



Progress report (2015 - June 2019)

The Circular Economy Programme in the Amsterdam Metropolitan Area

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With valuable support of challenge lead
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The Challenge of Making a Transition to a Circular Economy in the Amsterdam Metropolitan Area

The Amsterdam Metropolitan Area, like the rest of the world, faces the challenge of using resources more efficiently.

The growth of the world population, the increase of consumption of materials and the rise in the production of waste is leading to growing scarcity of some key resources, more volatile prices and a severe impact on the environment. This problem of resource efficiency will even exacerbate as a result of the staggering increase in urbanisation. In 1950 30 per cent of the world's population was urban, while in 2014 54 per cent resides in urban areas. By 2050, 66 per cent of the world's population is projected to be urban.

In order to decouple economic growth and development from the consumption of finite resources, we need to move from a linear to a circular economy.

A circular economy is an economic and industrial system based on the reuse of products and raw materials and the restorative capacity of natural resources. It attempts to minimise value destruction in the overall system and to maximise value creation in each link in the system. Within Europe, the Netherlands is one of the leaders in moving towards a circular economy. However, although considerable progress has been made, the Netherlands still has a long way to go when it comes to grasping the full potential of a circular economy.

The Amsterdam Metropolitan Area has joined forces to move towards a circular economy.

Because of the great opportunities it could offer the region. The region's ambition for 2025 is to be worldwide frontrunner in finding smart solutions for the limited availability of resources through redesign and the closing of energy, water and material loops. Simultaneously, innovation and new business development will be realised in the Amsterdam region. At the regional level, the focus is on energy transition and closing material cycles (high value recycling of resources and circular design of product- and material chains). The vision is that the circular economy can lead to cost reduction, the creation of new business and employment, and that it could save resources and energy. In addition, this can stimulate the development of knowledge, innovation and startups, and increase the supply of key resources. In consequence, this offers societal merits in all respects: People, Planet and Profit.

The Amsterdam Metropolitan Area is in an outstanding position to become a leading circular resources hub in Europe.

It is a comparatively densely populated region (2.33 million inhabitants) in which large amounts of products and materials circulate, and many innovative and sustainable entrepreneurs are active. The region has an excellent logistic network across all transport modes (including a main harbour, global

airport -Schiphol- and prime railways and roads), and a coordinated spatial planning. It composes of a broad spectrum of economic activities and knowledge infrastructure, while societal support is present for circular economy initiatives.

To promote circular economy municipalities take a variety of initiatives such as promoting the separation of waste by consumers and companies, developing advanced platforms to reuse, refurbish and remanufacture products and [supporting circular business development](#) together with the Amsterdam Harbour Authority and the Schiphol Area Development Company. [Amsterdam](#) is a good example of a city approach.

However, some initiatives require coordination at a higher scale, primarily the region. Thus, it requires a clear division of tasks and responsibilities among

the municipalities involved in order to develop into an outstanding circular hub. Governors of the region have recognised this precondition and are willing to act accordingly.

The Amsterdam Economic Board (Board) has taken the lead to coordinate and accelerate those circular activities that need to be set up at regional scale.

The Board has initiated a circular economy programme in January 2015 in close cooperation with the Regional Board of Local Governments, business, knowledge institutes and citizens. This programme focuses on closing material cycles (high value recycling of resources, reuse of products and circular design of product- and material chains). Besides this programme a separate, joint initiative has started on the energy transition.

