Future perspectives for Amsterdam as a circular city

amsterdam smart city

This white paper is an invitation to discuss the next steps towards developing a circular economy in Amsterdam.

Amsterdam is a prosperous city; it is appealing to residents, businesses and visitors. Progress is being made on laying the foundations for a more sustainable and flexible city with a circular economy. This is crucial to ensure that Amsterdam remains a strong, attractive and liveable city in the future.

Increasing the speed with which we reduce CO_2 emissions is becoming increasingly important. The transition from fossil fuels to sustainable energy sources plays a key role in achieving this, together with reducing the amount we throw away, reducing waste and using raw materials more efficiently. In the short term these measures will contribute to our climate change goals, and in Europe this could lead to a 48% reduction in CO_2 emissions by 2030.

The way we produce and consume goods in a linear economy is no longer sustainable for the long term. In its sustainability agenda, the circular economy is one of Amsterdam's mainstays for innovation. In 2015, Amsterdam declared its goal of becoming a leader in the transition to a circular economy. In declaring the ambition to make Amsterdam a 'circular city' by 2050, the city has set challenging target. This is not only a matter of necessity; a circular economy will also provide opportunities for the city's economy and quality of life. Over the past few years, through its Circular Amsterdam and the Innovation Programme, the city government and partners in the city, have carried out a number of projects, studies and pilots experimenting with the principles of a circular economy. This was a good initial step and it is now the right moment to take the transition towards a circular city to the next level.

In the run up to the city government's new term of office, we would like to invite businesses, universities and research institutes, social organisations and government bodies to join the discussion about our approach to transitioning to a circular economy for Amsterdam. This involves examining the way we are organised and the choices and investments we need to make. The perspective outlined in this paper will provide inspiration for this discussion.

At the start of this year, the programmes 'Amsterdam Circular: Learning by Doing' and 'Circular Innovation Programme 2016-2018' were evaluated. Partners from the Smart City network have produced this paper based on insights from this evaluation and by looking ahead to the choices that need to be made. The result is a potential perspective on Amsterdam's future as a circular city and the steps that need to be taken to achieve a circular Amsterdam.

We will cover the following:

I. What are the ambitions and challenges we face to achieve a strong, liveable and sustainable future and how can a circular economy contribute to this?
II. What will a Circular Amsterdam look like and what transitions are important to achieve it?
III. What do we already do well and should therefore continue doing?
IV. As a city, what do we need to do in the near future in order to take the next step?

Businesses ⚯ *Government Bodies* ⚯ *Residents*

I. AMBITIONS AND CHALLENGES

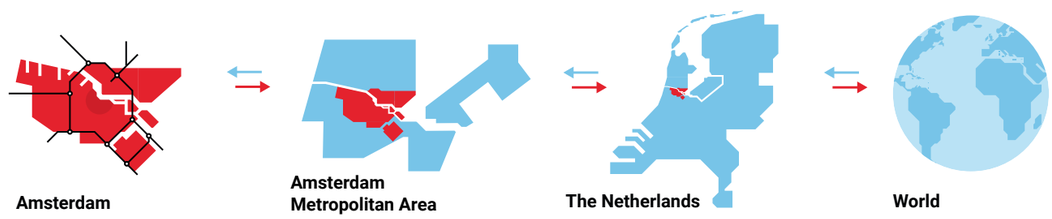
A strong, liveable and sustainable future for Amsterdam

More and more people are moving to Amsterdam, more are more businesses are choosing the city as their location, and more and more tourists are visiting. Amsterdam is growing, and the economy is flourishing. In the city, we promote social diversity and inclusivity, with equal opportunities for everyone. In the future, this approach will help maintain Amsterdam as an international, dynamic place to live and work, and the attractive tourist destination that it is today.

People sometimes take Amsterdam's success for granted. But it is a major challenge to maintain Amsterdam as the attractive city it is today. Amsterdam's growth also has negative implications. An increasing number of residents and stronger economic activity naturally leads to increased consumption, higher use of energy, water and products, and more waste. The demand for raw materials and resources increases while the availability of these limited raw materials and resources shrinks. Growing demand, and the fact that many of these resources are finite, leads to scarcity and wide fluctuations in price. The way we produce and consume in a linear economy is simply not sustainable in the long term. There are also short-term implications. A circular economy provides opportunities for the economy, makes the city more liveable and places Amsterdam in a leading international position. In order to remain competitive, we need to act now.

