clean air, circular economy, climate-resilient city, sustainable municipality).

Circular economy initiatives are also being supported by the Green Deal as part of a national ambition of making of the Netherlands a "Circular Hotspot". The Green Deal programme is developed as a joint initiative among the Ministries of Economic Affairs, Infrastructure and the Environment, and the Interior and Kingdom Relations, and is regulated by a board comprised of businesses, non-governmental organizations (NGOs) and government. The aim is to address a number of non-financial barriers for circular initiative in order to create a protected space for economic activities to stabilize and scale up after their initial success. According to the Ellen Macarthur Foundation (2017) the Green Deal programme has been very successful in promoting circular initiatives: "By the end of 2015, after four years of numerous applications and 185 concluded projects, the Dutch government has proven with the Green Deal Programme that with a responsive and collaborative approach and by bringing in relevant stakeholders across sectors many of these barriers can be overcome without needing to provide financial incentives".

The circular economy is very much at the centre of the national strategy for transitioning to a green economy. Thus, a large amount of circular initiatives across the Netherlands have been initiated in the last decade. Today cities like Amsterdam are willing to take it a step further and "build on momentum" to scale up those initiatives by analysing opportunities and challenges from a systemic perspective. For example, the City Scan Method carried out on the city of Amsterdam has also developed a scalability map for each of the value chain to identify how and where to act to scale up their impact at a city level.

In all the consulted documents, the City of Amsterdam is depicted as a pioneer in the transition of the circular economy at a metropolitan scale to become an example for the rest of the world. This is probably why there is no reference to experiences of other cities around the world.

To conclude, the circular economy in Amsterdam sounds very much like an opportunity of city branding very much in line with the intention of the Netherlands of presenting itself as the "hotbed" of technological innovations in support of an efficient growth with higher productivity and more job opportunities, though

using the same resources. Nevertheless, the City of Amsterdam state quiet clearly that a transition to a circular economy will enable the city to localize production and minimize resource dependency from other countries. Still, despite the intention to decrease and change consumption patterns are mentioned in the city plan, it is not clear what is being done to make that happen.

The circular ecology imaginary in Paris

Framing

Circular Economy in Paris is framed as "the first stage in the fight against climate change" (BIO by Deilotte, 2015, p. 3). The aim of the Parisian circular economic model is "to preserve the planet and its inhabitants using a socially centred approach, and build a world that is at once more ecological, more equitable and more united" (ibid). The Parisian Translation of the circular economy is described as a "new business model that respects the environment, protects the common good, and creates jobs (…). A model that is based on sharing rather than profit, collective intelligence rather than individual competition, recovery rather than waste" (BIO by Deilotte, 2015, p. 4).

The circular economy imaginary in the metropolitan area of Paris is being used as "a collective and unifying political horizon" in the creation of the Greater Paris region (ibid). This might also explain the large focus on social cohesion and local identities. Moreover, a motivation to undertake this process seems to be the, at that time, upcoming Paris Climate conference COP2, which was then held in December 2015 and which was already expected to culminate in an international agreement to limit global warming to less than 2 degrees Celsius by the end of the century. This supported further a strong causality bond between CE, energy and climate strategies for the metropolitan area. As a consequence, in line with Section 4 of the French energy transition law, adopted by the National Assembly on July 22, 2015, the CE metaphor in Greater Paris connects issues of waste management with that of energy transition and climate.

The White Paper on the Circular Economy of Greater Paris get inspiration from the following European Commission initiatives: "Towards a circular economy: A zero waste program for Europe" (EC, 2014) and "The Roadmap to a Resource Efficient Europe" (EC, 2011) setting the major strategies to be implemented by 2050.