The Amsterdam Metropolitan Area

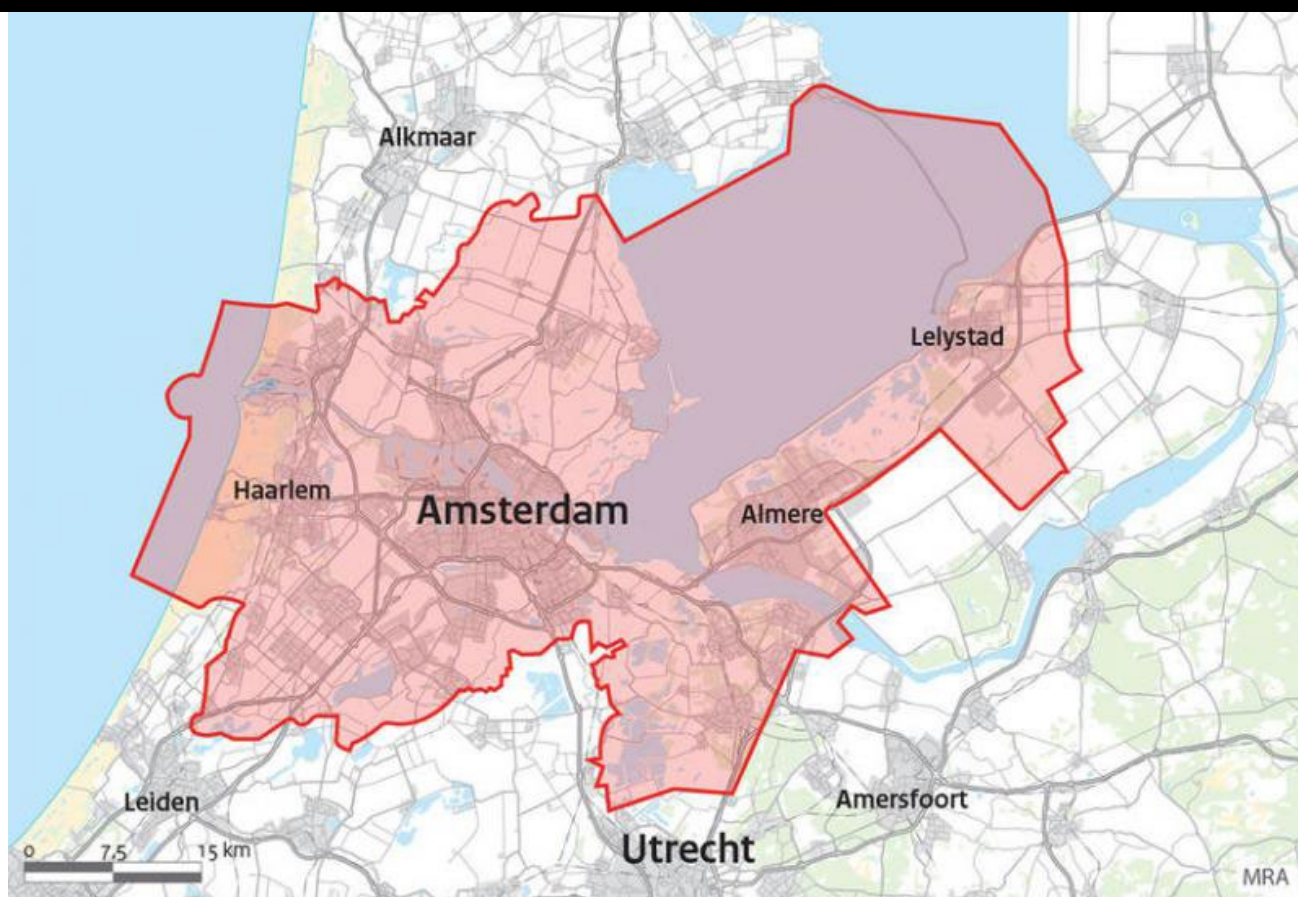


Figure 1: The Amsterdam Metropolitan Area

The programme focuses on the following key objectives for 2025:



Figure 2: Amsterdam Economic Board key objectives 2025 circular economy

GOVERNANCE: TRANSITION MANAGEMENT APPROACH

Moving towards a circular economy is not business as usual but requires a fundamental shift in our economic system. To make this change we need to adopt an innovative governance approach, also called transition management, which is based on the following guiding principles.

1. **All relevant actors should be involved in the change process.**
2. **Changes should take place at micro-, meso- and macro scale.**
3. **There should be room for experimenting and learning, because a transition process cannot follow a predetermined path.** This is not a top-down manner of management, but rather a subtle way of stimulating transition processes towards a more sustainable state. One should continuously adapt, learn and respond to new situations. Learning is therefore crucial in the pursuit of sustainable development.
4. **Connections should be made between innovative practice experiments and changes at the system level.**
5. **One should be aware of the context specificity, the selection and empowerment of frontrunners and the composition of a transitional arena.**

Based on these guiding principles the Amsterdam Metropolitan Area has initiated an ambitious programme, called 'The Metropole region of Amsterdam as Circular Resources Hub'.

The execution of the programme has been in the hands of the Amsterdam Economic Boards challenge lead Circular Economy, respectively Dominique van Ratingen (2015 – 2016), Marjolein Brasz (2016 – June 2019) and Claire Teurlings (July 2019 – present) and is orchestrated by Jacqueline Cramer, member of the Amsterdam Economic Board (2015 – present). In 2018 the Regional Board of Local Governments have also appointed two programme managers to coordinate the governmental activities (Jolein Baidemann and Marten Boels).

THE DESIGN OF THE PROGRAMME

The circular economy programme of the Amsterdam Economic Board identifies 4 phases in all its activities:

- **Phase 1:** Drafting the circular economy programme
- **Phase 2:** Building circular initiatives
- **Phase 3:** Scaling up at regional level
- **Phase 4:** Mainstreaming at national level

From 2015 – 2018 all activities in the programme focused on phases 1 and 2.

