CIRCLE ECONOMY | City of Amsterdam

BUILDING BLOCKS FOR THE NEW STRATEGY AMSTERDAM CIRCULAR 2020-2025

Directions for a thriving city within the planetary boundaries

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COLOPHON

Building blocks for the new strategy Amsterdam Circular 2020-2025

This report is the joint product of a collaboration between the City of Amsterdam, Circle Economy and Kate Raworth.

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Circle Economy

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At Circle Economy, we believe in a visionary future for our planet — one in which we do not have to compromise in order to achieve economic, social, and environmental prosperity. As an impact organisation, we connect and empower a global community to create the conditions for systemic transformation. With nature as our mentor, we work alongside businesses, cities and governments to identify opportunities to make the transition to the circular economy and provide a powerful combination of practical and scalable solutions to turn these opportunities into reality. Our mission is to empower a global community of businesses, cities and governments to accelerate the transition to the circular economy through practical and scalable insights and solutions that address humanity's greatest challenges.

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We would like to thank Kate Raworth in particular for her contribution.

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1. INTRODUCTION

Systemic transformation of Amsterdam

Amsterdam wants to be a fully circular city by 2050. To realise this ambition, systemic change is needed. The city of Amsterdam is the first city in the world to use the Doughnut economics model. With this model, Amsterdam is building an integral circular economy strategy for the period 2020-2025; creating a point on the horizon where environmental, societal, and economic priorities take centre stage. This report is the first outcome of this process. It outlines the building blocks for a holistic circular economy strategy for the period 2020-2025 with a forward view to 2030.

The future of Amsterdam's economy is circular

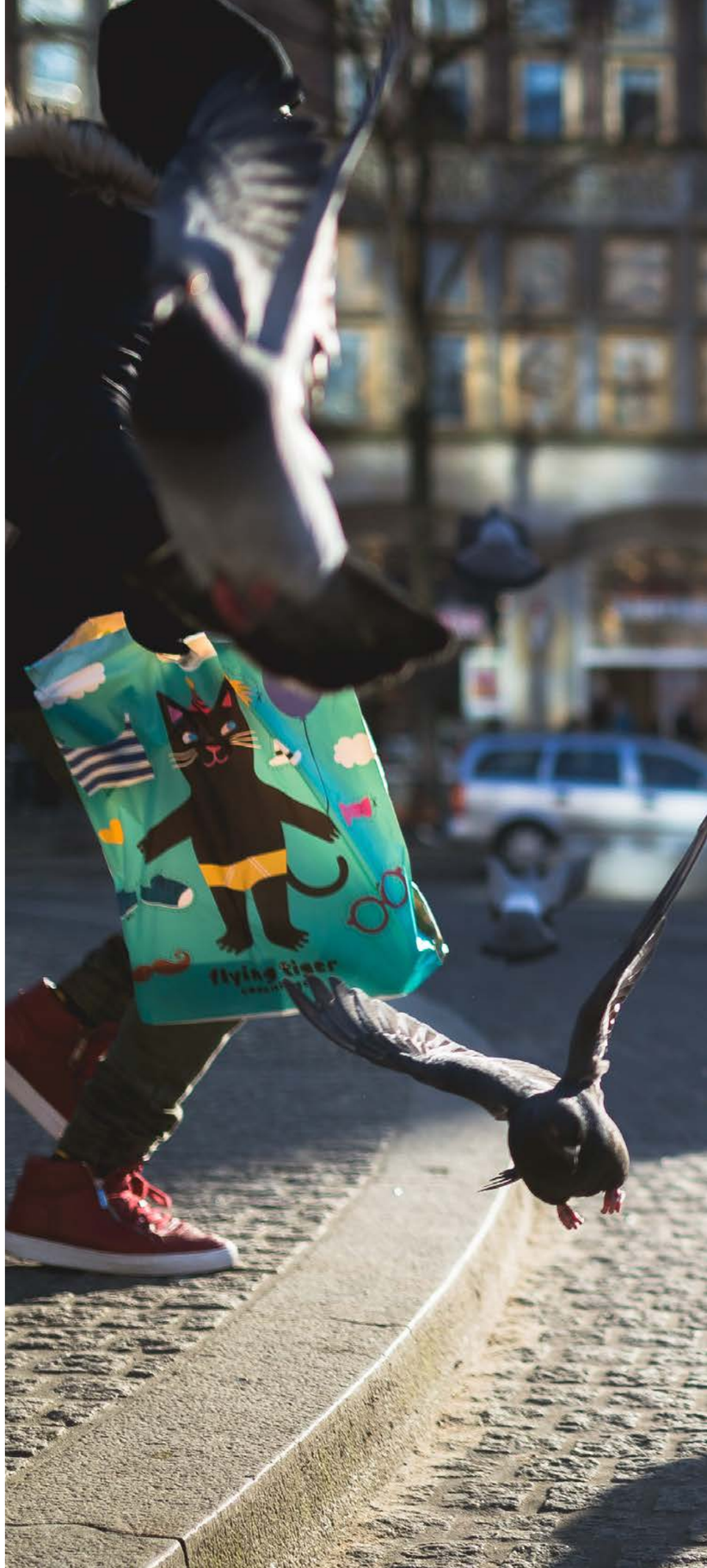
The municipality of Amsterdam wants to transition towards a circular economy as soon as possible. Over the last few years, the city has already completed over 70 projects that contribute towards a circular economy. The evaluation of these projects has proven that the circular economy is both realistic and profitable. To bring the circular economy into mainstream practice as soon as possible, Amsterdam is now focused on upscaling and accelerating these existing circular projects. To do this, the municipality aims to employ all of its municipal instruments available. On top of that, the municipality lobbies on the national and European level for fitting financial, fiscal and legal frameworks.

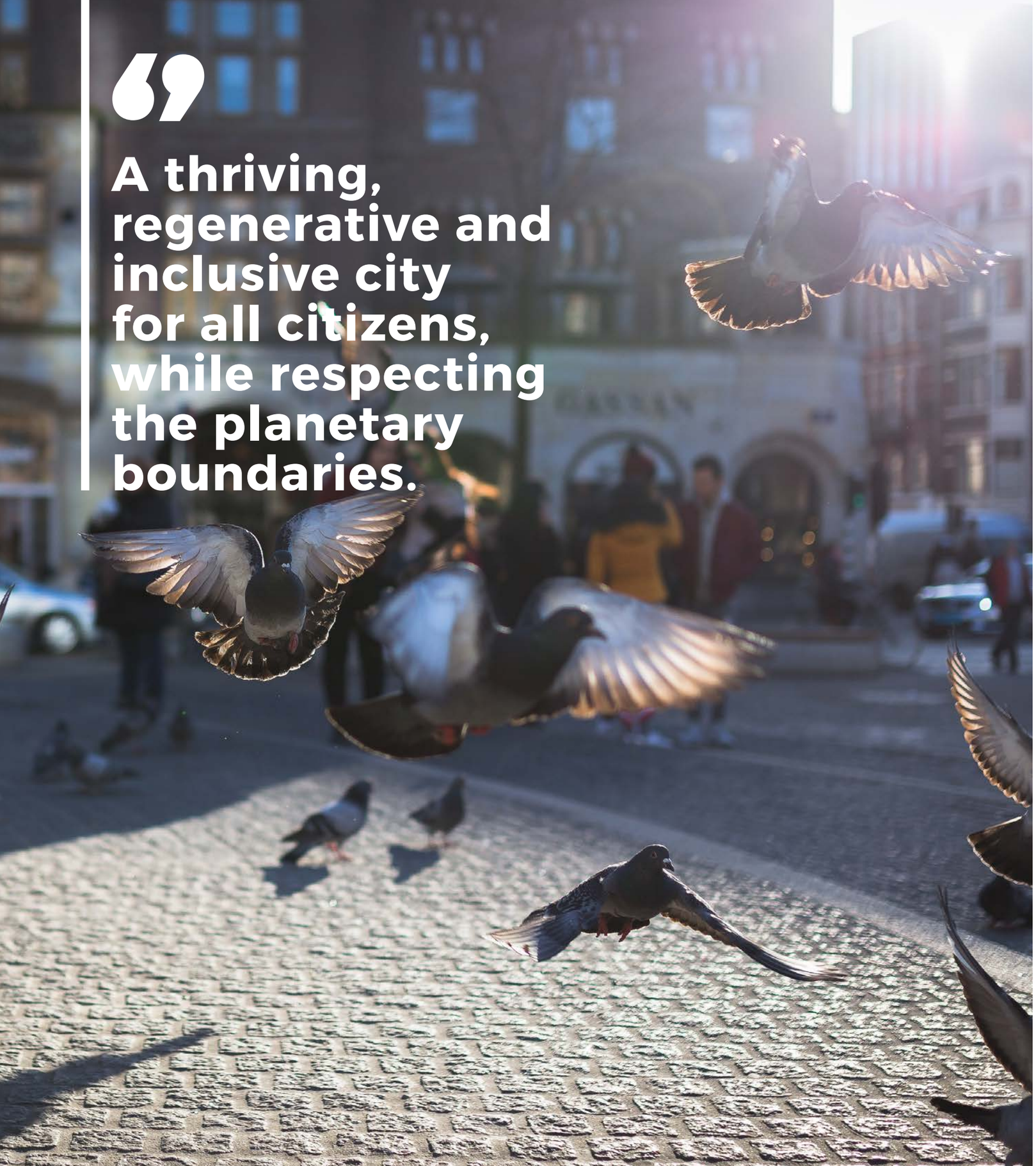
Priorities for Amsterdam

The city of Amsterdam plans to move towards a circular economy as quickly as possible - and by 2050 at the very latest.[1] The municipality has adopted various circular programmes, including Amsterdam Circular: Learning by doing, and the Circular Innovation Programme.[2] To realise a circular economy, a fundamental shift in our present ways of producing and consuming is necessary. This is why the city has prioritised the value chains of Construction, Biomass and Food, and Consumer goods, following the report Amsterdam Circular: Evaluation and Action Perspectives. In the transition towards circularity, these three value chains are key. Currently, the construction sector creates 40% of total municipal waste, consumer goods represent the largest environmental impact of households and one-third of all food goes to waste. By pursuing circularity in these value chains, Amsterdam will contribute to substantially decrease their associated environmental impacts. On top of that, circularity presents an opportunity for the creation of added-value and jobs in the local economy, for instance through the repair of products.

Global momentum for a circular economy

The transition towards a circular economy is not only underway in Amsterdam, but in numerous cities and countries throughout the world. The circular economy contributes to achieving the Sustainable Development Goals (SDGs) and the Paris Climate Agreement,[3] while creating positive effects on themes such as employment, industrial innovation and the social agenda.[4] This is why both the European Union (EU) and China have prioritised the circular economy in their trade and development strategies.[5] Recognising this potential, the Dutch government aims to become 50% circular by 2030, and fully circular by 2050.[6]





A thriving, regenerative and inclusive city for all citizens, while respecting the planetary boundaries.

2. THE **AMBITION**

Amsterdam wants to be, and continue to be, a thriving and equitable city; to ensure a good life for everyone - for all citizens and visitors - without compromising the natural boundaries of the Earth. In the pursuit of equality, the city has set a specific focus on wellbeing, next to welfare.

A finite Earth does not have an infinite supply of resources. This is why it is crucial to work towards creating a more circular economy. The city of Amsterdam is aware of the impacts that its modes of consumption and production generate, both within and far beyond the boundaries of the city. Ultimately, Amsterdam recognises the potential of circular measures towards realising its climate goals. To this end, the city of Amsterdam is challenging all citizens and visitors to be aware of their personal impact and to actively work on decreasing this cumulative impact.

To realise its ambition, the municipality focuses on becoming a circular and climate-neutral city.

The circular city: The city of Amsterdam wants to become a circular city, and aims to use 50% fewer primary raw materials by 2030 and become 100% circular by 2050 at the latest.[7]

The climate-neutral city: The city of Amsterdam has adopted the objective of the Paris Agreement and strives to cut its CO_2 emissions by 55% by 2030. Before 2050, CO_2 emissions should be decreased by 95% in comparison with 1990 levels. The city wants to be natural gas-free by 2040.

Amsterdam's motto is, and remains, "learning by doing". This encapsulates the innovative character of the city and its citizens, companies and knowledge institutions.

3. THE DOUGHNUT ECONOMY

To safeguard the future of the Earth; its flora, fauna and humanity as a whole, it is crucial to create a system that does not overshoot the planet's ecological ceiling. In the meantime, the wellbeing of all people must be guaranteed. To realise the vision of a thriving city, the municipality of Amsterdam has adopted the Doughnut economics model. This model of the Doughnut brings together environmental sustainability and social justice topics under the same umbrella, in an easy-to-grasp framework. It provides a way for the nations, cities, businesses and citizens alike, to work towards creating a safe and just space - creating the building blocks towards the circular economy, and guiding the radical transition towards a new economic system.

The Doughnut model

The Doughnut model, developed by the British economist Kate Raworth, highlights the inadequacies of the current global economic system and the dichotomy between social wellbeing and environmental sustainability. Obsessively focused on producing, consuming, and discarding waste, the global system is driving global environmental crises, while also increasing social inequality - welfare is distributed in an increasingly unequal way. With the Doughnut model, Kate Raworth describes how we can operate in a safe and just space for humanity; a place that allows societies to thrive without harming our planet.[8]

Why a City Doughnut for Amsterdam?

The city of Amsterdam decided to work together with Kate Raworth and Circle Economy to develop the first City Doughnut. With the Doughnut, Amsterdam can develop and shape the city of the future. The Doughnut enables the municipality to develop a holistic vision for a circular economy, design relevant strategic directions and measure progress. The model gives insight into the dynamics between material flows and social and environmental issues, showcasing the deep interconnectedness of our system. On top of that, the model helps in preventing trade-offs when implementing a new circular economy.

