EUROPEAN SPATIAL RESEARCH AND POLICY

Volume 27 2020 Number 2

https://doi.org/10.18778/1231-1952.27.2.02

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CIRCLING THE SQUARE: GOVERNANCE OF THE CIRCULAR ECONOMY TRANSITION IN THE AMSTERDAM METROPOLITAN AREA

Abstract. Circular economy (CE), the new 'buzzword' in urban and regional studies and policy debates, is about shifting from a linear production process towards a circular one in which the generation of waste is minimised, materials circulate in 'closed loops', and waste is not considered a burden but rather a resource that brings new economic opportunities. However, while there is a consensus on the need to facilitate a transition towards a circular economy, the governing of this endeavour remains extremely challenging because making a circular economy work requires cutting across sectoral, scalar, and administrative boundaries. Drawing on the sustainability transitions literature and the case of the Amsterdam Metropolitan Area, arguably one of the frontrunners on the strive towards a circular built environment and economy, the paper seeks to identify and understand barriers for CE transition at a regional scale. The findings underscore the multi-faceted nature of the challenge and offer lessons for the governance of emerging regional circular spatial-economic policies.
Key words: circular economy, transitions, urban regions, governance, sustainability, planning.

1. INTRODUCTION

In an increasingly urbanised world, cities are crucial for enacting sustainability transitions and human development within global boundaries (Frantzeskaki *et al.*, 2017; Wolfram and Frantzeskaki, 2016). With the advent of Circular Economy (CE) as a 'new sustainability paradigm' (Geissdoerfer *et al.*, 2017), there has emerged the need to shed more light on the role of cities – vital economic, social and political hubs – in a shift towards circularity.

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CE is most often understood as a socio-economic regime in which value-creation mechanisms would be decoupled from the consumption of finite resources by avoiding waste, closing material loops, and facilitating ecological restoration and regeneration of the damage to the eco-systems done by the predominant linear industrial processes underpinning the current capitalist economy (Ellen McArthur Foundation, 2015; Geissdoerfer *et al.*, 2017). While in a 'linear' economy products are manufactured, then sold, used, and disposed of, and finally, hopefully their parts are recycled, in a circular model the focus is on maintaining the value of the materials used in products through maintenance, repair, reuse, remanufacturing, etc.

The ascent in significance of the CE concept in business, policy and academic circles has been nothing short of spectacular. It prompted new policies and strategies at all scales and levels of government, from the European level (European Commission, 2015; Domenech and Bahn-Walkowiak, 2019), national (e.g. in the Netherlands, see Dutch Ministry of Infrastructure and the Environment & Ministry of Economic Affairs, 2016), to regional (e.g. Provincie Noord-Holland, 2017) and local (e.g. Circle Economy, 2016). Cities across the world put CE on their policy agendas and develop strategies to shift away from the linear mode of production and consumption (Obersteg *et al.*, 2019; Williams, 2019; Turcu and Gillie, 2020; Prendeville *et al.*, 2018, Petit-boix and Leipold, 2018). The concept has also spawned a rapidly growing body of literature from across various disciplines, from environmental economics, industrial ecology to urban studies (for an overview of the emerging perspectives on CE in research, see Merli *et al.*, 2018 and Winans *et al.*, 2017). Thus, 'circular' has become the new 'sustainable' (see Geissdoerfer *et al.*, 2017).

While we are merely at the beginning of a transition towards CE (Ghisellini *et al.*, 2017), it is already clear that this transition requires vast resources, involvement of a large variety of actors, and it depends on the ability to foster collaboration and exchange of knowledge. According to Ellen MacArthur Foundation "a transition to the circular economy […] would involve considerable costs, such as R&D and asset investments, stranded investments, subsidy payments to promote market penetration of new products, and public expenditure for digital infrastructure" (2015, p. 15). More specifically, a shift towards circular models of production and consumption would require that all actors engaged in the flow of a particular material flow were engaged in the process and revised their business models, ways of working, behavioural patterns, and expectations towards products. Crucially, new governance arrangements are also needed to revise and connect the strategic agendas of territorial authorities, businesses, and civil society actors to facilitate the transition. Governance is thus one of the pillars of this shift (Ellen MacArthur Foundation, 2015, p. 15).

Even though there is a consensus that cities need to 'go circular', there is a gap in knowledge on how cities can actually facilitate a transition towards CE (Fratini *et al.*, 2019). The literature on circular economy tends to focus either on the technical aspects of closing the material loops or on the business models related to it,

at the expense of a consideration for the social and environmental dimensions. While this may be "be more attractive for policy makers and private business", it can be "problematic for the transition to a more sustainable economic system because attention and resources are diverted from more comprehensive and holistic approaches" (Geissdoerfer *et al.*, 2017, p. 766). Fischer and Pascucci argued that "the main challenge is to understand how to facilitate this transition when constrained by an institutional system that is aligned with the status quo of a linear economy" (2017, p. 18). In a similar vein, Fratini *et al*. stressed that "developing and implementing circular economy strategies in cities calls for new governance systems and/or changes in the existing governance arrangements" (2019, p. 987). However, to enable a shift towards a circular economy in a particular territorial context, one needs to understand the context-bound barriers for it, explore what needs to change, and where problems lie.

Addressing this lacuna is urgent because "the concept of the CE in itself is over-hyped, scarcely investigated and therefore ill-defined, [...] so far dominated by a business-focused narrative for competitive advantage, raising questions about the placement of the CE within a broader urban sustainability agenda" (Prendeville *et al.*, 2018, p. 172). The current applications of the CE paradigm in urban strategies and initiatives tend to neglect the questions of land use, geographical scale, and the complexity of urban systems (Williams, 2019) and local territorial conditions (ESPON, 2019), which all have a bearing on multi-actor cooperation across scales and sectors that CE requires (Obersteg *et al.*, 2019).

There is also a gap in knowledge regarding the role of social contexts, including social identities and institutions, in CE transitions in cities (Fratini *et al.*, 2019; Moreau *et al.*, 2017; Korhonen *et al.*, 2018). Research to date highlights institutional barriers for a CE transition and the need for new rules governing interactions between the multitude of actors involved (Ghisellini *et al.*, 2017; Fischer and Pascucci, 2017). Against this background, the fact of understanding the institutional context for a CE transition is an urgent research gap to bridge, especially considering the political tensions that the spatiality of cities and their transition agendas entail (Marin and De Meulder, 2018).

Finally, while most studies on urban transitions towards CE focus on cities, there is insufficient attention paid to its regional dimension and the operationalisation of a CE at the scale of an urban region (Obersteg *et al.*, 2019; OECD, 2019). Such a regional perspective is much needed in the wake of the growing role of urban regions as the scale at which urban (sustainability) policies are developed and implemented, albeit often without sufficient resources and capacity (Turcu and Gillie, 2020). A regional lens to study a CE transition is also helpful due to the regional dimension of metabolic flows, which go beyond the administrative boundaries of cities, connecting actors and activities across wider regional spaces (Geldermans *et al.*, 2018). In summary, without a clear understanding of those issues one risks taking ill-informed decisions on how to best promote a CE and

lead to a situation where the concept might "lose credibility and become reduced to buzzwords or greenwashing" (Prendeville *et al.*, 2018, p. 188).