In 2019, phase 3 started for those initiatives that realised new business development. Phase 4 is not yet in sight.

Phase 1 - drafting the circular economy programme - evolved relatively fast due to the comparatively favourable cultural and political climate in the region. This positive climate has not only enabled the emergence of the circular economy

programme of the Board, but also triggered other circular initiatives at the local level and within industry.

Phase 2 – building circular initiatives – is key in the implementation of the programme and can cover a variety of activities. After four years the results of the circular initiatives that had been build, were monitored and evaluated. Reflecting upon these results led to the start of a next round of activities in January 2019.

To stretch the circular ambition of the programme, the aim was to set up activities that focus on the highest possible steps on the ladder of circularity (after Cramer, 2015):

Levels of circularity: 10 R's



Figure 3: Level of circularity: 10R's (After Cramer, 2015)

In Phase 2 we have a variety of activities. The ladder of circularity influenced the strategic focus. We applied two strategies.

TWO MAJOR STRATEGIES

1. Development of infrastructure

This section explains the strategies that we type as 'infrastructure'. With this approach we aim to initiate and grow activities that are needed to support the transition and are independent of an industry or material stream.

1.1 Circular procurement.

Procurement professionals hold a key position in influencing market demand and drive innovation around circular business. In redefining procurement needs, sellers are rewarded for their circular solutions and innovations. In doing so we create a market for a wide variety of circular products¹ and services. Furthermore, it requires new consortia of companies working together, deviating from the know linear supply chains.

Three communities of practice were set up successively, with in total 31 representatives of procurement or sustainability divisions from local

governments and other contractors (for example businesses and knowledge institutes).

The goal was to gain knowledge about circular procurement, exchange experiences and explore potential cooperation. Each community of practice consisted of 6 sessions, in which the participants learned from each other and acquired the necessary expertise to implement circular procurement within their own organisation. The participants chose a few procurement trajectories to start with and planned to add more in the coming years. It was left to the participants themselves to decide which trajectories they would select.

In order to be as innovative as possible, the participants were encouraged to include start-ups as well as scale-ups. Investments were made particularly in the following five product groups: demolition and construction, office furniture, road signs, catering, and data servers and ICT business equipment. To plan and monitor the circular procurement initiatives of local governments, a 'circular procurement' roadmap was jointly formulated under supervision of the government programme manager Jolein Baidenmann. Representatives of industry and knowledge institutes are currently interested in adopting a similar roadmap.

Key results

150 million euros invested in circular procurement. Moreover, 31 municipalities and the two provinces of the region have signed a manifesto which committed them to realise 10% circular procurement by 2022, 50% in 2025 and 100% as soon as possible.

1.2 Human capital agenda for the circular economy

Jobs of the Future

The circular economy programme of the Amsterdam Economic Board also pays attention to the potential of the transition towards a circular economy for circular jobs. We strongly believe that the future is shaped by the next generations. To achieve this major transition we ensure that our educational institutes entertain the notion of circular economy within their complete curricu-

lum, incorporate it in specific subjects and make it part and parcel of their own vision and mission. Therefore a 'Manifesto Circular Education' has been formulated and signed by 15 frontrunners in education (from primary to scientific education) in the Amsterdam Metropolitan Area.

To support the above initiative, to consultancy firm Circle Economy and Erasmus University Rotterdam have written the report "[Circular jobs and skills in the Amsterdam Metropolitan Area](#)", the world's first regional deep-dive to explore the

character of jobs and skills in the circular economy. Additionally, it provides practical actions for urban policymakers to boost the development of a future-proof and circular workforce. The report

was produced for the City of Amsterdam and the Amsterdam Metropolitan Area. The Board actively supported the development as steering committee member.

Key results

Commitment of 15 educational institutions and 225.000 citizens ranging from kids to young adults involved in the notion of circular economy.

2 Closing the loop of resource streams

The aim of this strategy is to create ecosystems in which resource streams are recycled and if possible reused and redesigned. The following nine main resource streams, consisting of many sub-streams were selected:

Closing the loop of 9 priority resource streams



Figure 4: Closing the loop of 9 priority resource streams

These resource streams were chosen because of their high volumes, large environmental footprint and potential for innovative improvement in terms of recycling, product reuse and redesign. Priority was given to household resource streams, because more public data are available about those compared to business resource streams. Although data on volumes was missing, some business resource streams were also included because these were prioritised by members of the Amsterdam Economic Board (viz. data servers, demolition and building, metals and the resource stream of the food industry which is a sub-stream of biomass).