To solve the challenges we face, partners in Amsterdam endorse the urgency needed to move to a circular economy. They share the city government's ambition for a circular Amsterdam by 2050. A circular economy extends beyond Amsterdam's boundaries and will require a regional, national and international approach. A circular economy is one of the European Commission's top ten priorities. From a national perspective, the Government's goal is for a fully circular economy by 2050. And the Amsterdam Metropolitan Area (AMA) is also increasingly adopting circular programmes, such as the AMA Agenda.

According to Amsterdam's partners, it is logical that Amsterdam, both as a municipality and as a part of the Amsterdam Metropolitan Area, should take a leading role. A full commitment to the transition to a sustainable and more flexible city with a circular economy is the only way to guarantee that Amsterdam remains a strong, liveable and sustainable city in the future. With its many entrepreneurial residents, innovative start-ups and businesses, universities and research institutes, and other organisations that are already involved with the circular economy, the AMA has a strong basis.



OPENING THE DISCUSSION

Choices about what we aim to achieve by transitioning to a circular city

By 2050, Amsterdam will be circular. In the Sustainability Agenda and the Circular Innovation Programme, the City of Amsterdam identified guiding principles. These principles have not yet been translated into practice, and consequently they still do not provide a sufficiently firm basis for the choices that now have to be made about the transition to a circular economy. At the same time, the principles are interrelated, and each has its own pace of development. For example, reducing waste cannot happen without a change in behaviour, which itself will take more time than measuring raw material usage.

We need to translate the principles into concrete ambitions and explain what these ambitions mean for the role, behaviour and approach of the public, the authorities, commerce, and universities and research institutes. The Amsterdam Smart City network is therefore calling for a discussion on how we can achieve a circular economy in Amsterdam, and how rapidly. The points outlined below provide a starting point for this discussion.

7 GUIDING PRINCIPLES

1. A circular city produces no waste. All materials form part of a closed technical or biological cycle.

- No rubbish or food waste is produced. All materials and scrap are reused in a high-quality closed cycle. The life expectancy of products has been extended as far as possible.
- On the street, waste bins as we know them today no longer exist. They have, for example, become raw material collection points for materials and goods that can be reused.

2. All energy is provided by renewable sources

- Amsterdam is an energy-neutral city and all energy is provided from renewable sources.
- Waste is no longer purchased as a fuel for power generation, and household waste is no longer burnt.
- The city is no longer connected to the natural gas network. Neighbourhoods are self-sufficient in providing their own renewable energy via local power grids and exchange renewable energy, possibly tax free.
- Areas in the city have been set aside for the production of renewable energy. Facilities for producing energy are integrated into the urban environment as a matter of course.
- Transport in the city is part of the circular urban metabolism. Vehicles run on renewable energy sources.

3. Raw materials (financial or other forms) are used to create value

- Various production processes and the supply and demand of raw materials are optimally aligned, so that businesses use a circular business model and residents themselves become the provider of goods and materials. This changes the way we produce and consume.
- Wherever possible, products are produced and repaired locally. Production processes are flexible and are shared in order to produce as much as possible locally.
- Everyone has access to simple applications for real-time insights into the flow of goods and materials in the city. This encourages us to make more conscious choices and all residents feel concern for the environment they live in.

4. Modular and flexible product designs and production processes increase the adaptability of the system.

- In urban planning all new public spaces, infrastructure and buildings are designed with flexibility in mind. This means that as requirements change, their use can be adapted, or modules can be disassembled. We will also examine how existing buildings can be transformed to work in a circular economy.
- All new construction and renovation in Amsterdam is 100% circular and climate neutral. Designs are flexible, using modular components and reusing building materials.
- All services and infrastructure (such as cables and pipes) are installed such that energy, water and waste is produced, used or reused locally. Utilities are no longer only supply and delivered, but also returned and shared.
- All products produced in Amsterdam are 100% circular and climate neutral. Designs are flexible and raw materials are reused.