THE **DOUGHNUT** MODEL

The social foundation

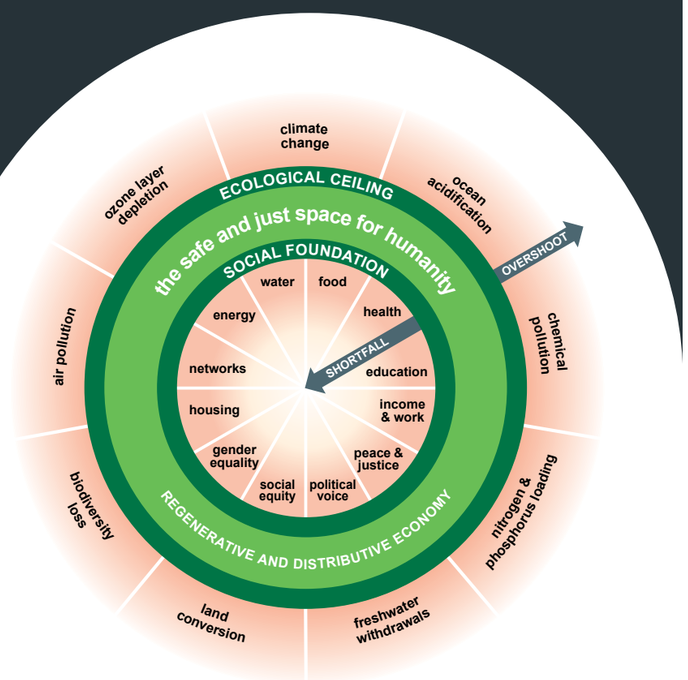
The inner boundary of the Doughnut represents the social foundation. The twelve categories are derived from internationally agreed minimum social standards, such as access to adequate water, health, and peace and justice. These standards were internationally established through the Sustainable Development Goals in 2015.[9]

The ecological ceiling

The outer boundary of the Doughnut represents the ecological ceiling of our planet. This ceiling consists of nine categories. Each category presents a threat to a system or process that is important to maintaining the stability of the planet. We cannot go beyond these limits if we want to ensure prosperity for future generations.

A safe and just space for humanity

Between the social foundation and the ecological ceiling lies a safe and just space in which humanity can thrive.



The process towards creating the first City Doughnut

To create a strategy for a Circular Amsterdam 2020-2025, Kate Raworth's Doughnut model was used as a powerful tool. A participatory trajectory was designed to bring together all involved stakeholders. Together, they formulated the directions for a circular Amsterdam. Over 50 officials from the various departments in the city and region, and over 100 stakeholders from three value chains were brought together.

The process comprised of four steps:

1. Mirroring the current targets of the city with the Doughnut model
2. Developing holistic circular economy directions for the three priority value chains
3. Enhancing the current targets to align them with the ambitions in the circular economy directions and the Doughnut model
4. Enriching and validating the directions with knowledge from the ground

For each step, a workshop was organised with the various stakeholders.

The outcome

The outcome of the four workshops was a set of seventeen directions for pursuing circularity in the key value-chains of Construction, Biomass and food, and Consumer goods. Together they form the building blocks for an inclusive and thriving Amsterdam.

The directions are built upon existing initiatives, best practices and (inter)national policies, as well as strategies that have been pursued over the past years in Amsterdam. Besides environmental issues, the directions cover social topics, such as social equality and employment opportunities.

The seventeen directions form the building blocks towards creating a holistic strategy for the city of Amsterdam - towards the first City Doughnut.

"Around the world, ambitious places are starting to ask a crucial question: how can we thrive here, while respecting the rights of all people and the whole planet? Amsterdam is at the forefront of asking this very 21st century question and has begun a pioneering journey of putting its implications into practice.

It has been a huge pleasure for me to work with the officials and residents of this city over the past five months, using the Doughnut to start answering this question. Together we have turned the Doughnut into a creative tool for big-picture thinking, exploratory discussions and strategic planning, and I know that the innovations made here will inspire many other places to start asking similar questions, and to find their own place-specific answers.

Amsterdam has of course already shown clear leadership with the city's existing circular economy ambitions. Through this project, in collaboration with the team at Circle Economy, the city is forging ahead once again, drawing up a transformative roadmap for circularity that sets it on course to become one of the world's most regenerative and inclusive cities. I have no doubt that the impacts of this work will ripple far beyond the city limits, spurring others to summon such vision, ambition and momentum towards the future that we want and need to create."

Kate Raworth

June 2019

4. CIRCULAR ECONOMY DIRECTIONS FOR AMSTERDAM

4.1 Seventeen circular economy directions

In the transition towards a circular economy, Amsterdam has prioritised the three value chains of Construction, Biomass and food, and Consumer goods, following the report Amsterdam Circular: Evaluation and Action Perspectives.[10] The three value chains have the potential to create positive environmental and economic impacts, and drive the transition towards a more circular and equitable economy. To realise circularity in these priority value-chains, seventeen circular economy directions were formulated.

The seventeen directions presented in the following chapters are built upon existing initiatives, activities, and strategies that have been pursued over the past years in Amsterdam. (Inter)national policies, best practices and the recommendations presented in the report Amsterdam Circular: Evaluation and Action perspectives have also been taken into account while designing the seventeen directions.

Each circular direction was designed and tested in a participatory process with over 50 representatives from the municipality of Amsterdam. In addition, the directions were validated by over 100 external stakeholders, including businesses, experts and knowledge institutions.

For each of the circular economy directions presented in the next section, the following is described:

- **Description of the circular economy direction:** What is the direction, why is it relevant for Amsterdam?

LEVERS FOR THE CIRCULAR CITY[12]

DIGITALISATION

Digitalisation relates to the incorporation of smart sensors and technologies to collect and monitor data. This enables the tracking and monitoring of material and resource flows in the city. Capturing this data makes it possible for the city to identify where resources are located and distributed, and further extends the possibilities to close material cycles.

TRUE AND FAIR PRICING

In a circular economy, the prices of products and services must reflect their true and full costs. This also includes the indirect social and environmental costs, such as CO_2 emissions, that are incurred to produce the product or service. The city can stimulate true and fair pricing with municipal instruments such as procurement. Also, the city can lobby the national government and the EU.

INNOVATION NETWORKS

Innovation networks connect diverse groups of innovative stakeholders (e.g. startups, corporates, knowledge institutes and artists) to ideate new circular solutions. Fostering innovation networks secures the provisioning and mainstreaming of new circular products and services in the future.

SYSTEMS THINKING

Systems thinking, in practice, is about systemically addressing collaboration issues. It is about good intentions that go wrong, about patterns that trap people and about interventions that have an effect on the system as a whole. Systems thinking is a holistic approach that aims to tackle major issues by analysing and exploring the interrelations of spheres of influence in a system. In order to achieve systemic change towards a circular economy, we need to embrace systems thinking. It demands involvement, participation and alignment of all stakeholders in the city.

EXPERIMENTATION

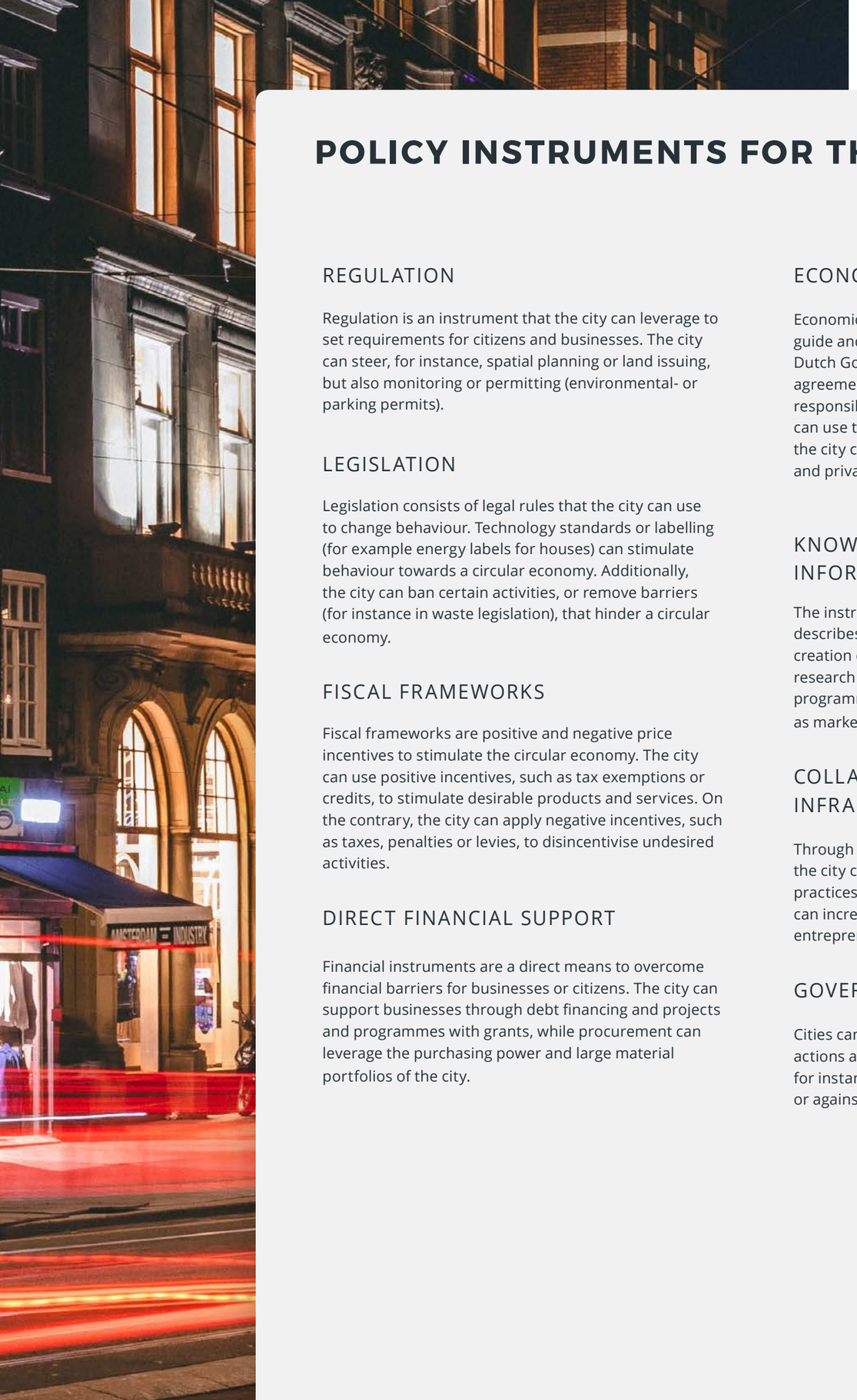
The circular economy requires space to experiment, test and prototype new innovations. Testing with future users helps to validate innovations and identifies those that are ready to be scaled up. Such places could be living labs, incubators or festivals that the city can provide and (co-)create.

LOGISTICS

The circular economy demands an efficient logistics system in which materials can be transported to users, producers, and processors. A city-wide (reverse) logistics networks reduce transportation and enable the efficient recovery of resources.

JOBS AND SKILLS

The circular economy creates new possibilities for employment and also demands new skills. Preparing the labour market, for example through education and training programmes, is essential to accelerate the circular economy.[13]



POLICY INSTRUMENTS FOR THE CIRCULAR CITY[14]

REGULATION

Regulation is an instrument that the city can leverage to set requirements for citizens and businesses. The city can steer, for instance, spatial planning or land issuing, but also monitoring or permitting (environmental- or parking permits).

LEGISLATION

Legislation consists of legal rules that the city can use to change behaviour. Technology standards or labelling (for example energy labels for houses) can stimulate behaviour towards a circular economy. Additionally, the city can ban certain activities, or remove barriers (for instance in waste legislation), that hinder a circular economy.

FISCAL FRAMEWORKS

Fiscal frameworks are positive and negative price incentives to stimulate the circular economy. The city can use positive incentives, such as tax exemptions or credits, to stimulate desirable products and services. On the contrary, the city can apply negative incentives, such as taxes, penalties or levies, to disincentivise undesired activities.

DIRECT FINANCIAL SUPPORT

Financial instruments are a direct means to overcome financial barriers for businesses or citizens. The city can support businesses through debt financing and projects and programmes with grants, while procurement can leverage the purchasing power and large material portfolios of the city.

ECONOMIC FRAMEWORKS

Economic frameworks are economic incentives to guide and foster the market towards circularity. The Dutch Government, as well as the EU, are developing agreements to hold manufacturers and importers responsible for the treatment of their products. The city can use these agreements for local policy. Furthermore, the city can strengthen collaboration between the public and private sectors (public-private-partnerships, PPPs).

KNOWLEDGE, ADVICE AND INFORMATION

The instrument of knowledge, advice and information describes the way the city can directly influence the creation of knowledge. For example, the city can expand research and development activities, initiate education programmes and increase information campaigns (such as marketing for good).

COLLABORATION PLATFORMS AND INFRASTRUCTURE

Through collaboration platforms and infrastructure, the city can enable the sharing of knowledge, data, best practices and information amongst stakeholders. This can increase government transparency and empower entrepreneurs and academics.

GOVERNANCE

Cities can utilise instruments of governance to shape actions and decision-making in practice. With lobbying, for instance, the city and its partners can work in favour or against an activity.

- **Main impacts of the circular economy direction for Amsterdam:** What are the key Doughnut themes (social foundation and planetary boundaries) impacted by the direction?
- **Current state in Amsterdam:** What are the current activities in Amsterdam? And where is the city currently at with reference to developing this direction?
- **Who needs to be involved and what should be done?:** Which stakeholders need to be involved (e.g. businesses, governments and civil society)? What should the different stakeholders do in order to implement the direction?

4.2 Levers and instruments for the circular city

How can the city of Amsterdam give effect to the circular economy directions? Levers and policy instruments support the successful realisation of the seventeen circular economy directions. In some cases, they even act as a prerequisite for a circular city. To support the circular transition, relevant levers and policy instruments are presented next to each direction. Levers apply to all actors in the circular economy, whereas policy instruments are to be used by the municipality specifically.

Levers: Levers are enabling elements that facilitate the transition to a circular economy. The box “Levers for the circular city” presents the levers for all actors in a circular Amsterdam. The levers are applicable to all value-chains. They form the foundation for the transition and are necessary to achieve a circular economy.

Policy Instruments: Policy instruments are interventions that the city can leverage to stimulate the transition towards a circular economy. They are explained in the box “Policy instruments for the circular city”.[11]

4.3 CONSTRUCTION

CIRCULAR ECONOMY DIRECTIONS

- **Foster circular area development through flexible zoning, climate adaptation and regenerative urban design**
- **Incorporate circular criteria into the land issuing and tendering of all construction and infrastructural projects and in the public space**
- **Enable the construction of adaptable and modular buildings**
- **Scale-up circular dismantling and mono-stream collection**
- **Support the use of renewable and secondary construction materials**
- **Stimulate circular retrofitting in private and social housing**

Foster circular area development through flexible zoning, climate adaptation and regenerative urban design

Regardless of how circular a single building may be, it should be embedded in a circular urban environment in order to be fully circular. The design of an area is crucial in creating a socially inclusive and regenerative urban system. The planning and development of districts should be able to adapt to evolving area-specific demands. At the same time, area developments should embrace regenerative energy, water and waste management systems that can support climate adaptivity and the circular economy in the city.