The objective per waste stream was to build consortia of parties that were willing to jointly set up

challenging circular initiatives. Here we applied the previously mentioned 4 phased approach and focussed on reaching end of Phase 2 to enable scaling to regional level (Phase 3).

- **Phase 1:** Drafting the circular economy programme – design an action plan (see below)
- **Phase 2:** Building circular initiatives
- **Phase 3:** Scaling up at regional level
- **Phase 4:** Mainstreaming at national level

The Board designed and adopted a generic approach to generate and select the most promising options for closing the loop of each resource stream. Experiences showed however, that this generic approach had to be applied flexibly. The overall approach was as follows:

The approach of material streams is tailor-made



Figure 5: Generic approach to generate and select circular options

The approach adopted has often led to innovative steps towards the circular economy. The parties involved strived for ambitious solutions, both for generating new products (flavour additives, phosphate and calcite, insulation material and regenerated clothes, diapers and mattresses) and the reuse of products (building materials and data servers).

New business models were adopted in about 60 percent of all cases. The most often applied

model was the 'shared costs and benefits model', in which key actors jointly estimated the overall cost-result ratio in advance and made a calculation that reflected the share of each actor in a well-balanced manner. Such an honest account of the costs and benefits was often needed to build a viable consortium, which was economically attractive for all consortium partners. Other new business models that were applied were: leasing, sharing and the introduction of a cooperative or voluntary producer responsibility scheme.

Key results

High value recycling and product-redesign and reuse of 20 resource streams. Find the examples below.

High-grade food waste processing

Waste streams from the food industry consist of valuable resources which can be reused, for example to produce flavouring additives. Plans for a bio-refinery that reclaims nutrients are being developed by a startup (a spin-off from a flavouring additive manufacturer) in collaboration with the University of Amsterdam's Green Campus. To obtain sufficient residual food waste streams, co-operation is needed with major food companies

in the region. The Board actively supported the making of this consortium. Also read: [High-grade food waste processing](#).

Roadside grass as a green raw material

The processing of organic waste from public green space (e.g. grass and clippings) focused on recycling organic waste from public green space to produce energy and resources. The Board helped to form a consortium consisting of a

recycler, three public authorities that provide the waste material and a start-up that is able to make insulation material from the reclaimed resources. Also read: [Roadside grass as a green raw material](#).

Green Energy Factory

The production of green gas, heat, compost, citrus fuel and water from organic waste has been set up by Meerlanden, one of the main waste incineration facilities in the region. Their so-called Green Energy Factory was built in Rijsenhout, just south of Amsterdam Airport Schiphol, and uses vegetable, fruit and garden waste from nine municipalities and 4,000 companies in the region as input. The Amsterdam Economic Board helped to set these developments in motion by conducting thorough market research and bringing together the parties concerned. Also read: [Organic waste: the start of something beautiful](#).

Circular demolition and construction

Circular building and construction got a boost in 2017 through the initiation of a platform for circular building and construction co-financed by the local governments of the Amsterdam Metropolitan Area. This platform, called [C-creators](#), is an independent foundation that aims to accelerate circular construction and building through learning by doing and experimenting. The Board has supported the establishment of this platform.

Electronic/electric waste

Sorting materials is the first step towards closing the loop of discarded products. The Board has encouraged the two main waste incineration facilities to expand the facilities for dismantling electronic and electric equipment in special service centres. However, the next step of reclaiming the materials is not considered as the core business of the two main incineration facilities and therefore is left to others. The reclamation of two resource flows – plastics and cables – is already a viable business. The other main resource, printed circuit boards, is reclaimed abroad. As new techniques have emerged that can achieve higher value recycling, the Board acts as a match-

maker between niche company and the Port of Amsterdam to set up an innovative recycling plant for printed circuit boards. Also read: [Major steps in e-waste: recycling electronic equipment](#).

Non-wearable textiles

Sorting is the first step in closing the loop of the resource stream of non-wearable textiles. The Board has actively supported a scale-up that anticipates market opportunities in sorting these textiles using innovative technology. This sorting company has initiated the next step 'generating fibres' by building a consortium with a commissioning partner (a municipality), a textile collector and a niche company that can produce new clothes from the fibres. To complete the consortium, the partners are still looking for a company interested in mechanical defibrating. Although the consortium can start with one municipality as commissioning partner, the business case will clearly improve when more municipalities join the initiative and supply non-wearable textiles. Efforts are therefore being made by the Board and the governing board of the local governments to interest them in harmonising their procurement policies with this initiative. Also read: [From discarded textile to new thread](#).