This paper responds to the abovementioned knowledge gaps by exploring the scope for transitions towards a CE in the Amsterdam Metropolitan Area (AMA), often (self-)styled as a global leader in circularity. Building on transition management literature, the paper aims at identifying the barriers that prevent the implementation of the necessary elements for governing a CE transition in that urban region.

2. TRANSITION GOVERNANCE AND MANAGEMENT

2.1. Transition governance

Given the complex nature of governing a CE transition in urban regions (Obersteg *et al.*, 2019) and cities, and the many barriers that need to be overcome to depart from the prevailing linear economy, it can be fruitful to apply a governance approach that aims to address the tension between "the open-ended and uncertain process of sustainability transitions and the ambition for governing such a process" (Frantzeskaki *et al.*, 2012, p. 21). Examples include adaptive governance (Olsson *et al.*, 2006), reflexive governance (Voß *et al.*, 2006; Grin *et al.*, 2010), or transition governance (Loorbach, 2007; Frantzeskaki *et al.*, 2012). What these governance notions have in common is that they perceive reality as being "multiscalar, complex, nonlinear, uncertain, normative, dynamic, complex and path dependent" (Wittmayer and Loorbach, 2016, p. 14). Such notions resonate with the complex nature of governing a CE as a major sustainability transition (De Jesus and Mendonca, 2018; Bode *et al.*, 2019; Obersteg *et al.*, 2019). Additionally, these governance theories have evolved in more specific approaches like transition management (Rotmans *et al.*, 2001; Loorbach, 2007), offering potential pathways to manage sustainable change in various ways.

2.2. Transition management

Therefore, in relation to our specific CE case, we chose to use the transition management approach for two reasons: (1) to understand what can be done to transition from one situation to another, thereby overcoming barriers and challenges; and (2) to develop possible policy recommendations for CE transitions.

Yet what are transitions and what is transition management? A transition, according to Rotmans *et al.* (2001, p. 16), can be defined as a "gradual, continuous process of change where the structural character of a society (or a complex sub-system of society) transforms". "The 'transition management' approach has

made substantial contributions in questions related to the governance of large-scale societal transformations" (Farla *et al.*, 2012, pp. 991–992) and has played a pivotal role in Dutch policies aimed at decreasing persistent environmental and societal problems (Rotmans, 2003; Elzen *et al.*, 2004; Loorbach, 2007; Farla *et al.*, 2010). The central idea behind transition management is that societal, environmental and economic changes requires the identification of a multitude of barriers that prohibit or hamper change, and to do so in a holistic integrated manner by looking at various governance levels and the links between them. Governing sustainability transitions starts with understanding how "strategies, resources and capabilities of individuals, firms and other organisations impact the overall system and trigger transformation processes, and how these changes at the system level feed-back into the observed strategies at the actor level" (Farla *et al.*, 2012, p. 992).

Importantly, the transition management approach does not hold "a silver bullet solution for actually realising ambitious sustainability objectives" (Nevens and Roorda, 2014, p. 120). It requires translation and adaptation to specific transition challenges and questions in the urban contexts (Nevens *et al.*, 2013; Wittmayer *et al.*, 2014b), and political regimes (see Wittmayer and Loorbach, 2016). One can also question the extent to which "governance towards desired outcomes can be deliberately managed, despite their multi-level, multi-actor character" (Jackson, 2014, p. 524). To this, Meadowcroft (2009, p. 484) responded that "although transitions cannot be controlled in any absolute sense, they can be influenced (encouraged, re-oriented, or sped up) through deliberate intervention."

2.3. Transition management framework

In order to effectively govern the various barriers towards a CE in urban regions, applying the transition management framework to a specific institutional context can be particularly useful (see Fig. 1). Transition management provides "an action impetus and more intangible outcomes in terms of practising collaborative governance and system thinking (Nevens and Roorda, 2014), and it holds promises with regard to creating space for alternative ideas, practices, and social relationships (Wittmayer *et al.*, 2014a; Roorda *et al.*, 2014)" (Wittmayer and Loorbach, 2016, p. 24).

This transition framework distinguishes four transition levels and corresponding transition governance activities (see Loorbach 2007; 2010) as follows (see Wittmayer and Loorbach, 2016, p. 19):

– Transition Arenas with strategic-level activities: activities aimed at the long term through which the future is collectively debated, imagined, and formulated in policies, visions and norms;

– Transition Agendas with tactical-level activities: activities aimed at the mid-term, aiming for change in established structures, institutions, regulations, and physical or financial infrastructures;

– Transition Experiments with operational-level activities: activities aimed at the short term, involving experiments and actions through which alternative ideas, practices, and social relations are explored, tested, and showcased;

– Transition Monitoring and Evaluation with reflexive-level activities: activities geared towards learning about the present state and system dynamics, possible future states, and the path from present to future, including (collective) learning from ongoing transition activities.

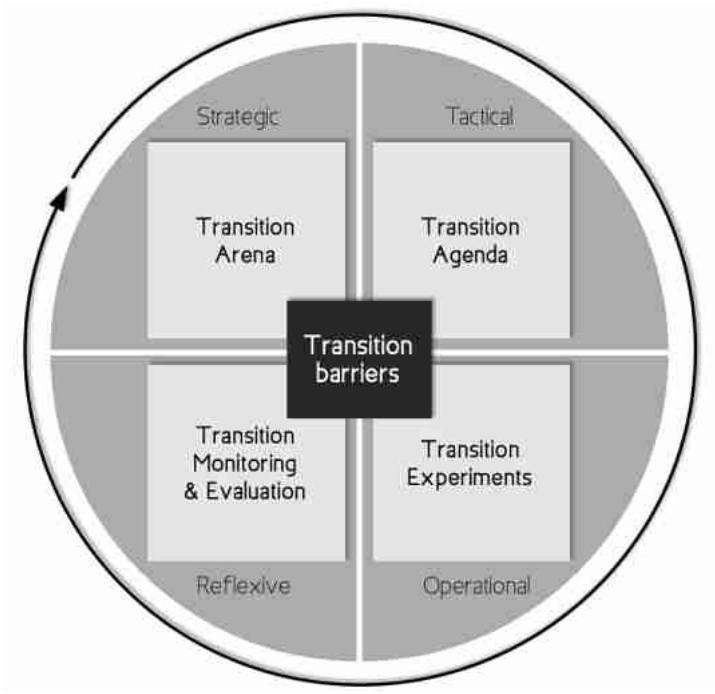

Fig. 1. Conceptual framework: barriers for managing transition towards CE

Source: adapted from Wittmayer and Loorbach, 2016.