Impact visualisation of the direction according to the doughnut economy model

1 CLIMATE CHANGE

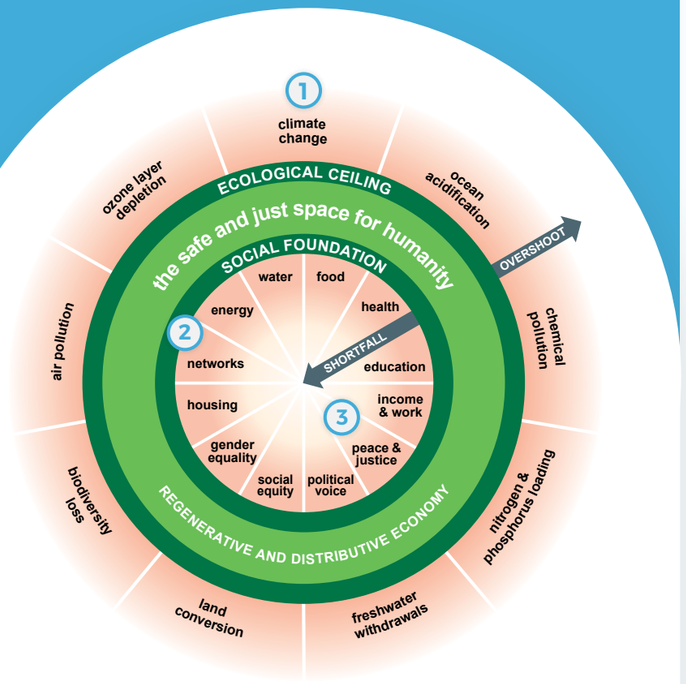
Climate-adaptive neighbourhoods are better capable to adapt to the effects of climate change.

2 NETWORKS

Developing circular districts demands new ways of collaboration within the municipality and with businesses. Moreover, circular areas will enable networks due to their physical properties, e.g. flexibility.

3 PEACE & JUSTICE

By developing more heterogeneous and resilient neighbourhoods, they will become more inclusive and decrease the rate of conflicts and crimes.



Moving towards a circular construction chain occurs on multiple scales; from the construction element, to the building or to the neighbourhood.[15] [16] Buildings need to be embedded in circular infrastructure and urban systems to opera te in a fully circular way. It is important that the planning and development of buildings are able to adapt to area-specific needs that can change over time.

Flexible zoning can, for instance, allow for 'hubs' that can support circular activities. Hubs for reuse and repair, or local nutrient recovery facilities, could be integrated within residential areas to enable the everyday realisation and uptake of circular practices.

At the same time, designing districts or buildings around mixed-uses can enable more efficient use of space, while minimising the impacts of transportation, and overall negative climate impacts. Furthermore, mixed-use districts within the city have the potential to be more cohesive and enable more collaborative and sustainable behaviour.

Impacts of the direction on Amsterdam

Creating climate adaptive and regenerative areas goes hand-in-hand with fostering a healthy and sustainable Amsterdam.[17] [18] Applying the learnings from projects that already use a holistic circular approach (such as Buiksloterham) to upcoming large area developments (such as Haven-Stad), is crucial in embedding circularity in the city of Amsterdam.

CURRENT STATE OF **AMSTERDAM**

There are already a few examples of neighbourhoods in Amsterdam that embed circular principles. Future area developments should ensure that mixed-use criteria are also taken into account and are based on a zoning plan that allows a degree of flexibility to adjust to future changes and changing needs in the area.

Examples of existing initiatives:

- The Haven-Stad area, where 40,000-70,000 new houses will be built, aims for 75% reduction in CO_2 emissions, emission-free mobility, rainproof districts, 50% reuse of resources and 65% waste separation.[19]
- Stadstuin Overtoom, developed by housing association Eigen Haard, is the first climate-neutral district in Amsterdam with energy-efficient residential buildings, a green and car-free environment, and space for businesses.[20]
- Bajeskwartier will be a car-free district with a mix of rented and private housing, providing a green and healthy environment for living, work and recreation.[21]
- Buiksloterham is a sustainable and circular district for living and working.[22]

CITY OF AMSTERDAM

Regulation

- Spatial planning should allow for flexible zoning.
- Challenge the market by adopting criteria on climate adaptation and circular systems in land issuing.

Collaboration platforms and infrastructure

- Share knowledge to adopt circular principles in construction through collaboration and co-creation. Best practices and knowledge in the fields of biophilic[23] design and biomimicry[24] can expand knowledge of architecture and construction firms.

Knowledge, advice and information

- Research the application of flexible zoning, by using shorter leasehold (“erfpacht”) periods.

LEVERS

DIGITALISATION SYSTEMS THINKING

ROLES OF OTHER **STAKEHOLDERS**

REGIONAL, NATIONAL AND INTERNATIONAL GOVERNMENTS

- Regional government: **enable circular area development through flexible zoning; provide support and data to housing corporations, urban planners, architects, and construction firms for the planning of new districts**
- National and international governments: **adjust the legal framework to facilitate circular development projects; offer advice, supporting services and guidelines to municipalities and businesses**

BUSINESSES

- Financial advisors: **develop investment strategies and financial means to support circular area development**
- Startups and advisors: **bring innovations, new ideas and inspirational pilots for circular area development into new district planning; develop innovative approaches and technologies for regenerative energy, water and waste management systems; communicate the impact of new approaches; shape new visions for future area developments**
- Companies in industrial and office areas: **collaborate with other companies, local communities and civil society; practice an open work environment**
- Urban planners, developers, architects, engineers and construction firms: **incorporate circularity in new area development projects; incorporate local needs into design and planning**

NON-PROFIT ORGANISATIONS AND INTEREST GROUPS

Environmental organisations and social associations: **bring their knowledge and relevant content on environmental and social concerns into new area development projects**

UTILITY AND PUBLIC SERVICE PROVIDER

- Housing associations: **explore the potential for mixed-use concepts; collaborate with developers and other parties that operate in the area**

KNOWLEDGE/EDUCATIONAL INSTITUTIONS

- Universities, and other research institutions: develop and assess new approaches and technologies for regenerative energy, water and waste management systems; **conduct research about local social and environmental impacts of different urban planning approaches; collect and evaluate best practice cases in circular area development**

CIVIL SOCIETY

- Private homeowners and tenants: **engage in the design and continuous improvement of circular areas**
- Community initiatives: **collaborate with local companies and other actors in the district to create a green and healthy environment**

Incorporate circular criteria into the land issuing and tendering of all construction and infrastructural projects and in the public space

Circular criteria in land issuing and tendering processes enable construction projects to be evaluated on their economic, social and environmental performance. The criteria should be incorporated into all public procurement and tendering processes, from the renovation of a building, redevelopment of neighbourhoods, to the construction of new infrastructural projects, buildings and public spaces.

Impact visualisation of the direction according to the doughnut economy model

1 CLIMATE CHANGE

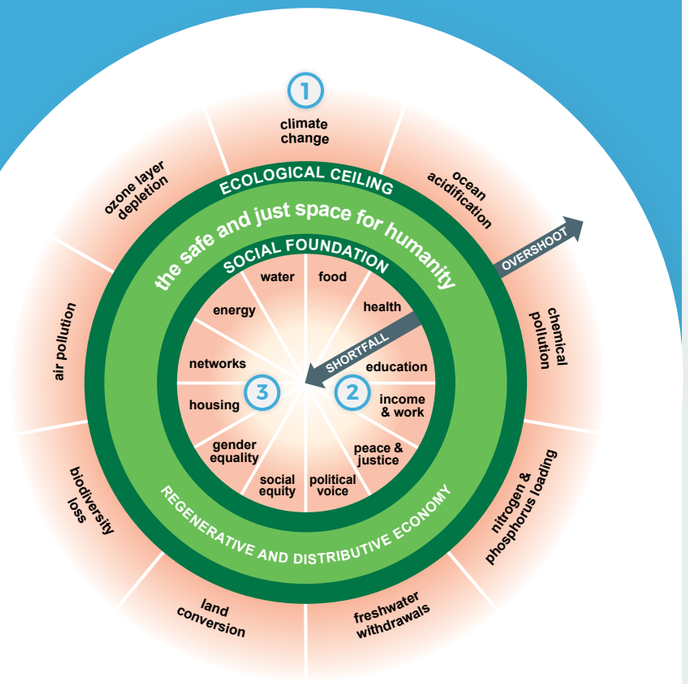
Using circular tendering criteria increases the share of reused and renewable materials. with a lower carbon impact, which leads to a reduction in CO_2 emissions during the production of new construction materials.

2 INCOME & WORK

Circular tendering will stimulate businesses in the circular economy, which can lead to additional jobs. However, jobs in the conventional construction sector may be lost.

3 HOUSING

The houses built and renovated according to circular criteria contribute to more environmentally and socially friendly housing.



Despite the growing global recognition of the potential of the circular economy, mainstream adoption of circularity in the construction sector is still yet to be achieved. The development and the use of circular criteria in public tendering and procurement processes can change this. The criteria can play an essential role to accelerate the demand, innovation, and wide-scale adoption of circular principles in the construction sector.[25] Circular tendering criteria should target topics such as energy, water and material usage, but also regenerative and resilient design, in harmony with ecosystems and biodiversity.

By incorporating circular criteria in public tendering and procurement processes for construction, cities can contribute to the creation of a thriving and sustainable city. As such, all public construction projects can be realised in an economically responsible way that also contributes to the wellbeing of people and the biosphere, and that prevents unnecessary resource depletion, environmental pollution and ecosystem degradation.[26] The national transition agenda for a circular construction economy mentions that from 2023 on, all governmental tenders - on the national, provincial and municipal level - will be circular, unless this is not (fully) possible. Following this, by 2030, all governmental tenders are circular. [27]

Impacts of the direction on Amsterdam

Amsterdam is in a unique position to issue land on a regular basis, due to its leasehold of a large part of the Amsterdam area. This can be used to provide circular guidelines for new buildings.[28] [29] Using circular criteria for land issuing could ensure a resilient and low-carbon built environment in Amsterdam. Circular tendering criteria related to housing can also contribute to healthier indoor living conditions and contribute to a better quality of life for citizens of Amsterdam.[30] By incorporating circular criteria in its tendering processes, Amsterdam could operate as a launching customer for circular infrastructural projects. In this way, the city can provide businesses with an incentive to develop, apply and use circular strategies.

CURRENT STATE OF AMSTERDAM

There are already some examples of successful circular procurement and tendering in Amsterdam. Acknowledging these examples, circular criteria need to be further developed and incorporation of circular tendering criteria needs to become mainstreamed.

Examples of existing initiatives:

- The Roadmap Circular Land Tendering is used by the municipality of Amsterdam to issue residential and non-residential building plots, and for tendering transformation, renovation and demolition projects.[31]
- Rapid Circular Contracting (RCC) is a method developed by Stichting Circulaire Economie to accelerate the tendering of innovative projects with circular ambitions.[32]
- The Port of Amsterdam is using circular public procurement for a cycle lane.[33]
- The redevelopment of Comeniusstraat Oost was the first circular building tender in Amsterdam.[34] Other projects include Bijlmerbajes and Stadstuin Overtoom.[35]

LEVERS

TRUE AND FAIR PRICING

JOBS AND SKILLS

EXPERIMENTATION

CITY OF AMSTERDAM

Direct financial support

- Stimulate demand by including uniform circular criteria into the procurement of all construction-related projects.

Regulation

- Incorporate circular criteria into all new land-issuing.

Collaboration platforms and infrastructure

- Share knowledge between government and market about innovative circular tendering procedures through exchange platforms.
- Facilitate new types of collaboration between developers and owners, of areas where land is not owned by the municipality, to allow for experimentation

Knowledge, advice and information

- This direction requires specific and customised inputs w ith capacity from the municipality to facilitate different types of construction and area development projects.
- The city can track and measure progress on resources that are sourced circular.

Governance

- Lobby to change the fiscal system towards increasing tax on resources and decreasing tax on labour, as well as for more adaptive regulations.

ROLES OF OTHER STAKEHOLDERS

REGIONAL, NATIONAL AND INTERNATIONAL GOVERNMENTS

- Regional government: **develop circular tendering criteria for procurement of construction-related projects and land-issuing; guide investors to invest in circular construction and infrastructural projects; initiate public-private collaborations**
- National government (e.g. Rijkswaterstaat): incorporate circular criteria in national infrastructural and public construction projects; **change fiscal system to facilitate circular construction**

BUSINESSES

- Consultancies (e.g. Copper8), innovators: **develop services and support regarding circular tendering criteria and processes**
- Construction companies and architects: **integrate circular principles into their work**

NON-PROFIT ORGANISATIONS AND INTEREST GROUPS

- Green Office: **create a platform for exchange and collaboration between private and public actors around construction**
- Material passports (e.g. Madaster Foundation): **give insight into and provide data about the composition of buildings and materials**
- Associations and other collaboration initiatives (e.g. Cirkelstad, Platform31, CB'23): **provide a platform for collaboration and knowledge exchange among different actors in the construction sector; develop new initiatives and standards in the construction sector**

UTILITY AND PUBLIC SERVICE PROVIDER

- Omgevingsdienst Noordzeekanaalgebied (environmental services): **ensure compliance with legal obligations**

KNOWLEDGE/EDUCATIONAL INSTITUTIONS

- BIM Loket, CROW: **provide a technology platform for transport, infrastructure and public space**
- PIANOo: **share knowledge about procurement**
- Universities: **conduct research about the effectiveness of regulations and policies; collect and assess example cases; develop and assess new business models, construction techniques and materials for circular construction**

CIVIL SOCIETY

- Tenants: **demand and appreciate circular criteria integrated into their homes**

Enable the construction of adaptable and modular buildings

To meet the ever-changing societal needs of the city (such as housing and recreation), buildings should be designed from the ground-up to be adaptable and modular. This avoids unnecessary (de-)construction. The city of Amsterdam can take the lead by incorporating flexibility and adaptability into all new construction projects.