Material engagements

"The French Agency for the Environment and Energy Management (ADEME) defined the circular economy according to seven pillars in order to uncouple economic growth and the consumption of natural resources: Sustainable supply, eco-design, Industrial and Regional Ecology (IRE), Product-Service System, sustainable consumption, extending the duration of use (re-use, repair, and re-utilization), and recycling" (BIO by Deilotte, 2015, p. 6). It is a regional strategy "to take into account the realities of energy, raw material and travelling flows" within Greater Paris. Furthermore, producing new activities and jobs, seems to be one of the great expectations on a CE strategy in Greater Paris. Furthermore, the Circular Economy strategy was organized around 8 topic area:

- WG 1a: Food, from urban agriculture to bio-waste;
- WG 1b: Fight against food waste, awareness-raising and redistribution2;
- WG 2: Planning, from eco-design to green construction;
- WG 3: New economies, performance and re-use;
- WG 4: From eco-design to end of life, products with short lives (everyday products);
- WG 5: From eco-design to end of life, products with medium or long lives (equipment);
- WG 6: Development of recoverable energy;

- WG 7: Industrial and regional ecology (IRE).

Governance arrangements

The White Paper (BIO by Deilotte, 2015) represents the first strategic step towards developing the Greater Paris region's circular economic model. The work done in the groups resulted in a set of recommendations, compiled in the White Paper under 65 proposed initiatives, based on 7 strategic areas:

1. Encourage and support economic players
2. Innovate and experiment
3. Scale up and establish momentum in the region
4. Change attitudes and practices
5. Involve local authorities, businesses and citizens
6. Create a network linking players
7. Change legislation

These strategies were then addressed to public decision-makers of the Parisian metropolis, as well as to economic players and citizens. Co-organized by several local authorities within the Île-de-France region at the initiative of the City of Paris and supported by the ADEME regional office, a General Assembly was launched on March 11, 201. The purpose was to bring together a wide spectrum of players (government authorities, business, associations, NGOs, academia, research, etc.) to develop opportunities for the implementation of the circular economy in the Greater Paris Metropolis. The working groups gathered more than 240 persons, representing over 120 different organizations, among which were "local authorities, citizens and players that are active in the economic, associative and academic sectors, in order to advance a new regional project" (BIO by Deilotte, 2015, p. 4).

The strategies are organized following three territorial levels: a) the administrative level of the municipal administrations involved, b) the area under the political and public power of Paris municipality, and c) the enlarged geographical area of intervention of Greater Paris.

The responsibility on the implementation seems quite distributed among the different actor categories. However, there is a lot of focus on bottom-up initiatives carried out on volunteer basis, which despite showing a large interest in developing an inclusive circular economic model largely including characteristics of a sharing economy with the public authorities as facilitator and a large integration of citizens, it is still not that clear what could be gained from the proposed interventions in terms of business and job-creation. Nevertheless, despite the process was led by the public authorities, businesses took active part within the working groups in charge of developing the strategies. Thus, they largely represented within the process and therefore might be willing to take ownership during the implementation phase.

According to the White Paper by BIO and Deloitte (2016), the Greater Paris region could be considered as "the voice and testing ground of France" in respect to the implementation of the Circular Economy imaginary in France. Each local authority is expected to examine the feasibility of the proposed initiatives, further refine them and transform them into a local roadmap. They are also recommended to collaborate with the European Union, the French State or regional economics, associative and academic players. Thus, according to the strategy laid out in the White Paper, local authorities are envisioned as regulators, facilitators and driving forces for the implementation process.

In addition to the strategies aimed at "changing legislation", it is not clear whether there are already policies in place able to facilitate the implementation of the circular economy but the following policy documents are mentioned as enablers for the implementation of the proposed initiatives and strategies:

- Circular of January 10, 2012 concerning the conditions for applying the obligation for major producers to separate bio-waste at its source. One of the consequences are that by January 1, 2016, mass catering establishments generating more than 10 tons of bio-waste per year is being required to sort and recover such waste by composting or anaerobic digestion.
- Decree of October 10, 2007: "Determination of the terms and conditions for the selective door-to-door collection of household and similar waste"
- ORDIF (2014) Management of Household and Similar Waste in Île-de-France in 2012
- The energy transition law adopted by a final vote of the French National Assembly on July 22, 2015, includes, by way of example, a minimum percentage of recycled paper in stationery items purchased by government departments: 25% as of 2017, 40% in 2020.
- Reduced VAT in effect for the variable portion of the rate applied to heating networks supplied by renewable and recoverable energy at a percentage exceeding 50%. The fixed portion of the rate already stands at 5.5% (identical for the other energies).
- In 2015, France passed a "pioneering" food waste bill which forces large supermarkets (> 400 sq m of retail space) not to discard food which is approaching its best-before date and to donate it to charity or to turn it into animal feed or compost. Not fulfilling such regulation, can cost supermarkets penalties up to 75000 euros or two years in jail (Samuel, 2015).