This framework has been applied in other studies about sustainable urban transitions (Frantzeskaki *et al.*, 2014). For transitions to happen, change and activities are required to take place at all of these levels, despite the different time horizons. Moreover, activities at one level affect governance activities at other levels, so interdependence is a key feature for transition management. As De Jesus and Mendonca (2018, p. 75) argued, we need to "develop a thorough understanding of the factors that foster and hinder the transition to a CE", by us defined as transition barriers that might occur at various transition management levels. Therefore, we will use this framework to map and relate the barriers and activities towards CE, using the AMA as a case.

3. METHODOLOGY

3.1. Research methods

This exploratory research is based on a set of three qualitative research methods, enabling the gathering of rich empirical material and a triangulation of insights from each of the methods used. First, we analysed the key policy documents, such as analyses, reports, visions and strategies elaborated by public authorities at the national, regional and local levels. This provided the necessary background knowledge and allowed us to orient interview questions to extract additional information from key stakeholders.

Second, we conducted 12 interviews with a selection of public and private circular economy stakeholders in the AMA and at the national level. The interviewee selection strategy entailed ensuring variation of kinds of actors, operating in different sectors and scales, in order to be able to contrast the different perspectives and paint a nuanced picture of the barriers for a CE transition. In particular, interviews were conducted with sustainability managers of the key economic actors and producers of waste in the region (Schiphol Airport, Greenport Aalsmeer, Flora Holland, Tata Steel, and the Port of Amsterdam), governmental organisations (Municipality of Amsterdam, Municipality of Haarlemmermeer, Ministry of Infrastructure and the Environment), grassroots organisations (Buiksloterham, Amsterdam), construction industry companies (Amvest, Delta Development Group), and major waste management companies (Afval Energie Bedrijf, van Gansewinkel). Interviews were semi-structured and focused on the stakeholders' understanding of a CE and its respective objectives, main challenges and potentials in achieving these objectives, the conflicts and collaborations between stakeholders, and knowledge needs. The interviews were recorded, transcribed and coded for the purpose of analysis.

Third, data was gathered through participatory observation in a series of four workshops as part of the REPAiR[1] living lab in Amsterdam bringing together a plethora of CE stakeholders, from academia, regional and local governments, to industry and civil society. The living labs workshops were intended to enable a co-creation of knowledge with stakeholders on the diagnosis of CE potential and challenges, design and testing of a participatory tool called GDSE[2] and on the design of eco-innovative solutions and strategies for CE in the AMA (see Amenta *et al.*, 2019; Arciniegas *et al.*, 2019).

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[1] *REsource management in Peri-urban AReas*

[2] *Geodesign Decision Support Environment*

3.2. Selection of case study

In a nutshell, the choice of Amsterdam region as a case study is relevant and justified because of its leading position in its transition towards a CE and the plethora of circular initiatives already taking place there. Additionally, these pioneering activities take place in a wider context where a CE is becoming a top policy priority. The Dutch government aims to shift the national economy towards one based on the principles of the CE by 2050 (Ministry of Infrastructure and Environment and Ministry of Economic Affairs, 2016). Finally, the national government has formulated specific CE policies focusing on specific sectors, for instance construction (Rijkswaterstaat and Ministry of Infrastructure and Environment, 2015).

That said, it is important to understand that the Dutch government administration is democratically institutionalised at the national, provincial and municipal territorial levels. All formal policy-making and legitimised democratic decision-making takes place at these three administrative levels, including spatial-economic and resource management issues. Nonetheless, in terms of spatial planning the Dutch state has a strong tradition of coordination between these administrative levels. At the regional and metropolitan levels, formal government bodies with financial means and decision powers are absent. Hence, at this regional scale more informal regional-metropolitan governance networks and local public-private project-oriented actor constellations are active. They influence formal policy-making, implementation and the co-governance of the built environment.

This situation is also recognisable in the AMA. The metropolitan region spans across the boundaries of two provinces and encompasses the city of Amsterdam and 32 municipalities. It is at the heart of the national circularity effort. The region brands itself as 'worldwide frontrunner in circularity'[3], the city of Amsterdam presents itself as a 'circular hotspot'[4], while the Port of Amsterdam sees itself as 'the perfect hub for circular economy'.[5] Behind the branding, there are also concrete policies implemented by cities located in the AMA, including Amsterdam, Haarlem, Haarlemmermeer, and more. In parallel, various private actors, from waste management companies to construction companies, develop circular development initiatives and formulate their own circularity ambitions, while a large variety of small and medium businesses and start-ups join the CE push (see Prendeville *et al.*, 2018). Despite this wealth of initiatives, the region remains at the beginning of the transition towards a CE. As reported in previous research, in Amsterdam "the focus is mostly on innovative solutions/products for supporting the making of urban circularities" (Fratini *et al.*, 2019, p. 982), whereas much less attention

[3] https://hollandcircularhotspot.nl/cities/metropole-region-amsterdam/ [accessed on: 18.06.2020].

[4] https://www.iamsterdam.com/en/business/news-and-insights/circular-economy/amsterdam-a-circular-hotspot [accessed on: 18.06.2020].

[5] https://www.portofamsterdam.com/en/business/settlement/port-amsterdam-perfect-hub-circular-economy [accessed on: 18.06.2020].

is paid to the management of the transition towards a CE and in particular to the development of cooperation across sectoral, scalar and administrative boundaries. Our analysis aims to shed light on these matters.

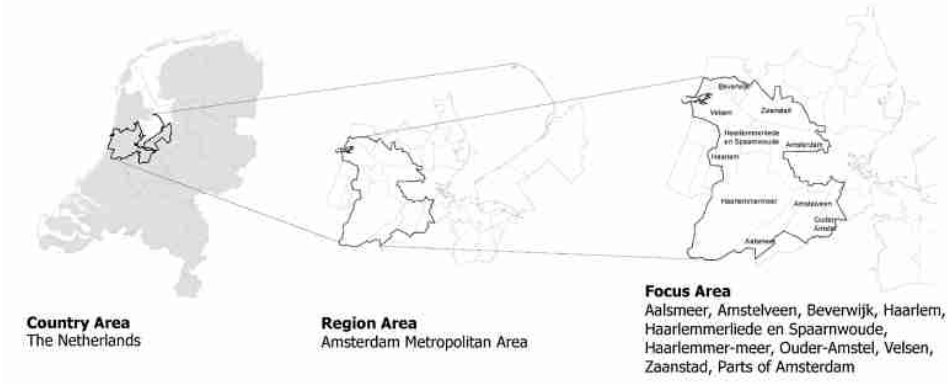

Fig. 2. Amsterdam Metropolitan Area and the focus area for the research

Note: on the map on the left, thin lines represent provincial boundaries, while the thick line corresponds to the boundaries of the AMA; on the maps in the middle and on the right, thin lines represent municipal boundaries, while the thick line indicates the focus area of the study.