Impact visualisation of the direction according to the doughnut economy model

1 CLIMATE CHANGE

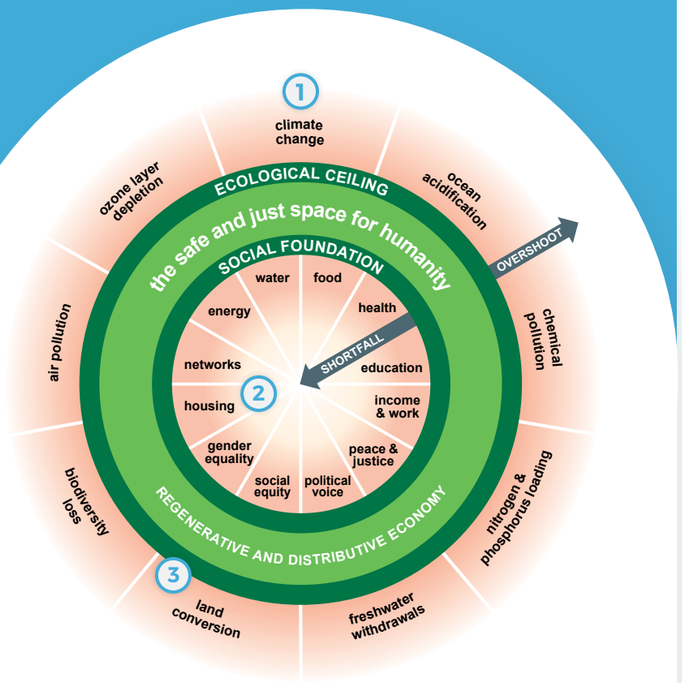
Adaptable and modular buildings have a longer lifetime, which means that less materials are needed for rebuilding.

2 HOUSING

Adaptability and modularity will prolong the lifetime of a building as it can be rearranged or its purpose can be changed according to changing circumstances or needs.

3 LAND CONVERSION

Adaptable and modular buildings will lead to more efficient use of land, because buildings can change their function and can be used for multiple purposes.



The existing built environment is one of the biggest barriers to circular construction. This is because these buildings have not been constructed with future purposes in mind. Adaptable buildings (commercial real estate, municipal real estate, as well as housing) are essential in ensuring that these will also be suitable for other functions in the future.

The adaptability of buildings is dependent on, amongst other things, floor to floor height, wall insulation, space for installations or fire safety. Requirements for office space are different from living space, and again for specialised functions. Therefore, the level of adaptability is determined mostly by the inner skeleton of the building, meaning its structural layers (load-bearing and floor structures). The inner structure of new buildings should meet the requirements to be adaptable for future use.

In a fast-changing economy, the functional demands of a building can change over time, and the future building stock has to be made ready for this. What is more, modular design reduces the time of construction and consequently reduces the construction costs.

Impacts of the direction on Amsterdam

Ensuring the design of modular and adaptable buildings could give Amsterdam the opportunity to meet the demands for sufficient and affordable housing. Moreover, modular- and adaptive design contribute to meeting the occupants' individual needs, which increases their quality of life. Furthermore, more efficient use of land could be achieved since buildings can change functions instead of having to build new ones. This offers opportunities for multi-purpose utilisation.

CURRENT STATE OF AMSTERDAM

There is a need for flexible and adaptable buildings to prevent a decrease of value in the future.[36] There are a few examples of modular and flexible buildings. However, such buildings are exceptions to the rule, as most buildings are constructed in a rigid and linear way.

Examples of existing initiatives:

- Finch Buildings develops wooden modular buildings.[37]
- Sustainer Homes provides prefabricated homes made from wood.[38]
- In the Sluis-neighbourhood, a flexible building will be designed.[39]
- Crossover is a mixed-use building with office space and facilities and homes for students and residence permit holders, in which also 40% of materials are circular and 98% are reusable.[40]
- Superlofts represents a flexible design and development framework merging hybrid urban programmes, designing participatory sustainable and adaptable lofts, offering its members the freedom to personalise.[41]

LEVERS

INNOVATION NETWORKS

CITY OF AMSTERDAM

Regulation

- Provide greater flexibility for modular and adaptable design in regulations for land use. The function of buildings should be enabled to change according to temporary needs.

Governance

- Lobby for fitting legislation and regulation.

Knowledge, advice and information

- Stimulate the development of the skills required for innovative design (design for deconstruction) as well as repair.
- Investigate the broad application of flexible and modular building design to improve adaptivity and resilience to future changes.

Fiscal frameworks

- Provide positive price incentives, such as subsidies to individuals and corporate real estate owners to financially support their investment into adaptable and modular construction.

ROLES OF OTHER STAKEHOLDERS

REGIONAL, NATIONAL AND INTERNATIONAL GOVERNMENTS

- Regional government: **support and reward the modular design of buildings through adapted or new regulations and taxation schemes**
- National and international governments: **adjust relevant regulations to foster modular and flexible building practices; create demand and best practices through public construction projects**

BUSINESSES

- Construction firms, planners, and architects: **incorporate modularity and adaptability into design and construction**
- Businesses: **invest in modular building design for their offices**
- Associations and other collaboration initiatives (e.g Bouwend Nederland (association of construction companies)): **provide a platform for collaboration and knowledge exchange among different actors; develop new initiatives and standards regarding modular and adaptive buildings**

NON-PROFIT ORGANISATIONS AND INTEREST GROUPS

- Public-private innovation partnerships and networks: build collaboration and knowledge exchange about innovative modular building solutions; **support the development of innovative business models; raise awareness and spread knowledge about advantages and impacts**

UTILITY AND PUBLIC SERVICE PROVIDER

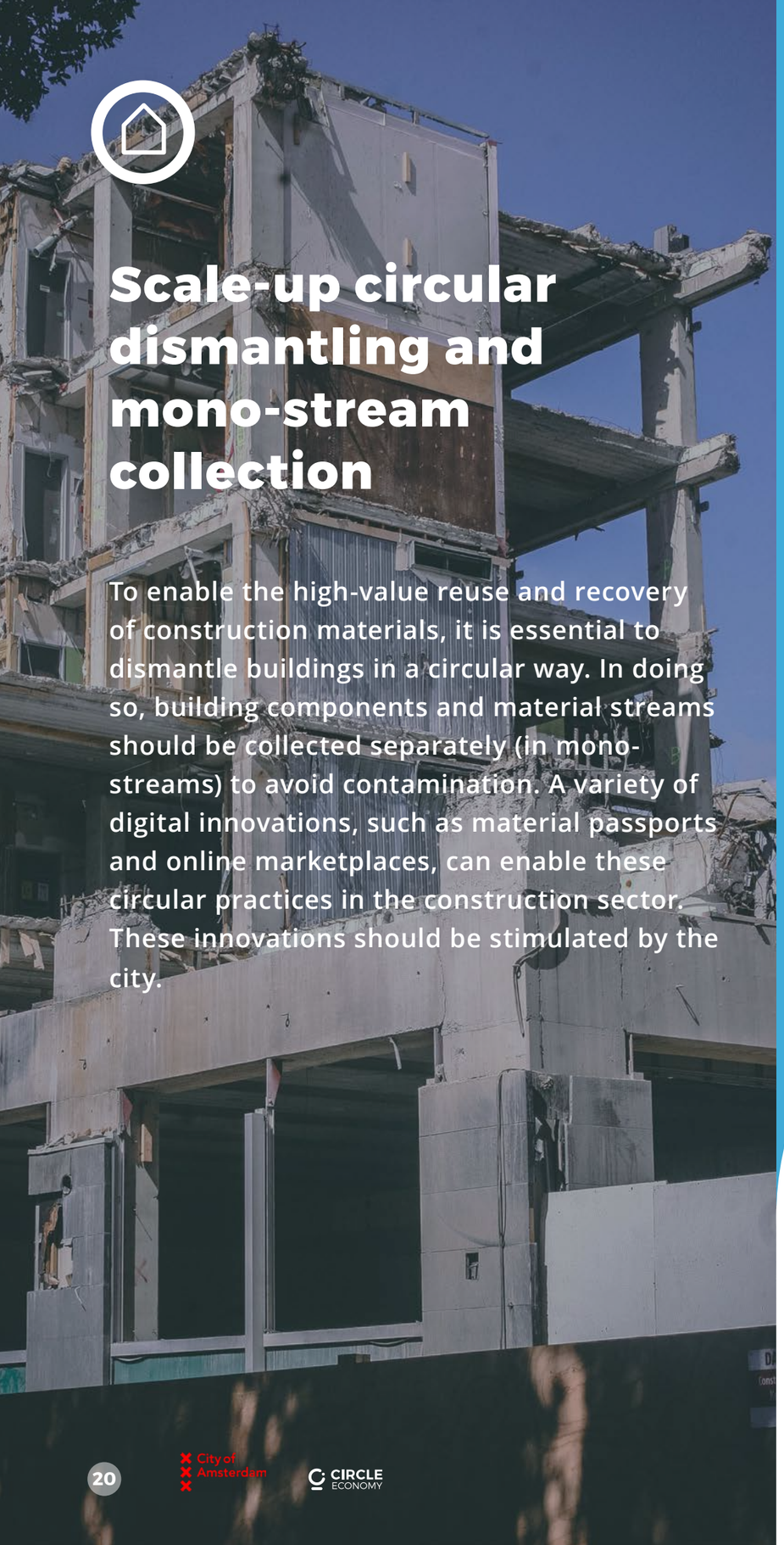
- Housing associations: **ensure mono-stream collection in all buildings constructions and renovations**

KNOWLEDGE/EDUCATIONAL INSTITUTIONS

- Universities: **conduct research about new innovations of high-value material processing and more effective ways to dismantle buildings; include supply-driven architecture and design for disassembly in their curriculum**

CIVIL SOCIETY

- Private homeowners: **consider mono-stream collection in all buildings constructions and renovations**



Scale-up circular dismantling and mono-stream collection

To enable the high-value reuse and recovery of construction materials, it is essential to dismantle buildings in a circular way. In doing so, building components and material streams should be collected separately (in mono-streams) to avoid contamination. A variety of digital innovations, such as material passports and online marketplaces, can enable these circular practices in the construction sector. These innovations should be stimulated by the city.

Impact visualisation of the direction according to the doughnut economy model

1 CLIMATE CHANGE

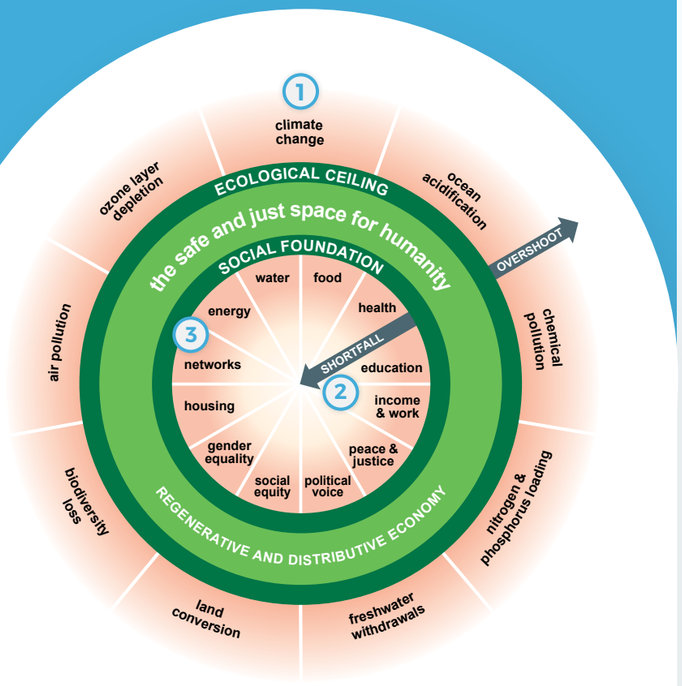
Circular dismantling and reuse of materials decreases the demand for new materials. This entails that emissions during extraction, processing and transport can be avoided.

2 INCOME & WORK

Circular dismantling and mono-stream collection creates new business opportunities.This provides new job opportunities. Contrary, jobs in more conservative sectors might get lost.

3 NETWORKS

Linking residual streams with new clients demands new forms of cooperation in the value chain.



In the Netherlands, most of the construction and demolition waste is reused for low-value purposes such as in the foundation of roads.[42] The lack of mono-stream collection, resulting in the contamination of resource flows, prevents high-value applications, such as repurposing. There is a great opportunity in the reuse of materials and components, such as insulation, timber frames, bitumen, doors, metals and stone.

One of the largest constraints to the large-scale reuse of construction materials is the lack of insight into the existing stocks materials that are already stored in the built environment.[43] A thorough mapping and tracking of all materials in the existing and new (building) stock can help to predict where and when certain materials will become available to the market. Technologies such as material passports can assist in doing so. These insights can allow for matching future demand with available demolition materials. Furthermore, in order to facilitate the transportation and exchange of secondary materials and components, Amsterdam can make use of transport over water and electric transport. In this way, the city can minimise its contribution to climate change, congestion and particulate pollution.

Impacts of the direction on Amsterdam

In Amsterdam, there are several initiatives that focus on the mono-stream collection of construction waste and early findings are now collected.[44] Circular dismantling and mono-stream collection could contribute to the reduction of virgin material use and associated climate impacts of the construction sector, as well as economic value losses. Circular dismantling and mono-stream collection of construction materials should be combined with digital tracking and matching of resources, to enable the exchange of materials amongst the different stakeholders in the Amsterdam Metropolitan Area (AMA). The implementation of the direction has the potential to establish connections between various stakeholders and strengthen the networks in the AMA, while also providing opportunities for new circular business models and circular employment.

CURRENT STATE OF AMSTERDAM

Digital material passports, disassembly plans and digital material exchange platforms are already being developed in the city of Amsterdam. The next phase in the transition towards a circular Amsterdam should focus on the further exploration of the applicability and profitability of mono-streams collection during the demolition, retrofitting and renovation of buildings.

Examples of existing initiatives:

- Amsterdam Logistic Cityhub in the Port of Amsterdam aims to create a distribution centre where goods and materials for construction are transported over water. Reverse logistics are used to obtain residual flows, goods and materials of construction projects from the city.[45]
- REPAiR (Resource Management in Peri-Urban Areas) is a European project in which a geodesign approach is used to turn (construction and demolition) waste into value.[46]
- Madaster provide insights and data regarding the composition of buildings and materials.[47]
- Material Passports are applied through (Building Information Modeling) BIM at new and current buildings at the Vondeltuin project.[48]
- In the redevelopment of the former Bijlmerbajes prison into the new district called Bajeskwartier, 98% of the materials from the former prison will be reused.[49]
- New Horizon and the Urban Mining Collective enable high-value reuse and upcycling of products and resources that are released in the renovation, transformation and demolition of buildings.[50] [51]
- Insert is a platform to create collaboration between demolition companies, civil engineering, and green business to stimulate material reuse.[52]
- Oogstkaart is an online marketplace for redundant and secondary materials.[53]
- Netwerk Betonketen strives for sustainable construction projects by closing the concrete loop, preventing the use of virgin concrete and reducing CO_2 emissions.[54]

CITY OF AMSTERDAM

Regulation

- Large-scale adoption of circular dismantling and mono-stream collection should take place in all new construction, transformation and renovation projects (locally and regionally). Align with the companies to scope whether specified areas for materials hubs are required in zoning plans.