On the base of the strategies developed on the White Paper, there are already plans for scaling up existing activities and to use the transition to a circular economy in Greater Paris as an example to follow for the rest of the country. Moreover, some of the activities presented in the document as part of the transformation to a circular economy, have ambitions for expanding internationally and/or branding the city of Paris on different aspects.

However, with the exception of mentioning inspirations from the European Commission strategies for the CE there are no references to other experiences outside France, which might have inspired the process undertaken in Greater Paris. This could also be motivated by an intention of differentiating/distancing the Greater Paris approach from the experiences of other cities (e.g. Amsterdam and London), placing more focus on business and economic growth.

According to a study carried out by APUR (2017), in the implementation of the circular economy imaginary in Greater Paris it is clear that:

- The concept of circularity is strongly interconnected with social, inclusive and collaborative values
- The intention is not just that of "closing the loop" in the production and consumption practices of the region but to institutionalize shared and unifying civic values with the aim of "creating society";
- The ultimate beneficiary is the consumer and the inhabitant, thus the aim is to create a variety of new and alternative services
- There is a large focus on creating new service systems with the following priorities: eco-design, urban agriculture, food (re)distribution, re-use, repair recover and recycle, under-graduate and professional education, skills swap, Fab-labs, co-working.

To conclude, the transition to a circular economy in Greater Paris is promising, largely focusing on building social capital and organization capacity involving a large variety of actors. Furthermore, given the strong focus on sharing and social inclusion, networks become an important indicator for the assessment of the

circular economic model being implemented. However, it remains unclear on how this transformation will be able to disrupt the path-dependency of traditional public services and businesses.

The circular ecology imaginary in London

Framing

The Mayor of London has asked to the London Waste and Recycling Board (LWARB) to develop a roadmap for the implementation of the circular economy for Greater London by 2036. To develop the roadmap "Towards a circular economy – context and opportunities", the (LWARB) and Greater London Authority (GLA) were largely inspired by the Ellen MacArthur Foundation framework and network.

The central motivation for undertaking a circular economy approach to infrastructure planning in the city of London is to tackle problems emerging as a consequence of a rapidly growing population and an incredible flux of international visitors: e.g. inefficient use and management of resources, price volatility, supply risks, degradation of natural resources, urbanization, the impact of disruptive socio-technical innovations. Furthermore, given that in London the largest two sectors in terms of gross value added (GVA) are the service sector (91,2%) and the construction sector (4.7%), the roadmap is planned to focus on their transformation.

The circular economy is presented as an alternative to traditional linear economic models based on resources exploitation and it is defined as a framework that:

- "aims to keep products, components and materials at their highest use and value at all times" (LWARB, 2015)
- "offers significant opportunities for growth that companies realise as a result of retaining the value of products and materials circulating in the economy" (ibid).

Inspired by Lacy and Rutqvist (2014)'s book "Waste to wealth", strategic actions were framed around 5 business models:

1. Sharing economy – share assets via sharing platforms
2. Prolong product life – through maintenance, design for durability, re-use and remanufacture of products and components
3. Recover value at end of life – through effective recycling and composting
4. Renewable inputs – shift to using secondary materials as the inputs for products
5. Product of services – sell access to product while retaining ownership of assets or dematerialization

Material arrangements

The implementation of circular economic principles is expected to benefit London for an approximate annual amount of £ 7 billion by 2036 and to create over 40000 new jobs. Those benefit were calculated by examining five main areas: the built environment, food, textiles, electricals and plastics.