Source: own work by REPAiR team TU Delft.

3.3. Analytical framework

In order to structure the analysis of CE challenges in the AMA we used a PESTEL-O model as proposed by Obersteg *et al.* (2019). It is based on the PESTEL framework (e.g. Song *et al.*, 2017) , often used in strategic planning. The acronym stands for Political, Economic, Social, Technological, Environmental, and Legal factors that affect how organisations work. The framework enables a comprehensive overview of (often interrelated and interdependent) challenges. Following Obersteg *et al.* (2019) we add the organisational factor ('O'), reflecting the importance of governance challenges for a CE identified in literature.

4. CIRCULAR ECONOMY TRANSITIONS IN THE AMA

This section describes the status quo of the transition towards a CE in the AMA, by relating the various identified governance challenges to the various transition management levels. The analysis is based on qualitative data retrieved from interviews

Table 1. CE governance challenges and positioning within the transition management levels

		Transition management			
PESTEL-O	*Governance challenges*	*Arenas*	*Agendas*	*Experiments*	*Learning*
Political	Lack of consistency in municipal sustainability policies	x			
	Lack of regional CE policy formulation and coordination	x			
	Lack of CE policy spanning across administrative boundaries	x			
	Domination of Amsterdam	x			
Economic/ financial	Banks reluctant in financing CE ventures			x	
	Limited awareness of successful CE business models in resource management and planning projects			x	
	No tax disincentives for companies and households producing waste		x	x	
	Competition for waste as a resource		x		
	Extreme pressure on land development favours rapid linear redevelopment at the expense of CE solutions			x	
Social/ behavioral	Consumer readiness to pay premiums for circular products			x	
	Fence-sitting and reliance on business leaders to make the CE transition			x	
	Limited awareness of CE among producers			x	
Technological	n/a				
Environmental	Presence of polluted or noise-restricted peri-urban wastescapes in port and airport areas			x	
Legal	Construction tender procedures not adapting CE principles and respondent to CE processes		x	x	
	Unclear legislation on waste ownership		x		
	Misalignment new planning law CE goals and provincial and municipal plan CE applications		x		
	Building regulations too rigid to accommodate circular innovations		x	x	
Organisational	Lack of regional CE platforms, networks and leaderschip	x			x
	Risk-avoiding attitude towards CE initiatives in municipalities		x		
	Silo-mentality within governments and business regarding CE	x	x	x	
	Knowledge fragmentation within and asymmetry between organisations	x	x		x
	Dominance of big players in waste management				x
	Secrecy about resource flows in production process				x

Source: own work based on Obersteg *et al.*, 2019; Dąbrowski *et al.*, 2019; Arlati *et al.*, 2017; Remøy *et al.*, 2018.

with key stakeholders, workshops, document reviews, scientific papers (Obersteg *et al.*, 2019), and conference presentations (Dąbrowski *et al.*, 2019). By doing so, we provide insight into how the AMA region shapes the transition towards CE, enabling a discussion about the extent to which these efforts and activities are assumed effective from a transition management perspective in addressing identified governance challenges. Table 1 illustrates AMA's main CE governance challenges and the transition management levels at which these challenges occur. The remainder of this section discusses the transition barriers observed in more detail.

4.1. Transition arenas

Concerning transition arenas, i.e. long-term-oriented strategic circular activities, the AMA can indeed be considered an early adopter among European urban regions, even though the municipalities lead the strategic efforts on CE. As already mentioned, several municipalities, especially the larger ones (the Municipality of Amsterdam, 2016; the Municipality of Haarlem, 2017; the Municipality of Haarlemmermeer, 2015) put forward visions, policies or action agendas for the development of CE and formulated circular city policies, intended to guide public and private decision-making towards that goal.

That said, the stakeholders have highlighted a number of political and organisational barriers for the implementation of these strategic activities. Some of those stem from internal issues within local governments and other organisations. Namely, stakeholders stressed the lack of consistency in municipal sustainability policies, now being supplemented by CE activities. They also indicated a risk-avoiding attitude towards CE initiatives among municipal decision-makers and a silo mentality within governments and large business (such as the Royal Schiphol Group managing Amsterdam's airport). This results in CE strategies being of interest or limited to some departments and not mainstreamed across the wider organisation.

Other barriers reported impact the relations between governmental and private organisations. First of those was mistrust between the municipalities involved in the AMA, particularly between the smaller municipalities and Amsterdam, which tends to be perceived as the dominant player in the region. At the same time, it was striking that none of the provinces involved in the AMA (North-Holland, Flevoland, and Utrecht) played a strong role in the CE arena, despite their important roles in spatial planning and many policy fields. This was partly due to the political clout of Amsterdam in the region contrasting with that of the provinces' territories spanning far beyond the AMA. But also the stakeholders simply did not deem the province as a relevant level of government for CE policy. Against this background, stakeholders tended to complain about a lack of inspirational and effective leadership in the region that could connect CE stakeholders effectively

and trigger commitment to a long-term strategy for CE. On the organisational front, our interviewees and workshop participants also highlighted a lack of regional policy platforms for formulating and coordinating longer term CE policy goals, with the time horizon of existing policies being limited to the medium term (AMA, 2018a). Moreover, stakeholders underscored knowledge fragmentation and knowledge asymmetry between organisations, both municipalities and companies, which skewed the playing field towards those organisations that had started developing knowledge on CE earlier. This was further aggravated by secrecy and a lack of platforms for data sharing on resource flows in production and demolition processes, hindering development of CE policies and strategies.

4.2. Transition agendas

Concerning transition agendas, the province of North-Holland (see Circle Economy, 2017; Provincie Noord-Holland, 2017), and the region of Amsterdam and its municipalities, especially Amsterdam, have put forward numerous tactical actions to stimulate the stride towards a CE. Examples included the establishment of a development plan for circular economy in the 2025 perspective (AMA, 2018a), the definition of actions along three tracks: circular procurement (harmonising tender procedures among municipalities to reach 50% of circular procurement by 2025), workgroups to facilitate closing loops in specific material flows, and a set of actions to kickstart CE (cooperation on waste management, facilitating access to data on materials, etc.). Interestingly, the leadership on the implementation of the plan was entrusted to sustainability councillors of Haarlemmermeer and Lelystad, which could partly contribute to addressing the lack of regional leadership problem mentioned above (AMA, 2018a). That was done to facilitate the implementation of the plan, the 2016–2020 spatial economic agenda for the AMA (AMA, 2018b) and to emphasise CE goals. What is more, the city of Amsterdam together with the AMA commissioned a study into the current circular jobs and skills' base across the region (Circle Economy, 2016), while a study by Metabolic (2017) mapped the circular potential of Amsterdam's neighbourhoods. Both studies have taken stock of the region's potential and provided a knowledge base of municipal and regional CE policies, but also for developers, construction companies, and waste companies willing to invest in circular activities. In parallel, the municipality of Amsterdam has issued a roadmap towards circular tendering (the Municipality of Amsterdam, 2017), recognising that the purchasing power of a municipality can be a catalyst for promoting circular land use and construction. Thus, CE conditions for building projects are now attached to land sales in Amsterdam, however, the approach is also promoted across the region with efforts to harmonise procurement rules (AMA, 2018a).