Direct financial support

- Include circular criteria related to deconstruction and reuse of mono-streams into each tender of municipal real estate (see direction related to circular procurement).

Governance

- Intensify the conversation with the national legislator on how to create a new standard for circular deconstruction using Amsterdam as exemplary projects.
- Lobby for changes in the fiscal system to decrease tax on labour and increase taxes on material consumption, and the need for material passports.

Collaboration platforms and infrastructure

- Use data and information sharing platforms to collect data and make resources flows more publically available.

Economic frameworks

- Support public-private partnerships that engage in smart waste management solutions. This way innovative and circular waste treatment can be fostered in the whole city (both for public and commercial construction waste).

LEVERS

DIGITALISATION

SYSTEMS THINKING

INNOVATION NETWORKS

ROLES OF OTHER STAKEHOLDERS

REGIONAL, NATIONAL AND INTERNATIONAL GOVERNMENTS

- Regional government: **foster the consideration of mono-stream collection of demolition materials through new regulations; provide physical space for processing and storage of reusable materials; create demand and best practices through public procurement of construction and retrofitting projects**
- National and International government: **formulate regulations and guidelines; advise municipalities and businesses; provide taxation incentives for mono-stream collection and digital resource tracking**

BUSINESSES

- Demolishers, collectors of demolition waste: **exploit the full potential of mono-streams in the deconstruction of structures**
- Construction companies, planners, and architects: **consider using secondary materials and modularity in the design and construction of new buildings**
- Material passports (e.g. Madaster foundation): **give insight into and provide data about the composition of buildings and materials**
- Associations and other collaboration initiatives (e.g Bouwend Nederland (association of construction companies): **provide a platform for collaboration and exchange knowledge and experiences among different actors; develop new initiatives and standards in the construction sector**

NON-PROFIT ORGANISATIONS AND INTEREST GROUPS

- Public-private innovation partnerships and networks (e.g. Climate-KIC, Stroomversnelling): **create awareness about the importance of mono-stream collection to enable high-value reuse; create collaborations and knowledge exchange about innovative solutions to foster the use of secondary materials in buildings; support the development of innovative business models; share data and knowledge**

UTILITY AND PUBLIC SERVICE PROVIDER

- Promotion commission: **advertise and communicate best practice examples**
- Public service provider: **provide support services for the construction and maintenance of modular buildings and their components**
- Housing associations: **invest in modular and adaptive new buildings**

KNOWLEDGE/EDUCATIONAL INSTITUTIONS

- Universities: **carry out research about adaptable and modular construction approaches, materials, and components**

CIVIL SOCIETY

- Private homeowners: **invest in flexible building design**

Support the use of renewable and secondary construction materials

To provide sufficient safe, and affordable housing for all, while ensuring carbon and resource targets are met, it is important for Amsterdam to embrace renewable and secondary materials in construction. Reusing and recycling materials that are freed when renovating or demolishing building can help to close resource loops. Renewable materials, such as wood, can reduce the climate impacts of the construction sector. This helps in turning the built environment into a net carbon-sink, rather than an emitter.

Impact visualisation of the direction according to the doughnut economy model

1 **CLIMATE CHANGE**

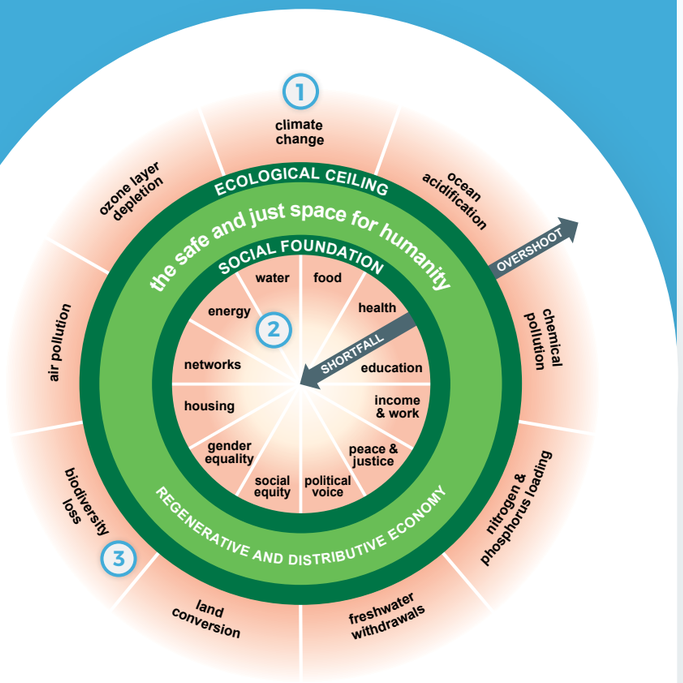
Using renewable and secondary materials reduces carbon emissions associated with extraction, processing and transport of materials.

2 **WATER AND ENERGY**

Renewable and secondary materials have smaller water, energy and virgin materials footprints.

3 **LAND CONVERSION AND BIODIVERSITY LOSS**

The production of renewable materials requires land. Depending on how the renewable materials are grown, biodiversity might be negatively affected, e.g. through mono-culture.



In the Netherlands, the construction sector contributes to a part of total CO_2 emissions.[55] Much of the associated emissions are generated through the production of materials, like concrete that is responsible for 5% of global CO_2 emissions.[56] Reusing and recycling materials can significantly reduce CO_2 emissions.[57] However, it is estimated that the reuse of materials will be sufficient for only one-quarter of all new-build projects planned in Amsterdam.[58] Therefore, in order to achieve its target of becoming a circular city by 2050, the remaining three-quarters of the new build projects in the city should be built with renewable, biobased materials. Biobased materials, such as short-cycle wood, should be ethically sourced, ideally from neighbouring regions in order to minimise environmental impacts associated with transportation. An example of renewable, biobased materials includes innovative wooden products, such as cross-laminated timber, which can be used to provide alternatives to concrete.[59]

Impacts of the direction on Amsterdam

Using biobased materials could support Amsterdam to reach its climate goals. To boost the potential benefits to jobs and the environment In Amsterdam, synergies can be created to reuse residual flows from the Biomass and food value-chain as a potential feedstock for bio-based construction materials. However, Amsterdam should be cautious when developing this direction and ensure the ethical sourcing of biobased materials in order to prevent negative impacts related to, for instance, destructive land conversion, both locally and globally.

CURRENT STATE OF AMSTERDAM

So far in Amsterdam, construction and demolition waste are commonly reused in infrastructure projects, such as low-grade crushed aggregates in road constructions.[60] Furthermore, various efforts are already being undertaken to use renewable or secondary materials, which need to be scaled up.

Examples of existing initiatives:

- CIRCL is a building in the Zuidas district that was designed and built from a circular vision, where high-value reuse of materials, an energy-neutral use phase and limited waste production take a central stage.[61]
- HAUT, a wooden residential tower along the Amstel river, is to become the second-highest wooden skyscraper in the world and is currently the most sustainable residential building.[62 63]
- The Eco BoardCompany uses residues resulting from the farming of tomatoes, capsicums, grapes, sugarcane, coconuts, wheat and many other vegetables and crops for the production of biobased recyclable board for construction purposes.[64]
- Innovatieprogramma Veen is researching how to decrease soil subsidence by growing bulrush (lisdodde), which is a fast-growing plant that can be used to produce bio-based construction and insulation materials.[65]
- Netwerk Betonketen strives for sustainable construction projects by closing the concrete loop, preventing the use of virgin concrete and reducing CO_2 emissions.[66]

CITY OF AMSTERDAM

Direct financial support

- Use financial stimuli to encourage builders to use secondary and renewable construction materials.

Knowledge, advice and information

- Provide training on new buildings processes and alternative design skills are required to successfully implement this direction.
- Education on biomimicry contributes to this direction. Research into new materials, their properties and applications.

Governance

- Lobby for carbon taxation to provide a better position for biobased materials, for regulations that facilitate the reuse of construction materials and for standards for minimum usage of renewable materials in construction and infrastructural projects.

Fiscal frameworks

- Offer positive price incentives, i.e. subsidies, for private and corporate real estate owners who decide to apply renewable and secondary construction materials.

LEVERS

INNOVATION NETWORKS

ROLES OF OTHER STAKEHOLDERS

REGIONAL, NATIONAL AND INTERNATIONAL GOVERNMENTS

Regional government: **support and empower local initiatives; enhance collaboration within the construction supply chain; foster the use of circular materials through new regulations; create demand and best practices through public construction and retrofitting projects; lobby the national government**

- National government: **put a carbon tax on materials; formulate regulations and guidelines for the (re-)use of renewable and secondary construction materials; support adoption with advice and guidelines; provide data insights into material consumption and utilisation; provide labelling and certification to identify into the origin and impact of construction materials**
- EU: **foster increased incorporation of sustainable materials through regulations; drive awareness-raising activities**

BUSINESSES

- Contractors, planners, architects and construction companies: **incorporate renewable and secondary construction materials in their building projects**
- Suppliers and subcontractors: **integrate such materials into their assortment**
- Material passports (e.g. Madaster Foundation): **give insight into and provide data about the composition of buildings and materials**
- Associations and other collaboration initiatives (e.g Bouwend Nederland (association of construction companies): **provide a platform for collaboration and knowledge exchange knowledge and experiences among different actors; develop new initiatives and standards in the construction sector**

NON-PROFIT ORGANISATIONS AND INTEREST GROUPS

- Inspectors: **check quality standards and compliances with criteria for sustainable material use**
- Public-private innovation partnerships and networks (e.g. Climate-KIC, Stroomversnelling): **create awareness about the importance of renewable construction materials; build collaboration and knowledge exchange about innovative circular solutions; support the development of innovative business models; share data and knowledge**

UTILITY AND PUBLIC SERVICE PROVIDER

- Public service provider: **provide support services and maintenance for structures incorporating renewable and secondary materials**
- Housing associations: **ensure the use of such materials in all of their new buildings and renovation projects**
- Public and private waste collectors (e.g. Renewi): **collect and treat municipal and commercial mono-stream and hazardous waste so that it allows for reuse and recycling**

KNOWLEDGE/EDUCATIONAL INSTITUTIONS

- Universities, and other research institutions (e.g. Dutch Institute for Building Biology and Ecology NIBE): **assess environmental impacts of materials; investigate new material compositions and ways to source them**

CIVIL SOCIETY

- Private homeowners: **consider secondary materials in construction and retrofitting of their buildings**

Stimulate circular retrofitting in private and social housing

Circular retrofitting can ensure that all necessary improvements to the energy efficiency of buildings are not undermined by an increase in virgin material consumption and waste generation. It is also important that the benefits of circular retrofitting are available to all citizens, regardless of their (socio-)economic status.

Impact visualisation of the direction according to the doughnut economy model

1 ENERGY

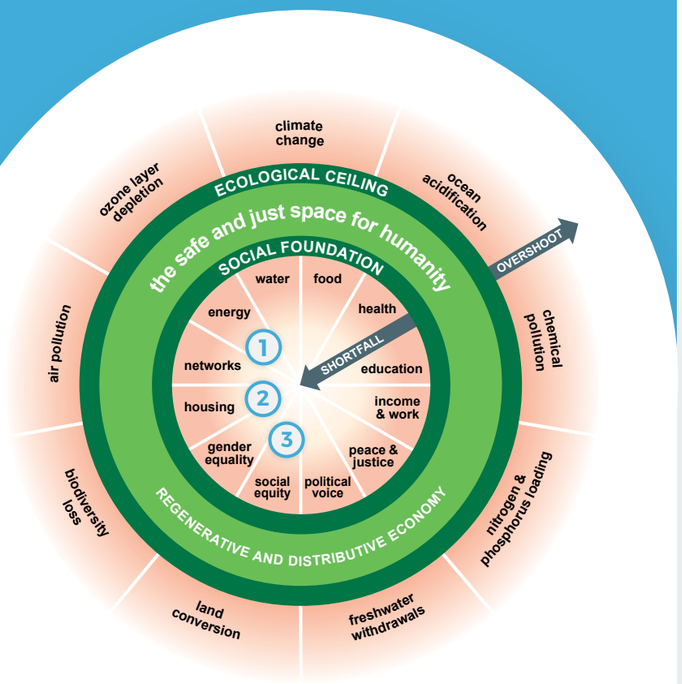
Circular renovations will contribute to an overall smaller energy footprint of buildings, because their energy performance increases. Moreover, reuse of materials decreases energy consumption for the production of new materials.

2 HOUSING

Circular and energy-neutral renovations result in higher living quality and comfort levels.

3 SOCIAL EQUITY

Realising circular renovations to decrease energy consumption can decrease energy bills and increase comfort. This can increase social equity, for instance in the social housing sector.



Buildings represent a staggering demand for energy. Globally, the heating, lighting and powering of buildings is responsible for 30% of total energy consumption, most of which still originates from fossil fuels.[67] The city of Amsterdam aims to retrofit all housing units (both private and social) in order to reduce the total consumption and costs of energy. In addition, Amsterdam wants to transition towards a gas-free society by 2050.[68] Currently, the housing sector of Amsterdam uses 300 million m³ natural gas, of which 90% is used for heating.[69] Therefore, large-scale renovation projects will be undertaken in the coming years to achieve energy-neutrality and eliminate the dependency on natural gas.[70] The city of Amsterdam should take a proactive approach to ensure that renovations are carried out in a circular way, for all houses. Housing associations are in possession of 45% of houses in Amsterdam. The social housing sector could, therefore, can play a key role in bringing forward circular retrofitting and capitalise on the economies of scale.[71]

Circular retrofitting includes dismountable, adaptable and reusable solutions that not only maximise energy efficiency, but also minimise waste reduction. Circular business models and new ways of collaboration are needed during all phases of the retrofit (re-design, re-build, re-use, re-purpose, dismantle). Maximising the use of secondary materials would also imply maximising the separate collection of waste flows (mono-streams) to ensure the reuse or recycling of materials.