Initial focus areas for action in London have been identified on the base of their environmental impacts, their retained financial values and potential for re-use:

1. **The build environment** is expected to contribute with 3-5bn £ to GDP by 2036. Example of interventions are:

   a. modular construction
   b. effective utilization of buildings
   c. design for building disassembly to foster material management and re-use
2. **The food sector** expected to contribute with 2-4bn £ to GDP by 2036. Example of interventions are:
   a. raising consumer awareness and knowledge
   b. reducing avoidable food waste
   c. using unavoidable food waste to create energy/compost
3. **The textile sector** is expected to contribute with 1bn £ to GDP by 2036. Example of interventions are:
   a. increasing lifetime of cloths through design and innovative technologies
   b. increasing the usage of cloths through renting or leasing
   c. increasing re-use, repair and recycling via incentives return scheme
4. The manufacture and sale of **computer, electrical and electronic equipment** is expected to contribute with £ 200 million to the national GDP by 2036. Example of interventions are:
   a. sharing, renting and product as service business models.
   b. increased re-use/effective recycling rate.
   c. designing better products that enable longer product life.
5. **The plastic sector** is expected to contribute with £ 200 million to the national GDP by 2036. Example of interventions are:
   a. activities to reduce plastic use.
   b. increasing the recycling rate.
   c. innovative recycling technologies

For each focus areas "adoption rates"[4] of new business models are applied. Such a measurement is expected to represent "the starting point for discussing a circular economy in London. This is the first time a high-level analysis across data sets has tried to quantify net benefit in London" (LWARB, 2015). But lack of data in regard to commercial consumption patterns, innovation and waste generation are expected to limit the scope of such analysis. Thus, "to develop this work further, [LWARB and GLA] would need to acquire or create new data sets, and further investigate the full supply chain for each focus area, including stakeholder engagement" (ibid).

Governance arrangement

The London Plan has identified 38 geographical locations ("opportunity areas") where large developments are expected to happen and the London Infrastructure Plan 2015 has identified 3 opportunity areas that will function as case studies of new developments in London. The LWARB's roadmap have identified five sectors with opportunities to enable the circular economy. Those are: digital, finance and service, media, higher education, government. For each of these sectors the working groups have identified strategic actions:

- **Digital:** smart technology offers a number of opportunities to enable the circular economy (e.g. track and trace products, facilitate reverse logistics capabilities and offer online platforms for collaboration and the sharing economy)

- **Finance:** the implementation of the circular economy requires the support of new forms of market thus "multiple forms of capital are needed to finance circular business models". LWARB is looking

[4] "Adoption rate" refer to the diffusion of innovations and seeks to explain how the use of new technologies, processes and innovations spreads through a society in time and space.

into developing a venture capital fund to back circular economy business in collaboration to private sector partners.

- **Media:** the diversity of global, national and regional media outputs are expected to promote circular economy approaches while integrating circular economy principles into their procurement policies.
- **Higher education:** internationally leading colleges and universities located in London could support through their research the innovation and knowledge creation needed to implement the circular economy. Furthermore, university have also considerable buying power, thus they are expected to change their purchasing policies to include circular economy principles.
- **Government:** targeted policies and tax reforms at both UK and EU level would be instrumental for the transition to a circular economy. The EU circular economy framework is already setting ambitious targets. Given that government estate is shrinking in London, utility companies could contribute to the circular economy with innovative procurement policies.

In order to adopt a circular economy business model, the LWARB (2015) suggest to act at three levels:

1. **Start-up:** the city of London has a great experience in incubating new businesses and it is home of a large and young SME community
2. **Scale up:** Supporting business to procure with circular outcomes in mind is expected to enable the circular economic businesses to scale-up
3. **Transition:** training and network opportunities are seen as key for a system transformation from a linear to a circular economy.

The London Waste and Recycling Board (LWARB) and Greater London Authority (GLA) have worked with stakeholders mostly from business and academia. It is not clear weather citizens and NGOs organizations are involved in the process.