Despite this flurry of tactical activities to promote CE, stakeholders again underscored many economic, political, legal, and organisational barriers. First, even

though efforts were undertaken to promote circular tendering, stakeholders stressed that this practice remained a relative novelty and companies in the construction sector were not yet prepared to offer competitive circular products and services. Second, more fundamentally, the existing tax system, as stakeholders frequently argued, did not disincentivise production of waste. Should waste generation be taxed, companies would have a strong incentive to change their ways of production towards more circular ones. Third, stakeholders recognised that should CE become mainstream, waste would no longer be seen as a burden but as a valuable resource for which companies would compete and keep it to themselves to reap the profits from activities towards maintaining or upgrading its value. In other words, individual agendas rather than collective ones are likely to become a challenge in the near future. Concerning legal barriers, stakeholders also recognised that the recently revised Dutch spatial planning law (Dutch: *Omgevingswet*) adopted CE as a goal, which could be an opportunity to push for circular urban development. However, the law has fallen short of providing clear rules for implementing that goal in spatial development plans at provincial or municipal levels. At the same time, building decree regulations (Dutch: *Bouwbesluit*) have remained too rigid to accommodate circular innovations in building technology and area development. This limits the possibility for imposing circular building features as a precondition for receiving a construction permit. Finally, the same organisational barriers as those affecting strategic level activities, namely fragmentation and knowledge asymmetries as well as silo mentality within organisations, were mentioned by stakeholders as hindering the deployment of tactical actions for CE.

4.3. Transition experiments

Transition experiments in the AMA region are operational activities which aim to facilitate changes at the relatively short term, focussing on experiments and actions through which alternative ideas and social relations are practised. One example in which the Amsterdam municipality and local builders experiment with circular visioning, tendering and construction is the circular urban redevelopment area of Buiksloterham. This CE initiative has been supported by a vision document Circular Buiksloterham (Gladek, *et al.*, 2015) that has been signed by many different organisations, including the city of Amsterdam, housing associations, the water board, and home builder groups. Moreover, CE tendering procedures also have been applied here as an act of a CE policy implementation. This site, being earmarked as an Urban Living Lab (Steen and Van Bueren, 2017) in which the development and testing of CE initiatives, products and policies plays a vital role, has been crucial for its experimental character in Amsterdam North. Lessons from this CE experiment indicate a wide variety of challenges, e.g. high CE ambitions being weakened by requirements motivated by the status quo (Steen and

Van Bueren, 2017). Many other CE spatial and urban experiments and initiatives across the AMA region are emerging as documented, for instance, in the Resource Atlas (Dutch: *Grondstoffen Atlas*) from RoyalHaskoningDHV *et al.* (2018).

Despite these extensive efforts, it has become clear from our interviews and workshops that such transition experiments face various barriers. Stakeholders have indicated that there is a lack of best practices of spatial CE initiatives, a fact which hampers a further development and financing of CE ventures. Also, knowledge on implementing CE initiatives seems rather fragmented, insufficient and/or unbalanced within and between organisations to effectively support a broader governance of CE transitions. Moreover, a lack of urgency in the demand for CE is evident, and it was marked as a 'root' challenge by some, as it is cheaper to produce in a linear manner, because reusing is more expensive, which for instance is the case of circular building materials and systems. Moreover, due to the prevailing extreme pressure on land development (for housing mainly), planning and development actors opt for risk reducing speedy business-as-usual development, in which CE solutions are often side-lined. At the same time, flexible land use rules are needed, as restrictions in zoning plans do not accept a re-use of wastescapes as construction around Schiphol airport for instance. In brief, financial, legal and organisational barriers observed in operational experiments often show a direct interdependence with (insufficient or incomplete) transition paths at the tactical levels, therefore hindering the effective management of transitions in more concrete CE projects.

4.4. Transition learning

A crucial final step in governing the transition towards a CE is (collective) learning. Transition learning consists of monitoring, evaluation, and reflexive activities aimed at understanding the present state and the dynamics in a system and the possible pathways from present to future situations. In the AMA, there are promising CE initiatives, and a few focus on learning. There is the AMS Institute which promotes circularity in urban regions as a central part of their research activities and various events and educational programmes[6]. In addition, AMS collects, develops and shares urban data for the scientific and professional community. Other learning platforms include Cirkelstad[7], which promotes CE themes nationwide, including policy, purchase, design, construction, and demolition for the building industry and cities. Recently, Cirkelstad has started organising various so-called Master Tracks including Circular urban development, circular housing, circular schools, and circular tendering[8]. Also, Madaster

[6] https://www.ams-institute.org/urban-challenges/circularity-urban-regions/ [accessed on: 08.10.2020]
[7] https://www.cirkelstad.nl/ [accessed on: 08.10.2020]
[8] https://www.cirkelstad.nl/opleidingen/ [accessed on: 08.10.2020]

plays an important role in the monitoring of the transition towards a CE as their online platform registers and stores data on the products, components, and materials being used in buildings, aimed at creating material or building passports. Thus, building industry actors would be able to determine the financial and circular value of buildings, and the opportunities for demounting and reusing building resources. Lastly, there are a number of funded research projects and programmes led by universities (of applied sciences) in which public and private organisations participate, through which personal, organisational and collective learning takes place.

Nonetheless, the data from our interviews and workshops has revealed that despite these learning activities several organisational barriers persist. The main barrier for this level of the transition towards CE is the lack of free and widespread availability and accessibility of data. For instance, information on the origins and characteristics of materials within CE building products or the resource and waste flows at the regional level is unavailable. In addition, such knowledge is fragmented within different organisations and platforms, and the data is not always managed accurately, which prevents collective learning. One major lacuna is the absence of systems and tools that monitor the progress in CE development in a region. In essence, a regional CE platform that links the diverging data and knowledge is missing. Also, the dominance of big players in the waste management sector and the secrecy about resource flows in production processes prohibit more collective transition learning processes. There is a need for data that enables municipalities, businesses and other organisations to assess and evaluate CE progress, and to steer upon that process with, e.g. guidelines and key performance indicators (KPIs). In more detail, the workshop participants have expressed the need for different CE assessment criteria, and a change from economic indicators to social and environmental values, the assessment of the value of sharing, and an evaluation of behavioural change triggered by a CE project and policies, as well as an overall assessment on the governance of the AMA in terms of how well its setup performs in CE policy implementation in order to propose reforms if and where needed. Finally, there is a need for awareness-building campaigns and more collective mainstream learning about a CE, embedded in and supported by regional innovation, education and economic policies.