Impacts of the direction on Amsterdam

Circular retrofitting could be key to ensure that the energy transition of Amsterdam towards a natural gas-free city takes place in a manner that does not threaten the harmony of other planetary boundaries. Circular housing renovations could also bring positive social benefits, since a reduction in the total energy consumption and related expenditures of households, can help to address the phenomenon of energy poverty in lower-income households.[72] By improving the liveability of current housing (such as retrofitting leaks, or poor insulation), or by using bio-based, non-toxic materials, the city could improve the indoor quality and ensure the health of all of its citizens. Making sure that circular retrofitting is affordable and accessible for private and social housing equally, Amsterdam could guarantee social equity, which is also one of the primary city's goals.

CURRENT STATE OF AMSTERDAM

The city of Amsterdam is currently facing the large challenge of how to transform its existing built environment to become fully circular, while at the same time providing affordable housing for all.[73] [74] Stimulating the existing efforts for circular retrofitting would be a necessary step for this transition.

Examples of existing initiatives:

- REHAB is a project that was initiated to develop solutions for circular renovation of the late postwar housing stock.[75]
- City-zen is a project that stimulates energy efficiency and improves quality of life by offering homeowners, housing associations and property investors the funding to retrofit their buildings.[76]
- Eigen Haard is a housing association that strives to become CO_2-neutral and circular by 2050.[77]
- Co-Green is a concept developed by Eigen Haard together with construction, demolition and architecture firms to challenge market parties to develop sustainable and innovative solutions for demolition, construction and living.[78]

LEVERS

TRUE AND FAIR PRICING

JOBS AND SKILLS

DIGITALISATION

SYSTEMS THINKING

CITY OF AMSTERDAM

Legislation & Regulation

- Ensure that national goals and local performance agreements do not conflict.

Knowledge, advice and information

- Encourage the participation of citizens when retrofitting the housing stock.
- Provide public services to help people insulate their homes in a circular way.
- Exchange best practices and new innovations.
- Research into circular renovation methods, including new biobased materials, and the repurposing of waste streams.

Direct financial support

- Provide financial support for pilots in circular renovations.
- Make agreements with the housing associations to ensure circular renovations.

Governance

- The municipality can lobby with the national government and the EU so that national agreements on energy efficiency can be made. It can also lobby for tax incentives for circular renovations, provide subsidies for housing associations, and a shift in taxation towards resources.

Fiscal frameworks

- Provide positive price incentives i.e. subsidies for individual and corporate real estate owners that decide to retrofit in a circular way.

ROLES OF OTHER STAKEHOLDERS

REGIONAL, NATIONAL AND INTERNATIONAL GOVERNMENTS

- Regional government: **promote the application of circularity through public retrofitting and renovation projects; enhance collaboration between different actors; support R&D; give advice to homeowners and companies on circular criteria; ensure that national goals and local performance agreements do not conflict; lobby at the national government**
- National and international government: **adjust legislation and regulations to make circular retrofitting more attractive; consult municipalities and businesses**

BUSINESSES

Building owners, contractors, architects, planners, construction companies: **consider embodied impacts and reusability of materials in the planning and investment of retrofitting and building projects; invest in modular building practices**

NON-PROFIT ORGANISATIONS AND INTEREST GROUPS

- Umbrella organisations (e.g. AFWC (Amsterdam Federation of Housing Associations), Aedes (umbrella organisation of housing associations)): **ensure compliance with circular retrofitting criteria of all member associations**
- Energy cooperatives: **contribute to energy neutrality in buildings by sharing recent insights and close collaboration with the municipality, housing associations and private construction businesses**
- Public-private innovation partnerships and networks (e.g. Climate-KIC, Stroomversnelling): **build collaborations and knowledge exchange about innovative solutions to mitigate and adapt to climate change; support the development of innovative business models; share data and knowledge to facilitate circular retrofitting and construction**

UTILITY AND PUBLIC SERVICE PROVIDER

- Housing associations: **ensure compliance of circular retrofitting in all of their buildings**

KNOWLEDGE/EDUCATIONAL INSTITUTIONS

- Universities and other research institutions, e.g. Amsterdam Institute for Advanced Metropolitan Solutions (AMS): **develop, collect, and evaluate innovative solutions, processes and materials for circular construction**

CIVIL SOCIETY

- Private homeowners: **plan reconstructions and renovations in line with circular criteria**

4.4 BIOMASS AND FOOD

CIRCULAR ECONOMY DIRECTIONS

- **Foster circular food production in urban and peri-urban areas**
- **Encourage healthy, sustainable and plant-based food consumption by all citizens**
- **Minimise food waste from retail, catering and households**
- **Increase separate organic waste collection from households and businesses to enable high-value treatment**
- **Scale-up high-value transformation of residual biomass and food flows**
- **Accelerate the closing of local nutrient cycles from biomass and water flows**

Foster circular food production in urban and peri-urban areas

Fostering local and sustainable food production practices (like permaculture) in urban and peri-urban areas can support the creation of a circular and resilient food system, while boosting local biodiversity. Strengthening the direct relationships between the producers of local food and consumers can not only stabilise food security and price volatility, but also allows for nutrients to be returned to local agricultural land or used in chemical, food-producing or pharmaceutical processes, all while minimising transportation demands.

Impact visualisation of the direction according to the doughnut economy model

1 CLIMATE CHANGE

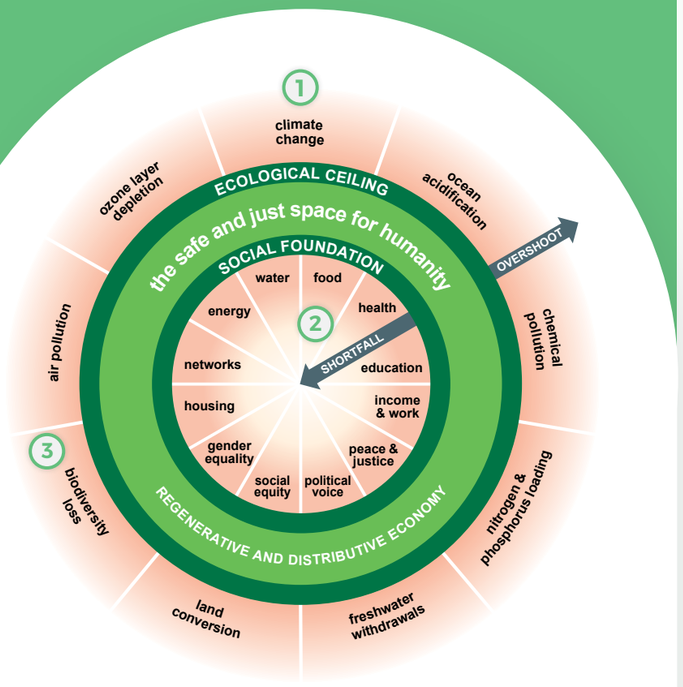
(Peri-)urban farming will lower the need for transportation of food, which saves fuels and CO_2 emissions. Additionally, it can mitigate the effects of climate change, such as the urban heat island effect, improve air quality and increase the water absorption capacity of the city.

2 FOOD

The city's food supply will rely more on local suppliers, which decreases the dependance on import of food. Secondly, more healthy and sustainable food will be provided to the citizens, which can contribute to human health.

3 BIODIVERSITY LOSS

Circular urban agriculture will bring more green into the city. This attracts more insects, bees and animals, which can increase the biodiversity in the city. Circular food production, such as permaculture, increases biodiversity and resilience of the agricultural system.



In cities, there is a growing disconnection between the production and consumption of food, since mainly non-urban land is used for the production and cultivation of food.[79] However, with 40% of the world's cropland located in peri-urban areas (the land within 20-50 km radius around urban boundaries), cities can source substantial amounts of local food.[80] Closer collaboration between the city and (peri-)urban producers provides an opportunity to reduce food-miles and associated climate emissions.[81] Additionally, organic waste and wastewater that are generated in cities present a promising source of compost and organic fertiliser to be supplied back to local (peri-) urban farms to help to close local nutrient cycles.[82]

Impacts of the direction on Amsterdam

In the AMA, one-third of the land area is used for agricultural purposes.[83] However, only 3% of this food is consumed locally as a large part of agricultural products are destined for the global market. Fostering circular and local food production in (peri-)urban areas can deliver a wide range of benefits to the AMA. Regenerative practices can provide a boost to local biodiversity and nutrients cycles, while greater urban vegetation cover through outdoor urban agriculture can increase climate adaptation.[84] While urban agriculture will not completely satisfy the appetite of Amsterdam alone, it can offer a range of societal benefits such as providing educational opportunities (from the environmental, to entrepreneurship) as well as strengthening social cohesion through citizen involvement.[85] A stronger connection to the local food system can also increase the likelihood that Amsterdammers will demand food grown using sustainable practices that benefit both the local environment and their own health.[86]

CURRENT STATE OF AMSTERDAM

A number of circular (urban) farming initiatives are successful on a small scale. However, there is still great potential to make existing farming practices more circular and regenerative. The challenge is to increase the share of small-scale, circular, and nature-inclusive agriculture, that allow for shorter supply chains.

Examples of existing initiatives:

- Pluk! Groenten van West is a Community Supported Agriculture (CSA) farm where people can sign up to harvest frequently and thereby support the farm.[87]
- Circulaire ProefTuin van West is an initiative to exchange innovations in the field of circular farming between entrepreneurs at Tuinen van West.[88]
- Van Amsterdamse Bodem is an online food platform for the MRA that connects initiatives related to food.[89]
- RUMORE (Rural-Urban partnerships Motivating Regional Economics) is a European project in which Amsterdam participates to foster urban-rural knowledge exchange and innovation in the circular agri-food cycle in the AMA and focuses on valorisation of residual organic flows and the protein transition.[90] [91]
- FOODLOGICA is a platform linking local food, consumers and businesses in Amsterdam's city centre through transport that reduces emissions, congestion and pollution.[92]

LEVERS

TRUE AND FAIR PRICING

LOGISTICS

DIGITALISATION

SYSTEMS THINKING

CITY OF AMSTERDAM

Regulation

- Include (peri-)urban farming in spatial planning, and provide spaces for testing circular farming techniques.

Knowledge, advice and information

- Supply education and training on organic and circular farming techniques and stimulate interest in (peri-)urban agriculture through local campaigns and school excursions. Urban farming educates citizens about circular and regenerative food production (e.g. through school excursions and training of new urban farmers).
- Provide advice and expertise to businesses engaging in circular farming.

Direct financial support

- Provide financial support for existing and new circular farming initiatives in (peri-)urban areas, and provide funding for new initiatives.
- Prioritise the procurement of sustainable, plant-based food that is grown locally using regenerative practices for consumption in municipal buildings. Procure circular produced food in municipal buildings is grown using regenerative practices.

Collaboration platforms and infrastructure

- Coordinate with the provincial and regional stakeholders, to align sync the city strategy to the regional strategy.[93]

ROLES OF OTHER STAKEHOLDERS

REGIONAL, NATIONAL AND INTERNATIONAL GOVERNMENTS

- Regional government (e.g. Provinces of Flevoland and North-Holland, AMA, the municipality of Amsterdam, city districts, Bureau Broedplaatsen (municipality department): **enable legal practicalities and enhance collaboration between (peri-)urban stakeholders; provide incentives to enhance local food production and collaboration**
- National government (e.g. Ministry of Agriculture, Nature and Food Quality, Ministry of Economic Affairs and Climate Policy): **support municipalities and businesses in administrative and advisory concerns; provide incentives and means to enhance local food production and collaboration amongst urban and peri-urban stakeholders**

BUSINESSES

- Food vendors (e.g. local shops and restaurants, supermarkets, catering, hotels, cafes): **purchase food products from local producers; collect and separate organic waste to be composted or digested locally**
- Wholesale suppliers and distributors (e.g. Logistics hub Deudekom, Port of Amsterdam, Greenport Aalsmeer, Food Center Amsterdam, GFT logistics): **transport food products between (peri-) urban areas through an efficient and emission-free system; enlarge current activities with reverse logistics services**
- Private waste collectors: **ensure the separate collection and processing at high value of bio-waste; supply products (e.g. soil, natural fertiliser) for regional farms**
- Farmers and food producers: **cultivate food with circular agricultural methods and provide food to suppliers in the city or sell it directly to consumers (e.g. through farmers markets)**

NON-PROFIT ORGANISATIONS AND INTEREST GROUPS

- Food banks and local non-profit food initiatives (e.g. Voedselbank (food bank), Resto VanHarte, RobinFood) : **promote and organise necessary activities, e.g. initiate awareness-raising campaigns; engage in meetups for local stakeholders to meet and work out collaborative initiatives**

UTILITY AND PUBLIC SERVICE PROVIDER

- VWA (the Netherlands food and consumer product safety authority): **ensure food safety, taking into mind that too strict rules may lead to food waste**

KNOWLEDGE/EDUCATIONAL INSTITUTIONS

- Universities: **carry out research on innovations and new ways of collaboration; bring circularity thinking into education**
- Schools: **encompass the concepts of circularity, sustainability and nature and in environmental education; support education on the value of waste, conscious food consumption, and local food production; promote multidisciplinary knowledge development**
- Universities' green offices: **implement projects that support circular innovations and new ways of collaboration**

CIVIL SOCIETY

- Small-scale food producers (e.g. gardening collectives, local beekeepers, school gardens): **cultivate food with circular agricultural methods and provide food to suppliers in the city or sell it directly to consumers; compost bio-waste locally on site**
- Roof and garden owners, schools, volunteers, local citizen initiatives: **initiate neighbourhood projects; engage in local food production activities; compost**
- Consumers: **buy local food products; collect and separate bio-waste**

Encourage healthy, sustainable and plant-based food consumption by all citizens

In order to provide enough nutritious food for everyone within our planetary boundaries, our diets need to change substantially. A diet based on plant-based proteins and unsaturated fats - while being low in meat, dairy, and highly processed foods - does not only lead to health improvements, but also has a lower environmental impact.[94,95]

Impact visualisation of the direction according to the doughnut economy model

1 CLIMATE CHANGE

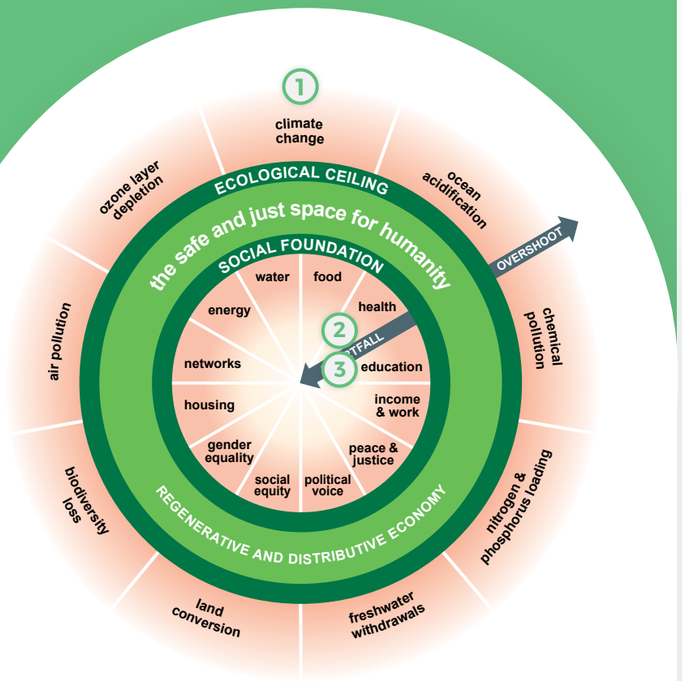
A healthy, sustainable and plant-based diet contributes to a lower carbon footprint as especially the CO_2 emissions caused by meat production can be avoided.