The role of the GLA is seen as that of supporting market development and innovation in CE majorly through public procurement and by engaging suppliers and raising awareness of the opportunities.

The roadmap has been developed to be used in a participatory process organizing the participants into working groups, one for each focus area. Each working group is responsible of writing a chapter identifying partners, actions, opportunities and challenges on a specific focus areas as well as discussing business models and procurement options. Many of the stakeholders involved are already working on circular economy business models in these focus areas. The aim is to bring these experiences on to the next level and "to inform the development of new policy in London and may shape the future direction of the new Mayor's Environment Strategy, London Plan, Economic Development Strategy and Transport Strategy" (LWARB, 2015).

Changing procurement policies in both the public and private sector seems at the centre of the London strategy for transitioning to a circular economy.

There are a number of case studies carried out by the LWARB on existing private initiatives associated with circularity in order to understand their potential for contributing to the transition to a circular economy in the City of London. The working groups organized for developing new business models for the focus areas will

take those case studies into account: “many businesses in London are already starting to run circular economy business models and benefiting from the opportunity. Customers in both the business to consumer and business to business sectors are seeing good value and convenience in these new market propositions” (LWARB, 2015).

Given that the transition to a circular economy is expected to happen mostly by changing business models, and public procurement is seen as a key instrument to scale up the transformation. Thus, the GLA has developed a Responsible Procurement Policy mostly focused on minimizing excess through reuse, recycle and “encouraging the procurement of goods derived from natural sources”. However, there are plans to review the Responsible Procurement Policy inspired by the Dutch Green Deal Circular Procurement.

Central targets to measure progress in the transition to a circular economy in the city of London are:

- “new jobs and training opportunities for Londoners.
- increasing the number of circular business start-ups, as well as existing circular businesses scaling up and more traditional businesses moving to a circular business model.
- a number of circular economy demonstration projects.
- increased rates of product recycling, sharing, re-use and remanufacture in focus areas
- increasing the number of GLA group procurements that use circular economy principles.
- greater understanding of how a circular economy can contribute to London’s greenhouse gas emissions reduction targets” (LWARB, 2015).

To conclude, differently from the Amsterdam and the Greater Paris cases, in Greater London the transition to a circular economic model is left quite a lot on the hand of businesses and the market. Both the citizens and the public sector more in general remain relegated to the role of costumers and their impact restricted to consumption practices and policy making.

Analysis and preliminary conclusions

Circular economy exhibits a fair amount of interpretative flexibility over time and space. Last decade, has seen a dramatic increase of publications on ‘circular economy’, recognizing the need to develop new policies, technologies and methods for stakeholders’ involvement. Nevertheless, very few articles go into much depth on the interrelation between circular economy and urban transformations. Emphasis is given to prescriptive approaches underpinning expectations for innovation and growth and where circular economy appears to be used as a ‘branding’ label for things that urban actors have been working on for some years. Much of the literature focuses on Chinese cases of technical fixes to resources flows. The implementation of the circular economy concept in post-industrial contexts remains largely un-explored. Not much attention is given to the organizational architecture and processes needed to translate the circular economy into effective political action, and to the active role that urban administrations can play.

The comparative discourse analysis shows that Amsterdam, Paris and London have engaged in quite different translations of the circular economy imaginary by aligning their engagement with circular economy to existing political priorities and institutional context: Amsterdam engaged with the circularity of building material, waste and energy through a “smart city” approach; Paris uses the circular economy imaginary as an unifying vision on which to base the legitimation of a newly established authority to govern urban development processes beyond municipal jurisdictions; London focuses on businesses with a product oriented approach aimed at low-carbon goods and resources flows for waste and energy utilities. None of the

three cases engage with reflections about and/or measures to regulate processes of commodification of urban flows (e.g. waste), this risking to de-politicize infrastructures, urban spaces and services if not properly reflected, organized and regulated. Our research shows that in depth research on the implications of applying the circular economy in processes of urban transformation are, therefore, needed. Accordingly, we are developing an analytical framework to support future research in this direction, which will certainly be presented at the IST 2018 Conference.

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