5. The change from consumer to user calls for new business models for production, distribution and consumption.

- Everybody shares and makes use of goods as a service. Ownership of goods has declined and sharing platforms and pay-per-use have become part of everyday life.
- Revenue models have been adapted accordingly. The focus has shifted towards long-term profit, and external costs are considered. Life expectancy for products has been improved and they are used more efficiently as people pay for use rather than ownership.

6. The logistics system is changing with an increase in regional logistics and return logistics.

- Emission-free industrial and logistics chains are designed around maintenance and product returns based on the principal of 'perpetual ownership'.
- Extra space is provided for businesses that work together in clusters, in production chains.
- Significantly more food is produced within the region (50%).
- Transport of waste and raw materials is increasingly combined. Empty delivery vans no longer make unnecessary trips through the city.

7. Human activity contributes to ecosystems and ecosystem services, and the recovery of natural resources.

- In 2050, Amsterdam is able to produce 50% of the food it consumes. The footprint required to satisfy Amsterdam's consumption, production and services (currently 80% imported) is significantly smaller.
- Amsterdam makes a positive contribution to the recovery of natural resources and ecosystems, as natural solutions and natural materials form the basis for the design of products, buildings and urban planning. This makes ecosystems more visible in the city and improves quality of life.
- Amsterdammers opt for green roofs, vegetable gardens, local produce and organic products,

A SMART AND CIRCULAR AMSTERDAM

7 guiding principles

There is no waste

Energy is clean

Raw materials = renewable materials

Buildings and products are flexible

Consumer has become user

Logistics are efficient

Ecosystems are the basis

In a circular city, these principles are closely interwoven:

What do we aim to achieve?

A socially and economically strong city
Opportunities for innovation and entrepreneurship
Stronger social networks with equal opportunities

A liveable city
Clean air
Space for parks, gardens and exercise

A sustainable city
Closed raw-material cycle
Clean energy

A VISION OF THE FUTURE

A CIRCULAR CITY

For the transition to a circular economy, it is important to have a shared concept of what a circular city is like, but as yet, there is no general agreement on this. What will Amsterdam's circular economy be like in 2050? Based on the guiding principles, we have sketched out a broad view of what a Circular Amsterdam could look like in 2050.

It is 2050. Amsterdam has developed into an even stronger economic engine for the Netherlands, and the Amsterdam Metropolitan Area is one of the top five strongest metropolitan areas in Europe. This success has been achieved through a circular economy. Amsterdam's CO_2 emissions have been reduced without negatively impacting its competitive position. In fact, Amsterdam has become even more attractive from an economic perspective.

With entrepreneurship and innovation being part of an Amsterdammers' DNA, by 2025 we were already the leader in the field of smart solutions for scarce raw materials. And now, in 2050, businesses, government bodies, universities and research institutions, and active residents have taken big steps towards achieving a fully circular city. As a result, Amsterdam has become even more appealing for companies and more liveable for residents and visitors. The city has experienced rapid growth and has become busier without sacrificing its liveability.

In a circular Amsterdam, everybody uses raw materials, energy and waste more effectively. We have created a sustainable relationship with our environment and we increasingly find solutions in our own region.

Businesses have formed new networks for supply chain collaborations, which in turn have resulted in new business models based around a circular economy. Start-ups with new earnings models have developed and are visibly contributing to the regions prosperity and liveability. Amsterdam has created even more scope for innovation and consequently there are many new start-ups within the AMA. The city government supports these circular start-ups and businesses that are clustered with supply chain partners. Not only small businesses operate according to circular principles, but also large-scale industry. The Port of Amsterdam plays an important role in providing space for and collaborating with supply chains. We have achieved economies of scale and as a result the circular economy has become profitable. To support this, sufficient space has been made available in and around Amsterdam. This has been achieved despite large scale residential housing development on land that was originally intended for commercial use. A coherent regional approach has been essential in achieving this; Amsterdam is a metropolitan area.