2 HEALTH

The strategy will support a healthy nutrition which is one of the most important contributors to human health.

3 EDUCATION

Information about healthy, sustainable and plant-based diets can be embedded in educational programmes that will teach and sensibilise the citizens of Amsterdam on the topic.



Food consumption is amongst the main drivers of environmental impacts.[96] Agricultural production is the most impactful stage in the life cycle of almost all food products, and it has significant impacts on each of the nine planetary boundaries (most notably climate change, land-use change and freshwater extraction).[97 98] In the meantime, the agricultural sector can substantially contribute to balancing the global carbon cycle.[99] The consideration of the planetary and social impacts of our diets is, therefore, integral to the circular economy.

Impacts of the direction on Amsterdam

The impacts of encouraging healthy and sustainable diets within Amsterdam can reach far beyond the city's borders, relating to the global impact of the food system. Nevertheless, societal benefits can also be reaped in Amsterdam. Needless to say, supporting healthy diets has the potential to reduce the number of chronic diseases (decreasing healthcare costs) and reduce health inequalities.[100] Furthermore, decreased meat consumption is likely to decrease land conversion, runoff of fertilisers and emissions of greenhouse gases, and increase food safety.[101]

CURRENT STATE OF **AMSTERDAM**

Even though meat consumption in the Netherlands has slightly decreased since the 1990s, a quarter of foods consumed are of animal origin.[102] This means that there is still great potential to stimulate healthy and plant-based diets. Some national and European projects are focused on accelerating the transition to plant-based diets, but the city is in need of more local initiatives.

Examples of existing initiatives:

- Amsterdamse Aanpak Gezond Gewicht (AAGG) is a programme by the Public Health Service (GGD) of Amsterdam that aims to reduce overweight and obesity among children (especially from low-income families) in Amsterdam.[103]
- FIT4FOOD2030 is a European research and innovation programme to stimulate healthy and sustainable diets.[104]
- RUMORE is a European project in which Amsterdam not only participates to stimulate rural-urban collaboration, but also to develop plant-based proteins.[105]
- The Green Protein Alliance is a social organisation contributing to accelerate the transition to plant-based proteins in the Netherlands.[106]

LEVERS

TRUE AND FAIR PRICING

JOBS AND SKILLS

SYSTEMS THINKING

CITY OF AMSTERDAM

Direct financial support

- Use criteria in procurement to make plant-based and locally-produced food the standard in government buildings and schools.

Knowledge, advice and information

- Spread knowledge through education about healthy diets and know-how on preparing plant-based dishes.
- Promote healthy and environmentally-friendly food choices through marketing and informational campaigns

Legislation

- Labelling of information about health and the environment to enable citizens to make better-informed choices.

Governance

- Lobby for an increased tax on unhealthy food and decreased tax on healthy food.

ROLES OF OTHER **STAKEHOLDERS**

REGIONAL, NATIONAL AND INTERNATIONAL GOVERNMENTS

- Regional government: **set procurement criteria for more plant-based and local food purchasing**
- National government (e.g. Ministry of Agriculture, Nature and Food Quality, Ministry of Economic Affairs and Climate Policy, Ministry of Health, Welfare and Sport: **adjust regulatory and legislative means to (financially) enable the transition to a healthy and sustainable diet for society and businesses; increase tax on unhealthy food and decrease tax on good foods to make these more affordable**

BUSINESSES

- Food vendors (snackbars, supermarkets, restaurants, cafes, catering): **expand or adapt food and drink offer to more healthy options**

NON-PROFIT ORGANISATIONS AND INTEREST GROUPS

- Consumer organisations, sports clubs, religious institutions, neighbourhood centres, Wakker Dier or other national organisations organising food campaigns: **engage in awareness-raising campaigns to promote a healthy and sustainable diet; provide information to consumers**

UTILITY AND PUBLIC SERVICE PROVIDER

- Public service centres: **provide advisory and educational courses about a more balanced diet**

KNOWLEDGE/EDUCATIONAL INSTITUTIONS

- Schools and universities: **incorporate healthy meal and snack choices; integrate food education into the curriculum**

CIVIL SOCIETY

- Consumers: **become educated in healthy and sustainable diets; consume and cook accordingly**

Minimise food waste from retail, catering and households

In a circular economy, food waste should be minimised to avoid the excess production of food and minimise environmental impacts. Citizens and businesses should be incentivised and educated to produce as little waste as possible.

Impact visualisation of the direction according to the doughnut economy model

1 CLIMATE CHANGE

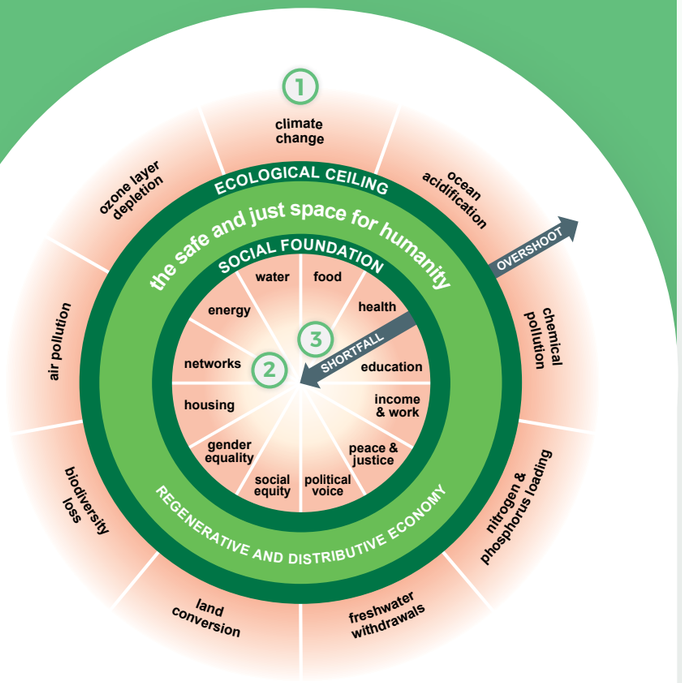
Minimising food waste will reduce the need for production of food and handling of food waste, and thereby decreases emissions associated to food production and waste treatment.

2 NETWORKS

Local networks and collaborations of sectors tackling food waste, will be strengthened through e.g. exchange of excess food.

3 FOOD

Food will be consumed more consciously, which can have a positive impact on healthy food choices.



Food is an important issue of the 21st century. Towards 2050, the planet needs to feed 10 billion people.[107] In order to achieve this in a sustainable way, we need to fundamentally change the way we consume and produce food.[108] [109] One of the greatest levers here is to change the loss of food in the systems. Globally, one-third of the food that is produced is lost or wasted.[110] In the Netherlands, people throw away 41 kg of edible food per person per year,[111] equivalent to wasting €140 per person per year.[112]

Impacts of the direction on Amsterdam

The municipality of Amsterdam, in collaboration with retailers, can contribute to preventing food waste in multiple ways. Households can be assisted in avoiding overbuying food and letting it spoil, by making them aware that this can make them save money while doing groceries.[113] This contributes to keeping the waste management system affordable. Research in London shows that, for every euro that the government invested in avoiding food waste, €9 were saved, mainly in waste management costs. If the savings for households are included, this adds up to €105.[114] Research shows that for every euro that was invested by businesses on preventing food waste, they realised an average return of €12.[115]

The municipality can stimulate the retail and catering industries to more effectively match supply with fluctuating demand and promote the sale of soon-to-expire or 'ugly' fruits vegetables and other food products.[116] Finally, the business community and the city can make sure that any surplus edible food is redistributed for human consumption, in particular to food-insecure and low-income populations.[117]

CURRENT STATE OF AMSTERDAM

Various initiatives in Amsterdam focus on collecting surplus food for redistribution or processing it into new food products

Examples of existing initiatives:

- BuurtBuik is an organisation that prepares free meals from leftover food to bring neighbours together.[118]
- Taste Before You Waste is an organisation picking up surplus food and organises events to raise awareness about food waste.[119]
- Guerilla Kitchen is an organisation preparing meals from company food waste.[120]
- Instock is a restaurant turning surplus food into meals.[121]
- Too Good To Go is an app used to decrease food waste by connecting food from local shops to customers.[122]

LEVERS

TRUE AND FAIR PRICING

EXPERIMENTATION

DIGITALISATION

CITY OF AMSTERDAM

Direct financial support

- Support businesses and start-/scaleups that tackle food waste in the city.

Knowledge, advice and information

- Use the marketing power of Amsterdam to address food waste and minimise advertisement leading to overconsumption of food. With, for instance, information campaigns people get more insight into e.g. portioning and planning of meals

Collaboration platforms and infrastructure

- Create the infrastructure and platforms that enable more efficient supply chains, that reduce food-waste.
- Capture any data about food waste.

Governance

- Lobby for adjusting regulation regarding food safety to enable reuse of food waste and to achieve true pricing concerning food pricing in relation to production.

ROLES OF OTHER STAKEHOLDERS

REGIONAL, NATIONAL AND INTERNATIONAL GOVERNMENTS

- Regional government: **lead awareness-raising campaigns; provide platforms to foster collaboration between stakeholders in the food value chain**
- National government: **adapt regulations that aim at balancing supply and demand; develop national and international advertisements for waste prevention; consider and adjust food safety regulations to allow for the reuse of food waste; increase taxation on (food) waste (for companies)**

BUSINESSES

- Supermarkets: **provide information about the durability of food products; discount soon-to-expire products**
- Restaurants, cafes, catering, hotels: **provide meals from leftover food products; provide smaller portions with refill options; use digital tools to monitor and reduce food waste**

NON-PROFIT ORGANISATIONS AND INTEREST GROUPS

- Voedingscentrum (the Netherlands Nutrition Centre): **provide information about ways to store food; provide recipes and inspiration on how to cook with overripe fruits and vegetables**

UTILITY AND PUBLIC SERVICE PROVIDER

- **Carry out awareness-raising campaigns about food waste prevention**

KNOWLEDGE/EDUCATIONAL INSTITUTIONS

- Universities (e.g. Wageningen University and Research): **research on best practices to prevent food waste**

CIVIL SOCIETY

- Consumers: **consume consciously (no overbuying); store food in an optimal way**
- NGOs: **engage citizens to participate in food waste initiatives; provide platforms for food sharing among citizens and food vendors**

Increase separate organic waste collection from households and businesses to enable high-value treatment

To change organic waste into a source of value, collection of source-separated waste is necessary, both at households and companies.

Impact visualisation of the direction according to the doughnut economy model

1 NETWORKS

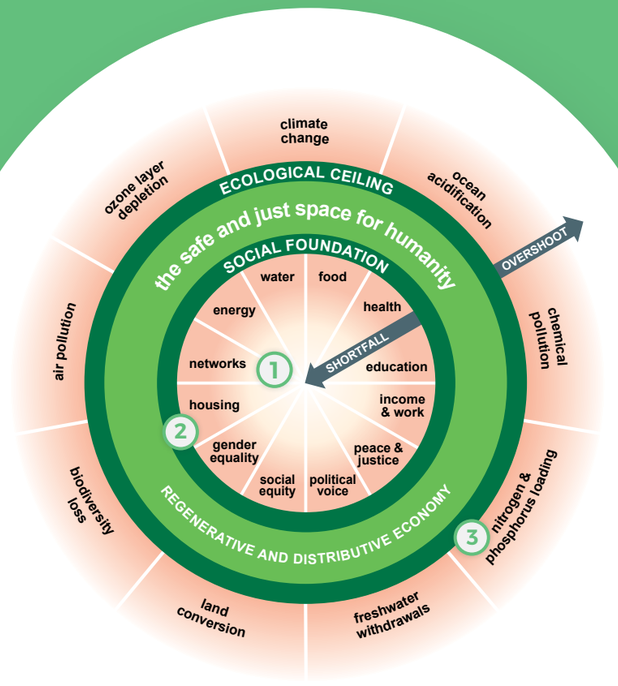
This direction enhances the waste logistic network amongst service providers and businesses within the city and the region.

2 HOUSING

Residential and commercial buildings or building blocks will be made available for mono-stream collection, which makes it easier for the waste management system to collect organic residual streams.

3 NITROGEN & PHOSPHORUS LOADING

A better separation and collection system for organic waste will result in lower amounts of nutrients running off into surface waters. The collected organic matter can be used to recover the nutrients, reducing the need for chemical fertilisers.



The wide range of high-value recycling opportunities of organic wastes requires an effective collection of pure and uncontaminated residual streams.[123] These can be specific residual streams, such as certain peels, coffee grounds or mixed kitchen waste from households. Every stream has a different value. Contamination can occur when different streams are mixed together in a single collection. Source separation is important, because kitchen waste contaminates household residual waste, making post-separation more difficult.

By adopting new technology and policy and by stimulating community engagement, rates of separated collection of kitchen and garden waste, and of specific organic streams, can be improved significantly.[124] New forms of collection, reverse logistics and strong commitment from supplying companies are key, especially In urban environments with little public space and a large density of dwellings, businesses,

Impacts of the direction on Amsterdam

Currently, in Amsterdam, organic wastes produced by households and companies are collected in separate systems and by different companies.[125] Household kitchen waste is only collected in a number of neighbourhoods. The challenge is to establish effective collection systems, based on the specific demand of processors. The focus can be on local ways of (intermediate) treatment, or treatment in the city's surroundings. When considering organic residual streams as 'urban organic waste' without making the distinction between household and company waste, other solutions might be effective/profitable.

CURRENT STATE OF AMSTERDAM

Several initiatives are aimed at improving the collection and treatment of organic residual streams.