Plastics

Sorting is the first step in reclaiming the different plastics for reuse. The Board asked the Port of Amsterdam (as landowner) to approach a niche company identified by the Board as an expert in innovative plastic sorting techniques. This has resulted in the development of a new initiative which will shortly lead to an up-to-date facility for sorting plastics. The largest waste incineration facility in the region will become the main supplier of the resource stream of plastics.

Diapers

The Board called for the reclamation of resources from recycled nappies in order to produce R-plastic, sterilized cellulose and sterilized super absorbing polymers for new applications. Having investigated the most promising options avail-

able in the market, the Board approached the waste incineration company in Amsterdam to determine its interest. As nappy recycling was appropriate to the diversification of its portfolio, the company was willing to co-invest in demonstration and commercial scale facilities. The next step was to select the most appropriate candidate, which happened to be a scale-up – a spin-off from a nappy manufacturer. Together with this company, the Board and the waste incineration company built a consortium with a customer and various municipalities to organise the collection of nappies. The initiative could then be launched. Also read: [Pilot to recycle millions of nappies.](#)

Mattresses

The increasing pressure on manufacturers to improve the redesign and recycling of mattresses became an incentive for action. This pressure is primarily caused by the technical problems that waste incineration facilities encounter in storing and processing mattresses. The existing alternative pathway – mattress recycling – is very expensive, which implies that it is barely possible for the two Dutch scale-up mattress recyclers to survive. To solve this stalemate, the Board has initiated a national initiative to set up a voluntary producer responsibility scheme. This includes a small price increase for each mattress sold in order to finance collection and recycling and to promote the redesign of mattresses for reuse and recycling through innovation. Mattress manufacturers are now taking the lead in decision-making on this plan.

In anticipation of the introduction of this initiative, an innovative manufacturer has already managed to redesign and sell a 'circular' mattress that sets an example to the entire sector.

Data servers

The case of data servers has been initiated by the Board in view of the rapid expansion of the data centre sector in the Amsterdam Metropolitan Region. The Board has approached key actors in the sector to help increase the circularity of data servers. A consortium consisting of a manufac-

turer, two industry associations and a data centre was formed. The first problem was a lack of knowledge about what happens to data servers once they are discarded. As there is no overarching administrative system, equipment is entirely untraceable, which hampers high value recycling. A Board partner adopting blockchain initiatives helped to address this problem. Knowing what happens to data servers after use also increases the interest in reuse (including the refurbishment of data servers in whole or in part). Consequently, SMEs and niche companies that can provide these services have become more involved. The data servers themselves are produced on the world market, which makes it hard for regional bidders to exert a radical influence on the product design. Also read: [Half a million data servers a year discarded in the Netherlands.](#)

Metals recycling

The Board has promoted the reuse and high-value recycling of ferro and non-ferro metals. The first, relatively easy step was the recycling of cans by connecting the waste incineration company to the major steel company in the region. However, more radical, innovative steps, have proven to be harder to make. Over 50 per cent of all (mostly polluted and/or mixed) ferro and non-ferro metal scrap is being exported, while the rest is being recycled in the Netherlands. In order to create new business through innovative processes and to reduce the export volumes, the Board has searched for interesting candidates. New promising options have been put forward, which are currently being prepared. They include reuse activities, particularly in the building sector, and new steps in recycling techniques in ferro and non-ferro metals.

NEXT STEPS

In the coming four years (2019-2023) the circular economy programme of the Amsterdam Economic Board will focus on:

- a. Scaling up the circular initiatives that have proven to be successful on a regional scale
- b. Enlarging and strengthening the circular procurement community in the region
- c. Initiating a next round of initiatives to close the loop of resource streams, particularly focussed on industrial resource streams

Drivers of success

The main lesson we have learned is that the success depends on a number of main drivers that are relevant for all initiatives. Firstly, there should be one or a limited number of initiators that act as inspiring 'transition brokers'. Secondly, cooperation across the product chain (including end-users) is key, including trust and mutual respect. A combined effort on the part of innovative companies and forward-thinking universities, plus a government to stimulate, facilitate and connect them, is crucial. As together they know more, and can achieve more. Thirdly, new financial and organizational arrangements are important to create a convincing business case. Finally, additional tailor-made incentives need to be attuned to the specific product-/waste stream at stake. One of the main incentives is circular procurement.

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Further reading:

J. Cramer, Moving towards a circular economy in the Netherlands: Challenges and directions, in Proceedings van The HKIE Environmental Division Annual Forum, 'The Future Directions and Breakthroughs of Hong Kong's Environmental Industry, Hong Kong, 17 April 2015, pp. 1-9.

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