5. CONCLUSIONS AND RECOMMENDATIONS

Governing a transition towards a CE in an urban region remains a great challenge, even for a frontrunner in this field like the AMA. This is not only because the governance challenges are multi-scalar, multi-sectoral, and multi-actor in nature

(Obersteg *et al.*, 2019), but also because these changes towards a CE need to take place simultaneously at and between different transition management levels (Wittmayer and Loorbach, 2016). In essence, transitioning towards a CE requires changes in the institutional cultures within a plethora of organisations involved in closing material loops, steering the transition, and dealing with its socio-economic, legal, technological, and spatial implications. Our paper illustrates that effective CE transition governance requires a consideration for the four transition levels of the framework in an integral way. All of them are interrelated, interdependent and needed to change the practices on the ground. For instance, transition experiments in circular construction are hampered by existing building legislations addressed at the transition agendas' level. Therefore, simultaneous action at all transition levels is needed to assist in the transition from local experiments by frontrunners to a regime change.

This paper contributes to the literature, first, by applying the transition management framework to a CE (Ernst *et al.*, 2016; Frantzeskaki *et al.*, 2017). We posit that – even more so than in other sustainability transitions – governing CE transitions requires working across sectors of the industry and institutions at various scales. Our findings also suggest that governance on a regional scale matters, because of the spatial implications of resource flows that span across the boundaries of municipalities. Second, we confirm that there are tensions and complexity in CE endeavours (see Marin and De Meulder, 2018), which indeed require new governance approaches. Our contribution here is, specifically, the identification and classification of the barriers for implementing the transition management framework on a regional scale. By doing this, we also enhance our understanding of institutional and governance challenges in CE (see e.g. Fratini *et al.*, 2019), often neglected at the risk of undermining a transition.

In the AMA, we generally have observed uncoordinated attempts to govern the transition towards a CE, due to the variety of institutions involved and the various unconnected CE-related initiatives occurring at different transition levels. Therefore, even though the AMA is a self-styled frontrunner in CE, we can conclude that the transition towards a CE is unfolding and ongoing, in some aspects advancing rapidly (e.g. the proliferation of strategic and experimental activities), but overall it is still at an early stage and, critically, remains uncoordinated across the levels of transition management.

Several implications for policy emerge from this research and the AMA as empirical case study. First, in line with previous research, we confirm that the regional scale is particularly important for governing a transition towards CE, due to the regional geography of material flows ignoring municipal boundaries (see Geldermans *et al.*, 2018) and the diversity of actors that need to be involved (see Obersteg *et al.*, 2019). The AMA case illustrates the complexity of

this regional challenge and the need for an extensive cross-sectoral, cross-scale and cross-boundary partnership to establish shared strategic, tactical and operational goals and means. To galvanise and steer such a partnership one needs an inclusive, visionary and proactive leadership at the regional level, integrating CE policy with spatial strategies. Such leadership cannot be relegated 'by default' to the largest municipality in the region. In the Dutch context, it can be argued that CE transition adds a new argument in favour of either strengthening (that is formalising, strengthening elected authorities and financially equipping) the currently ill-defined regional level of government, or rebalancing and consolidating inter-municipal cooperation within the existing system of territorial jurisdictions. Nonetheless, institutionalising a separate regional administrative government level with democratic decision-making powers and financial means is far from likely in the Netherlands, since it requires a constitutional change. Therefore, we advocate for stronger CE and spatial policy coordination between the formal national, provincial and municipal governments, informal regional, and metropolitan networks, and the key private sector actors involved. Second, our study has revealed that many practitioners advance within their own specific CE initiatives but encounter barriers that are beyond their sphere of influence. We recommend thus to interrelate the four elements of the transition management framework to put in place a more integral and holistic approach to the shift towards a CE. Third, in order to build awareness and catalyse transition it may be worthwhile to aim for 'quick wins with big impacts' by focusing on transition in a specific metabolic flow. For instance, construction and demolition material flows are a good place to start as construction is the biggest consumer of resources and simultaneously it is hugely important for AMA's economy and its urban expansion.

To conclude, we should mention the limitations of the research. Firstly, the empirical research included a study of only one region also illustrating a snapshot in time, which makes it difficult to generalise findings and conclusions. Therefore, future research should focus on cross-regional or cross-country comparisons of barriers for CE transition to draw more generalisable lessons and enable a transfer of knowledge between regions. Secondly, CE in the built environment, its governance and relation to spatial planning is a rapidly evolving field. This paper presents a snapshot of the governance of an emerging sustainability transition. Future research should adopt a more dynamic perspective on how the connections between the levels of transition develop over time.

Acknowledgements. This research was conducted as part of the REPAiR (REsource Management in Peri-urban AReas: Going Beyond Urban Metabolism) project funded by European Union's Horizon 2020 Research and Innovation Programme, under grant agreement no. 688920.

REFERENCES

AMA (2018a), *Ontwikkelplan Circulaire Economie Metropoolregio Amsterdam*, Amsterdam: Amsterdam Metropolitan Area.

AMA (2018b), *Ruimtelijk-economische Actie-Agenda 2016–2020*, Amsterdam: Amsterdam Metropolitan Area.

AMENTA, L., ATTADEMO, A., REMØY, H., BERRUTI, G., CERRETA, M., FORMATO, E., PALESTINO, M.F. and RUSSO, M. (2019), 'Managing the transition towards circular metabolism: Living labs as a co-creation approach', *Urban Planning*, 4 (3), pp. 5–18. https://doi.org/10.17645/up.v4i3.2170

ARCINIEGAS, G., ŠILERYTÉ, R., DĄBROWSKI, M., WANDL, A., DUKAI, B., BOHNET, M. and GUTSCHE, J.M. (2019), 'A geodesign decision support environment for integrating management of resource flows in spatial planning', *Urban Planning*, 4 (3), pp. 32–51. https://doi.org/10.17645/up.v4i3.2173

ARLATI, A., BERRUTI, G., DĄBROWSKI, M., FRASER, T., HEURKENS, E., KNIELING, J., MEZEI, C., OBERSTEG, A., OPPE, O., PALESTINO, M.F. and VARJÙ, V. (2017), *D6.1 Governance and Decision-making Processes in Pilot Cases*, REPAiR: REsource Management in Peri-urban AReas: Going Beyond Urban Metabolism.

BODE, N., BUCHEL, S., DIERCKS, G., LODDER, M., LOORBACH, D., NOTERMANS, I., VAN RAAK, R. and ROORDA, C. (2019), *Staat van Transitie: Dynamiek in mobiliteit, klimaatadaptatie en circulaire economie*, Rotterdam: DRIFT.

Circle Economy (2016), *Banen en Vaardigheden in de Circulaire Economie*, Amsterdam: Gemeente Amsterdam en Metropoolregio Amsterdam.

Circle Economy (2017), *Circulair Noord-Holland: Kansenkaart circulaire economie*, Amsterdam: Circle Economy.