Every Amsterdammer is a circular entrepreneur with each resident contributing to the circular economy. Residents have become 'urban miners' and waste is a thing of the past. Anything surplus to requirements is a raw material that can be used. Discarded goods and materials are taken to an upcycle centre where they are turned into something useful for others. The production of energy has become an integral part of the urban environment. Residents are supplied with renewable energy via neighbourhood grids, which allow them to exchange energy tax free. Food is increasingly produced in the city by residents themselves, using smart techniques.

Of course, this all has implications for the way the city looks in 2050. Public facilities for material collection, waste water treatment and energy supply are visible on the street. All new construction, renovation, and spatial planning is according to circular principles. Building materials are reused and new buildings are flexible and modular. For example, a building that starts life as a shelter for homeless people can be transformed quickly into housing. High levels of visibility mean that people become more conscious of their environment. The circular city is no longer an abstract concept.

II. WE'RE ON THE RIGHT TRACK

Amsterdam Metropolitan Area partners have been working together towards our ambitions for a circular city. These partnerships are not only a result of the urgency with which change needs to happen, but also because the city's transition to a circular economy brings opportunities!

It stimulates innovation and entrepreneurship, reduces dependency on imports, improves the quality of life for residents and creates new jobs. Over the past few years, through the projects 'Amsterdam Circular: Learning by Doing' and the 'Circular Innovation Programme 2016-2018', the City of Amsterdam has worked with partners on several large projects, research projects and pilots. This has enabled them to experiment with the principles of a circular economy.

The transition to a circular economy is a global challenge. Therefore, we are also working together on projects such as the government-wide circular economy programme ('A Circular Economy in the Netherlands by 2050'), and a great deal of effort is invested into sharing lessons learned across international networks. The City of Amsterdam aims to lead by example by, for example, the further implementation of circular procurement and tendering in its processes.

In recent years, the motto was 'learning by doing'. On this basis, over the last few years, 73 projects, including pilots, experiments, research assignments and tool development projects, have been completed. Real-life neighbourhood projects were often involved, as well as projects at a regional level, together with national and international parties. Completed projects were primarily driven by the Circular Amsterdam Programme and the Circular Innovation Programme, which were recently reviewed in the 'Circular Amsterdam Evaluation'. This concluded that the transition to a circular economy is both realistic and financially viable. Realistic due to the availability of technical solutions; financially viable, as circular solutions are becoming increasingly competitive when compared to traditional approaches, particularly when external costs such as CO2 are factored in. The projects identified that the circular economy has an increasingly important role to play.

Based on the evaluation, five success factors were identified:

I. The learning-by-doing approach works and fits with the nature of the city. This approach is aligned with its entrepreneurial spirit and leads to innovative solutions.
II. By focussing on two value chains 'building' and 'biomass and food', Amsterdam made the first steps towards a circular economy more feasible.
III. Research, information and knowledge exchange as well as new forms of collaboration have helped establish many useful insights about the transition to a circular economy.
IV. The City of Amsterdam has set a good example by, for example, integrating circular principals in its procurement process and stimulating circular construction by stipulating circular criteria during land allocation.
V. The Amsterdam City Council plays a key role in ensuring networks work closely together.

With this in mind, a positive first step has been taken. Amsterdam is playing a leading role in the transition to the circular economy. Winning the World Smart City Award for circular economy in 2017 was confirmation of this. And, it's not just the City of Amsterdam. An increasing number of partners in Amsterdam have also made a commitment to the circular economy.

III. NOW IT'S TIME TO TAKE THE NEXT STEP

The gap between the 73 completed projects and 'A Circular Economy in the Netherlands by 2050' remains significant. At the same time, it's becoming increasingly urgent. The route to a circular city has not yet fully crystallised. Together we need to gradually determine the most effective route to making Amsterdam's economy circular. The steps are not set in stone, although previous projects have helped to identify where the challenges lie. The behavioural change required affects everyone, including the entrepreneurial approach of the business community, the role of the government and the way society consumes. This will take time, mutual trust and our undivided attention

OPENING THE DISCUSSION

Making choices about the following steps for the transition to a circular city

To achieve the necessary scale, we must act now. At the same time, we do not know the precise route to a fully circular economy. Together, we need to work out the most effective route step by step. Co-ownership between commercial parties, universities and research institutions, and users is essential for us to achieve our goal.