DĄBROWSKI, M., HEURKENS, E., BERUTTI, G. and PALESTINO, M.F. (2019), 'Overcoming governance challenges to transitions for circular economy', presentation at the *Regional Studies Association (RSA 2019) Conferenc*e, Santiago, Spain.

DOMENECH, T. and BAHN-WALKOWIAK, B. (2017), 'Transition towards a resource efficient circular economy in Europe: Policy lessons from the EU and the Member States', *Ecological Economics*, 155, pp. 7–19. https://doi.org/10.1016/j.ecolecon.2017.11.001

Ellen MacArthur Foundation, SUN and McKinsey Center for Business and Environment (2015), *Growth Within: A Circular Economy Vision for a Competitive Europe*, Ellen McArthur Foundation.

ELZEN, B., GEELS, F.W. and GREEN, K. (eds.) (2004), *System Innovation and the Transition to Sustainability*, Edward Elgar, Cheltenham, UK, 2004. https://doi.org/10.4337/9781845423421

ESPON (2019), *CIRCTER – Circular economy and territorial consequences*, Applied research (draft synthesis Report, version 09/01/2019), Luxembourg: ESPON.

ERNST, L., DE GRAAF-VAN DINTHER, R.E., PEEK, G.J. and LOORBACH, D. (2016), 'Sustainable urban transformation and sustainable transitions: Conceptual framework and case study', *Journal of Cleaner Production*, 112, pp. 2988–2999. https://doi.org/10.1016/j.jclepro.2015.10.136

European Commission (2015), *Closing the loop: An EU action plan for the Circular Economy*, COM/2015/0614 final.

FARLA, J., ALKEMADE, F. and SUURS, R.A.A. (2010), 'Analysis of barriers in the transition toward sustainable mobility in the Netherlands', *Technological Forecasting & Social Change*, 77, pp. 1260–1269. https://doi.org/10.1016/j.techfore.2010.03.014

FISCHER, A. and PASCUCCI, S. (2017), 'Institutional incentives in circular economy transition: The case of material use in the Dutch textile industry', *Journal of Cleaner Production,* 155, pp. 17–32. https://doi.org/10.1016/j.jclepro.2016.12.038

FRANTZESKAKI, N., LOORBACH, D. and MEADOWCROFT, J. (2012), 'Governing transitions to sustainability: transition management as a governance approach towards pursuing sustainability', *International Journal of Sustainable Development*, 15 (1/2), pp. 19–36. https://doi.org/10.1504/IJSD.2012.044032

FRANTZESKAKI, N., WITTMAYER, J. and LOORBACH, D. (2014), 'The role of partnerships in 'realising' urban sustainability in Rotterdam's City Ports Area, The Netherlands', *Journal of Cleaner Production*, 65, pp. 406–417. https://doi.org/10.1016/j.jclepro.2013.09.023

FRANTZESKAKI, N., BROTO, V.C., COENEN, L. and LOORBACH, D. (eds.) (2017), *Urban Sustainability Transitions*, Routledge, New York. https://doi.org/10.4324/9781315228389

FRATINI, C.F., GEORG, S. and JØRGENSEN, M.S. (2019), 'Exploring circular economy imaginaries in European cities: A research agenda for the governance of urban sustainability transitions', *Journal of Cleaner Production*, 228, pp. 974–989. https://doi.org/10.1016/j.jclepro.2019.04.193

GEISSDOERFER, M., SAVAGET, P., BOCKEN, N. and HULTINK, E.J. (2017), 'The Circular Economy - A new sustainability paradigm?', *Journal of Cleaner Production*, 143, pp. 757–768. https://doi.org/10.1016/j.jclepro.2016.12.048

GELDERMANS, R.J., WANDL, A., STEENMEIJER, M.A., FURLAN, C., STREEFLAND, T., FORMATO, E. and IODICE, S. (2018), *D3.3 Process model for the two pilot cases: Amsterdam, the Netherlands & Naples, Italy*, REPAiR: REsource Management in Peri-urban AReas: Going Beyond Urban Metabolism.

GLADEK, E., VAN ODIJK, S., THEUWS, P. and HERDER, A. (2015), *Circular Buiksloterham: Vision and Ambition: Transitioning Amsterdam to a circular city*, Amsterdam: Metabolic, Studioninedots & DELVA Landscape Architects.

GRIN, J., ROTMANS, J., SCHOT, J., in collaboration with GEELS, F. and LOORBACH, D. (2010), *Transitions to sustainable development – part 1. New directions in the study of long term transformative change*, Routledge: New York. https://doi.org/10.4324/9780203856598

JACKSON, M., LEDERWASCH, A. and GIURCO, D. (2014), 'Transitions in theory and practice: Managing metals in the Circular Economy', *Resources*, 3, pp. 516–543. https://doi.org/10.3390/resources3030516

KORHONEN, J., HONKASALO, A. and SEPPÄLÄ, J. (2018), 'Circular Economy: The concept and its limitations', *Ecological Economics*, 143, pp. 37–46. https://doi.org/10.1016/j.ecolecon.2017.06.041

LOORBACH, D. (2007), *Transition management: New mode of governance for sustainable development*, PhD thesis, Erasmus University, Rotterdam.

LOORBACH, D. (2010), 'Transition management for sustainable development: a prescriptive, complexity-based governance framework', *Governance,* 23 (1), pp. 161–183. https://doi.org/10.1111/j.1468-0491.2009.01471.x

MARIN, J. and DE MEULDER, B. (2018), 'Interpreting circularity. Circular city representations concealing transition drivers', *Sustainability*, 10 (5). https://doi.org/10.3390/su10051310

MEADOWCROFT, J. (2005), 'Environmental political economy, technological transitions and the state', *New Political Economy*, 10, pp. 479–498. https://doi.org/10.1080/13563460500344419

MERLI, R., PREZIOSI, M. and ACAMPORA, A. (2018), 'How do scholars approach the circular economy? A systematic literature review', *Journal of Cleaner Production*, 178, pp. 703–722. https://doi.org/10.1016/j.jclepro.2017.12.112

Metabolic (2017), *Circular Amsterdam: Spatial Implications*, Amsterdam: Metabolic.

Ministry of Infrastructure and the Environment and Ministry of Economic Affairs (2016), *Nederland circulair in 2050: Rijksbreed programma Circulaire Economie*, Ministry of Infrastructure and the Environment and Ministry of Economic Affairs.

MOREAU, V., SAHAKIAN, M., VAN GRIETHUYSEN, P. and VUILLE, F. (2017), 'Coming Full Circle Why Social and Institutional Dimensions Matter for the Circular Economy', *Journal of Industrial Ecology*, 21 (3), pp. 497–506. https://doi.org/10.1111/jiec.12598

Municipality of Amsterdam (2016), *Circular Amsterdam: A vision and action agenda for the city and metropolitan area*, Amsterdam: Municipality of Amsterdam.

Municipality of Amsterdam (2017), *Roadmap Circulaire Gronduitgifte*, Amsterdam: Municipality of Amsterdam.

Municipality of Haarlemmermeer (2015), *Haarlemmermeer naar een circulaire samenleving Duurzaam 2015–2018*, Hoofddorp: Municipality of Haarlemmermeer.

Municipality of Haarlem (2017), *Haarlem Circulair in 2040*, Haarlem: Municipality of Haarlem.

NEVENS, F. and ROORDA, C. (2014), 'A climate of change: A transition approach for climate neutrality in the city of Ghent (Belgium)', *Sustainable Cities and Society*, 10, pp. 112–121. https://doi.org/10.1016/j.scs.2013.06.001

NEVENS, F., FRANTZESKAKI, N., LOORBACH, D. and GORISSEN, L. (2013), 'Urban transition labs: Co-creating transformative action for sustainable cities', *Journal of Cleaner Production*, 50, pp. 111–122. https://doi.org/10.1016/j.jclepro.2012.12.001

OBERSTEG, A., ARLATI, A., ACKE, A., BERRUTI, G., CZAPIEWSKI, K., DĄBROWSKI, M., HEURKENS, E., MEZEI, C., PALESTINO, M.F., VARJÚ, V., WÓJCIK, M. and KNIELING, J. (2019), 'Urban regions shifting to circular economy: Understanding challenges for new ways of governance', *Urban Planning*, 4 (3), pp. 19–31. https://doi.org/10.17645/up.v4i3.2158

OECD (2019), *Waste Management and the Circular Economy in selected OECD Countries: Evidence form Environmental Performance Reviews*, OECD.

OLSSON, P., GUNDERSON, L.H., CARPENTER, S.R., RYAN, P., LEBEL, L., FOLKE, C. and HOLLING, C.S. (2006), 'Shooting the rapids: Navigating transitions to adaptive governance of social-ecological systems', *Ecology and Society*, 11 (1), art. 18. https://doi.org/10.5751/ES-01595-110118

PRENDEVILLE, S., CHERIM, E. and BOCKEN, N. (2018), 'Circular Cities: Mapping Six Cities in Transition', *Environmental Innovation and Societal Transitions*, 26, pp. 171–194. https://doi.org/10.1016/j.eist.2017.03.002

Provincie Noord-Holland (2017), *We maken het rond: Ontwikkelingsperspectief circulaire economie*, Haarlem: Provincie Noord-Holland.

REMØY, H., FURLAN, C., WANDL, A., DĄBROWSKI, M., AMENTA, L., ARCINIEGAS, G., MUÑOZ UNCETA, P., STREEFLAND, T., GELDERMANS, B., HEURKENS, E., MEISTER, K., CRAIGEN, A. and ŠILERYTĖ, R. (2018), *D5.2 Catalogue of solutions and strategies for Amsterdam*, REPAiR: REsource Management in Peri-urban AReas: Going Beyond Urban Metabolism.

Rijkswaterstaat and Ministry of Infrastructure and Environment (2015), *Beleidsverkenning circulaire economie in de bouw: Een perspectief voor de markt en overheid*, Den Haag: Rijkswaterstaat & Ministry of Infrastructure and Environment.

ROORDA, C., WITTMAYER, J., HENNEMAN, P., VAN STEENBERGEN, F., FRANTZESKAKI, N. and LOORBACH, D. (2014), 'Transition management in the urban context', *Guidance manual*, Rotterdam: DRIFT.

ROTMANS, J. (2003), *Transitiemanagement, Sleutel voor een duurzame samenleving*, Van Gorcum, Assen.

ROTMANS, J., KEMP, R. and VAN ASSELT, M. (2001), 'More evolution than revolution. Transition management in public policy', *Foresight,* 3 (1), pp. 15–31. https://doi.org/10.1108/14636680110803003

RoyalHaskoningDHV, FABRICations and Circle Economy (2018), *Grondstoffen Atlas MRA*, Amsterdam: Amsterdam Metropolitan Area.

SCHOT, J. and GEELS, F.W. (2008), 'Strategic niche management and sustainable innovation journeys: Theory, findings, research agenda, and policy', *Technological Analysis & Strategic Management*, 20 (5), pp. 537–554. https://doi.org/10.1080/09537320802292651

SONG, J., SUN, Y. and JIN, L. (2017), 'PESTEL-analysis of the development of the waste-to-energy incineration industry in China', *Renewable and Sustainable Energy Reviews*, 80, pp. 272–289. https://doi.org/10.1016/j.rser.2017.05.066

STEEN, K. and VAN BUEREN, E. (2017), *Urban Living Labs: A living lab way of working*, Amsterdam: Amsterdam Institute for Advanced Metropolitan Solutions (AMS).

TURCU, C., GILLIE, H., TURCU, C. and GILLIE, H. (2020), 'Governing the Circular Economy in the City: Local Planning Practice in London Governing the Circular Economy in the City: Local Planning Practice in London', *Planning Practice & Research*, 35 (1), pp. 62–85. https://doi.org/10.1080/02697459.2019.1703335

VOß, J.P., BAUKNECHT, D. and KEMP, R. (2006), *Reflexive governance for sustainable development*, Edward Elgar: Cheltenham/Northampton. https://doi.org/10.4337/9781847200266

WILLIAMS, J. (2019), 'Circular cities', *Urban Studies*, 56 (13), pp. 2746–2762. https://doi.org/10.1177/0042098018806133

WINANS, K., KENDALL, A. and DENG, H. (2017), 'The history and current applications of the circular economy concept', *Renewable and Sustainable Energy Reviews*, 68, pp. 825–833. https://doi.org/10.1016/j.rser.2016.09.123

WITTMAYER, J.M., SCHÄPKE, N., VAN STEENBERGEN, F. and OMANN, I. (2014a), 'Making sense of sustainability transitions locally: How action research contributes to addressing societal challenges', *Critical Policy Studies*, 8 (4), pp. 465–485. https://doi.org/10.1080/19460171.2014.957336

WITTMAYER, J.M., ROORDA, C. and VAN STEENBERGEN, F. (eds.) (2014b), *Governing urban sustainability transitions: Inspiring examples*, DRIFT, Rotterdam.

WITTMAYER, J.M. and LOORBACH, D. (2016), 'Governing transitions in cities: Fostering alternative ideas, practices, and social relations through transition management', [in:] LOORBACH, D., WITTMAYER, J.M. , SHIROYAMA, H., FUJINO, J. and MIZUGUCHI, S. (eds.), *Governance of Urban Sustainability Transitions: European and Asian Experiences*, Springer, Tokyo.

WOLFRAM, M. and FRANTZESKAKI, N. (2016), 'Cities and systemic change for sustainability: Prevailing epistemologies and an emerging research agenda', *Sustainability*, 8 (2), 144. https://doi.org/10.3390/su8020144