Increased collaboration is necessary, not only during the transition to a circular economy, but also in relation to other transitions in the city. Transitions in mobility and logistics, the transition to renewable energy, the transition to a digital city, or transitions in the social domain are all examples of transitions that will impact the transition to a circular Amsterdam. Based on the actions below, we would like to invite partners in Amsterdam to join a discussion on the choices that need to be made in order to take the next steps towards a circular Amsterdam.

5 NEXT STEPS

1. Develop an integrated and interdisciplinary plan for the Circular Economy

Develop the guiding principles for a circular economy into more concrete goals for the city. Make this specific to different neighbourhoods, areas and integrated value chains and bring them together in a common Circular Economy Plan. Together, residents, businesses and government bodies can use this to make choices that contribute to a circular city. This plan must include decisions about the following:

- In 2050 Amsterdam is 100% circular. Building work is circular, the Port is circular, there is more circular business activity and more effective use is made of the space and raw materials available in the city. Waste is a thing of the past and fossil fuels are no longer used.
- Choose a neighbourhood-by-neighbourhood approach with a preference for local circular sources.
- Invest in forms of collaboration. Innovative partnerships and the integration of supply chains is essential.
- Cooperatives or open networks significantly increase resident's engagement and their freedom of choice.
- We start by stimulating the transition (for example through rewards), but sometimes compulsion is necessary, for example by means of pricing.
- We identify the right levels of scale – what can we achieve at neighbourhood level, city level, or what needs to be arranged at AMA scale and how can the government assist with appropriate legislation and joint investment?
- A common plan calls for collaboration with educational institutes and businesses. With this approach we lay strong foundations for implementation.

2. Digitise and make it measurable

Make the circular economy measurable and transparent. Only when we are able to monitor streams of materials, raw material streams and goods in the city, will we be able to anticipate and invest in measures that will have the greatest impact. To ensure that transparency and public interests come first, data must be open source. By monitoring data, we will be able to identify what is working, and areas for improvement. This will not only enable us to make the right choices in the beginning, but also to make adjustments as we progress. By considering different future scenarios, we can adapt more flexibly to uncertainties in the long term. As a first step we can start monitoring the 'urban metabolism' in clearly defined areas, for example for specific businesses and/or specific material streams. Later this can be extended to include streams across the entire city, region and/or complete supply chains.

3. Scale up

Following a period of learning-by-doing, it is necessary to scale up. Investment in larger, more complex developments that support circularity is needed. Make use of lessons learned in previous years, and start a more integrated approach that should ultimately increase impact and create a sound business case. Scale up based on the potential courses of action for different value chains as outlined in the Amsterdam Circular evaluation. Start applying circular principles in area development. See barriers as a learning opportunity and translate solutions to these challenges into lessons for the entire city. In this way, the circular city can gradually be extended to all areas.

4. Provide scope to experiment

Small-scale projects spread around the city can help make the transition to a circular economy more visible and tangible for everyone. Use this to increase scale by making circularity visible in more places, potentially in collaboration with residents. This helps to make the circular economy inclusive. Continue to invest in small-scale experimentation in addition to large-scale implementation. This allows for learning on a safe scale and ensures that the circular economy stays visible across the entire city. In order to learn from experimentation, the participation of government bodies, businesses, universities and research institutes, and residents is essential.

5. Establish the right conditions

The challenge for increasing scale relates not so much to technology but to the necessary conditions for the removal of barriers to the transition to a circular economy. Conditions that are currently required to move forward include:

- Make physical space available, by for example giving circular initiatives priority in land allocation.
- To achieve scale, a regional approach is required. More space than currently available in the city is required for commercial circular activity and businesses looking to collaborate in clusters. To achieve industrial scale, more space is required in, for example, the Port area.
- Commit financial resources for the infrastructure and facilities required for a circular city.
- Provide economic and financial incentives to make circular working attractive. For example, through circular procurement, the establishment of a raw materials cooperative to collaborate on solutions and share risks, or an investment fund with the necessary resources.
- In anticipation of a new Environmental Act, make optimal use of the Crisis and Recovery Act in order to create room for manoeuvre.

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5 steps we need to take today

1. Develop an integrated and interdisciplinary plan for the Circular Economy

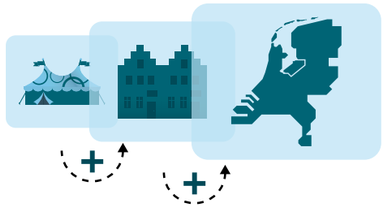
Establish common goals

2. Digitise and make it measurable

Measure, analyse and make it transparent

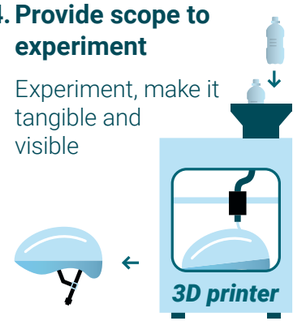
3. Scale up

Scale projects up and draw on lessons learned



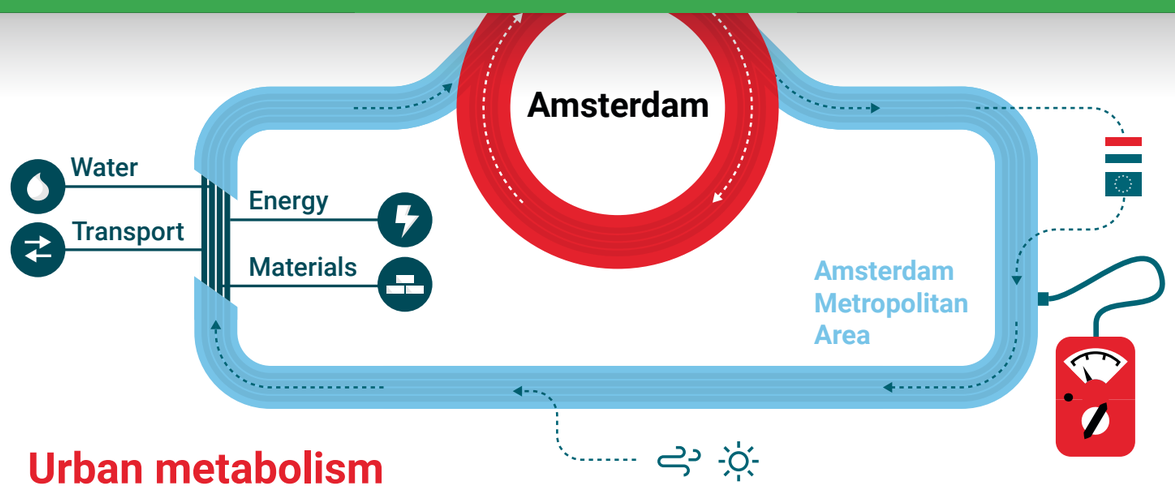
4. Provide scope to experiment

Experiment, make it tangible and visible



5. Establish the right conditions

Provide space, the right conditions and commit financial resources

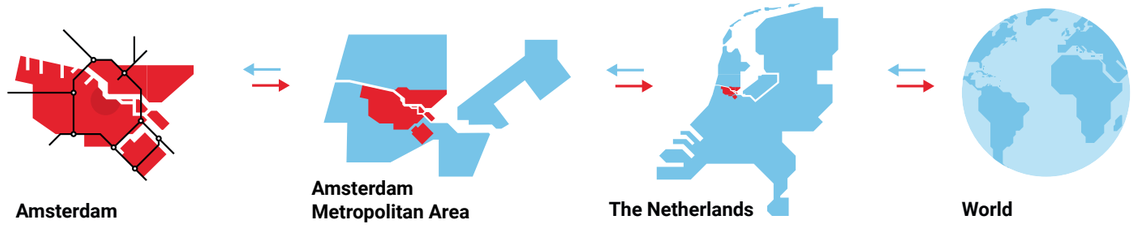


Urban metabolism

A real-time overview of the streams flowing through the city will help us to become smarter, more efficient and develop new networks.

Collaboration between different sized initiatives

Circularity is not limited to a specific location. Collaboration within the entire region, nationally and internationally is crucial for scaling up and speeding up adoption.



Amsterdam

Amsterdam Metropolitan Area

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World

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