Examples of existing initiatives:

- Chaincraft in the Port of Amsterdam processes organic material into fatty acids, test plant.
- Household kitchen and garden waste are collected at IJburg by waste containers.
- Research into the deployment of kitchen waste grinders in high-rise buildings.
- Local composting, for instance by using worm composting bins, and local collection of bread in collaboration with communities.
- Initiatives such as Waste Transformers (creating decentralised nutrient and energy hubs where residual waste streams are converted into energy and natural resources are recovered) and Biomeiler (creating heat and biogas by composting).

LEVERS

INNOVATION NETWORKS

LOGISTICS

DIGITALISATION

CITY OF AMSTERDAM

Regulation

- Support businesses and start-/scaleups that tackle food waste in the city.

Direct financial support

- Provide financial support for pilots that are innovative or experiment with ways to collect waste.
- Include source and mono-stream separation as criteria into the procurement of waste management services.

ROLES OF OTHER STAKEHOLDERS

REGIONAL, NATIONAL AND INTERNATIONAL GOVERNMENTS

- Regional Government: **provide infrastructure for waste collection and transport; offer advisory for businesses and citizens**
- National Government: **provide incentives and regulatory means to increase the organic waste collection**

BUSINESSES

- Companies and food vendors (restaurants, supermarkets, cafes): **separate their organic waste streams and ensure proper treatment**
- Waste collection and logistics companies: **provide easy-to-use biomass collection system for households and businesses**

NON-PROFIT ORGANISATIONS AND INTEREST GROUPS

- Various local and national organisations: **awareness raising; knowledge and experience sharing**

UTILITY AND PUBLIC SERVICE PROVIDER

- Waste collection companies: **merge households and company waste for more efficient collection; provide easy-to-use biomass collection system for households and businesses**
- Waste processing firms: **process the organic waste at the highest value possible**

KNOWLEDGE/EDUCATIONAL INSTITUTIONS

- Schools: **implement education about correct waste separation**
- Universities: **provide academic input for local projects addressing waste separation**

CIVIL SOCIETY

- Citizens: separate organic waste; **prevent contamination of organic waste streams**

Scale-up high-value transformation of residual biomass and food flows

Residual food and biomass, such as food waste and plants, can be transformed into a wide range of valuable products, including new food items, inputs for agriculture, and new biobased materials (with applications ranging from the manufacture of drinks cartons to construction materials).[126] This, therefore, requires effective waste collection.

Impact visualisation of the direction according to the doughnut economy model

1 CLIMATE CHANGE

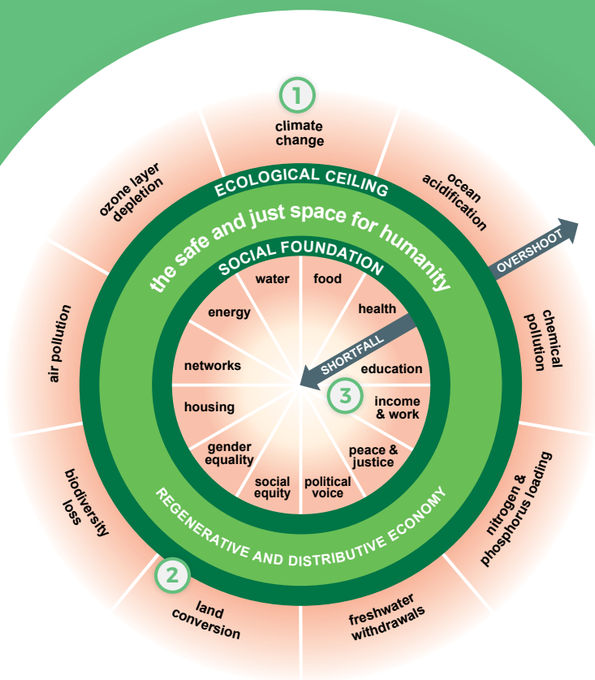
By utilising materials and products from residual flows, less virgin resources are needed. This reduces the emissions from the production process.

2 LAND CONVERSION

High-value reuse decreases the need for extraction of virgin materials, therefore, the competition for land can be reduced.

3 INCOME & WORK

Scaling up projects for high value transformation provides new business opportunities, and new jobs.



Residual organic flows, ranging from food wastes, agricultural residues to cuttings of greenery in public spaces, can provide a continuous stream of organic residues that can be used to make valuable products from biomass. In a circular economy, residual biomass will increasingly be seen as a viable alternative for construction materials, as well as providing valuable chemical building blocks for plastics and coatings.[127] Yet, to fully capture the potential of these residual streams, it is important to move beyond seeing these streams as a source of energy, but rather raw materials. Every type of biomass should be cascaded to their highest potential. For example, food waste can first be recovered for human consumption, and sequentially for animal consumption and digestion. Fibrous biomass, in contrast, might be suited to make textiles, biochemicals and fuels.

Impacts of the direction on Amsterdam

Cascading every type of biomass to their highest potential brings a new source of sustainable and biobased materials to Amsterdam. This has the potential to lower greenhouse gases associated with material production.

CURRENT STATE OF AMSTERDAM

There are already several companies in Amsterdam that are focusing on turning residual organic flows into high-value products. These should be scaled up to facilitate the transition towards a biobased and low-carbon economy.

Examples of existing initiatives:

- Quisquiliae is a project that creates value from residual organic flows from the agriculture and food industry by creating new ingredients for the food industry.[128]
- Chaincraft is a company that transforms organic residual streams into fatty acids, which are building blocks for many products in the food and chemical industries.[129]
- The Eco BoardCompany develops building materials from plant fibres originating from low-value agricultural materials.[130]
- The Calcite Factory recycles calcite pellets from drinking water companies' softening reactors and produces a seeding material to be reused by water companies.[131]

LEVERS

DIGITALISATION EXPERIMENTATION

CITY OF AMSTERDAM

Governance

- Lobby to make legislation more flexible to facilitate high-value reuse of organic residual flows and set up health and safety guidelines.

Direct financial support

- Use procurement to stimulate demand of and create a bigger market for recycled, biobased products - using the municipality as launching customer.
- Provide pilots with pre-competitive funding, and small businesses with the necessary (financial) support to scale-up.

Regulation

- Use spatial planning to design physical space where high-value reuse of biomass can take place, and create space for storage of biomass.
- Develop different required logistics levels in a joint logistics strategy: neighbourhood, district and city. Weigh the (residual) value of the stream against the necessary logistics movement. See previous direction.

Knowledge, advice and information

- Facilitate discussions in the market in order to find the correct scale for processing.

Fiscal frameworks

- Provide positive price incentives, such as subsidies, for startups to enable a scale-up.

ROLES OF OTHER STAKEHOLDERS

REGIONAL, NATIONAL AND INTERNATIONAL GOVERNMENTS

- National and international government: **set regulatory boundaries for municipalities and businesses; adjust regulatory and legislative means to support existing projects and businesses; provide incentives for businesses and consumers to invest in products of residual biomass and food flows**

BUSINESSES

- Banks: **provide financial support models to enable scale-up**
- Farmers: **collect residual biomass flows and perform on-site high-value transformation**
- Startups and Scale-ups: **develop innovations and realistic solutions**

NON-PROFIT ORGANISATIONS AND INTEREST GROUPS

- Nature organisations (e.g. Natuurmonumenten, Staatsbosbeheer, Landschap Noord-Holland): **input of on-the-ground knowledge, experiences and insights of best-practice examples and support measures**

UTILITY AND PUBLIC SERVICE PROVIDER

- Waternet: **reuse biomass from water streams (e.g. water plants and shore vegetation) to recover value**

KNOWLEDGE/EDUCATIONAL INSTITUTIONS

- Universities: **conduct research; provide scientific insights about new solutions; support governmental institutions and businesses in data-related concerns**

CIVIL SOCIETY

- Citizens, consumers: s**upport existing projects and products from high-value transformation**
- NGOs: **engage citizens; enhance collaboration between civil society and the public/private sector**

Accelerate the closing of local nutrient cycles from biomass and water flows

In a circular economy, all biological residual flows (both biomass and water flows) should be reused at their highest potential value. This can be done through the recovery of nutrients such as phosphates from sewage, or through fermentation of biomass. As a result, Amsterdam can reduce its dependency on importing synthetic fertilisers while at the same time decreasing the impact on the planetary boundaries (such as nitrogen and phosphorus loading).

Impact visualisation of the direction according to the doughnut economy model

1 EDUCATION

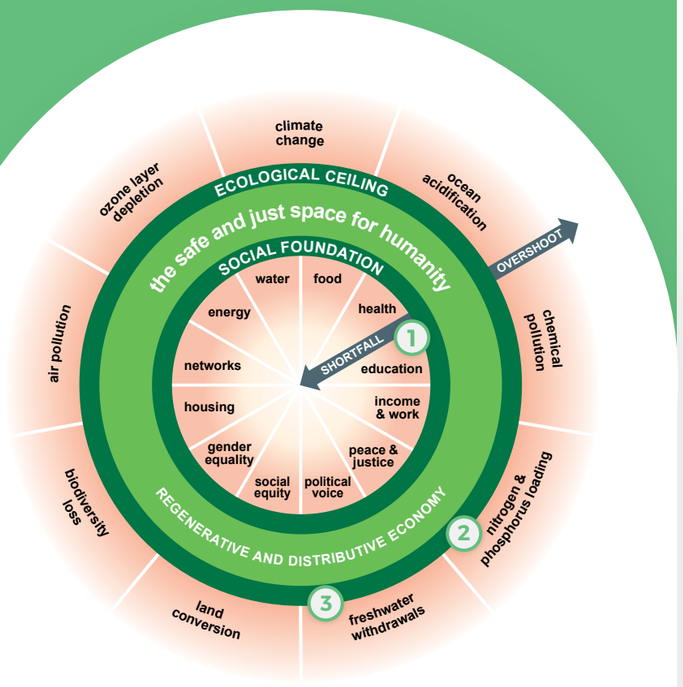
By having more activities in high-value nutrients recovery, and making it accessible to the public, the citizens will become more aware of closed loop biomass and water cycles, and the sustainability message behind.

2 NITROGEN & PHOSPHORUS LOADING

Less phosphorus and nitrogen needs to be extracted to produce chemical fertilisers. Applying the locally produced organic fertiliser to urban and peri-urban farms, might increase the overall nitrogen and phosphorus content in the soil.

3 FRESHWATER WITHDRAWALS

Closed water cycles applied in buildings, will decrease the consumption of fresh water.



Our current global system is exceeding the natural boundaries of the Earth's phosphorus and nitrogen cycle. The import of animal feed and synthetic fertilisers is leading to depletion of nutrients in exporting countries, and accumulation in the importing countries such as the Netherlands.[132] [133] Runoff of phosphorous - a finite resource - into our seas and oceans is at a level far beyond capacity, leading to eutrophication and oceanic dead zones.[134] However, the city can capture many of the nutrients that are currently produced as waste. In a circular economy, it is important to close nutrient cycles at a most local scale possible to maintain the ecological balance of the region.

Impacts of the direction on Amsterdam

Closing local nutrient cycles within the AMA through decentralised systems will create a more resilient city. The restoration of nutrient balances can support local and circular food production in both the city of Amsterdam as well as the surrounding region. Furthermore, increasing the local recovery of nutrients can reduce the dependence on imported and chemical fertilisers.

CURRENT STATE OF AMSTERDAM

There is still a great potential to maximise the value of nutrients recovery in the biomass and food value chain in Amsterdam.[135] There is a number of successful specialised projects focusing on high-value reuse of organic residual flows on a small scale. However, it is important to accelerate ongoing initiatives towards scaling up.

Examples of existing initiatives:

- Power to Protein is a project that extracts ammonia from sewage water.[136]
- Vosse Groen Recycling composts organic waste.[137]
- Wormenhotel is a decentralised solution for recovering nutrients from organic waste by using worms to compost kitchen scraps and other green waste (also called vermicomposting).[138]
- Re-organise is a research project by the Amsterdam University of Applied Sciences (AUAS) aimed at identifying opportunities for local, decentral processing of organic waste (e.g. into biogas or fertiliser) to decrease transport.[139]

LEVERS

INNOVATION NETWORKS

LOGISTICS

DIGITALISATION

CITY OF AMSTERDAM

Regulation

- Use spatial planning to provide physical space (for operation and testing) and infrastructure for businesses and initiatives that close nutrient cycles and recover nutrients at a high-value. Facilitating discussions in the market in order to find the correct scale for processing.
- Develop different required logistics levels in a joint logistics strategy: neighbourhood, district and city. Weigh the (residual) value of the stream against the necessary logistics movement.

Direct financial support

- Provide financial support for businesses that engage in, and experiment with, precompetitive nutrient recovery.

Governance

- Lobby for minimising regulations that restrict turning waste into products.

Knowledge, advice and information

- Facilitate research into new local nutrient recovery.

ROLES OF OTHER STAKEHOLDERS

REGIONAL, NATIONAL AND INTERNATIONAL GOVERNMENTS

- Regional government: **create physical space needed for waste collection and processing**
- National government: **provide subsidies to create a positive cost-benfit ratio for products made from recovered nutrients (e.g. natural fertiliser); minimise regulations that restrict turning waste into a product, e.g. on using digestate or international catering waste from airports and ships to be used as organic fertiliser, while safeguarding public health**

BUSINESSES

- Food vendors (supermarket, hotels, restaurants, retail, cafes): **collect and separate bio-waste**
- Private waste collectors: **ensure the separate collection of bio-waste; process bio-waste at a high value**
- Energy companies: **shifting demand from non-renewable to renewable energy sources, e.g. made from bio-waste**
- Closed-loop businesses: provide expertise; **share knowledge and experience with other businesses**
- Port of Amsterdam: **provide physical space to closed-loop businesses**

NON-PROFIT ORGANISATIONS AND INTEREST GROUPS

- Non-profit closed loop businesses: **share knowledge and experience**

UTILITY AND PUBLIC SERVICE PROVIDER

- GGD (community health services): **safeguard public health**
- Waternet (water board): **facilitate innovation for nutrient recovery from wastewater**
- Housing associations: **set up operational infrastructure in buildings for the collection and separation of high-value biomass and water flows**
- Waste departments: **manage the collection and efficient distribution of bio-waste**

KNOWLEDGE/EDUCATIONAL INSTITUTIONS

- Universities (especially technicians and engineers): **conduct research on optimal value retention (fertiliser, biogas, insect protein)**
- Schools: **educate children about the value of waste**

CIVIL SOCIETY

- Citizens: **collect and separate bio-waste; participate in neighbourhood composting projects**

4.5 CONSUMER GOODS

CIRCULAR ECONOMY DIRECTIONS

- **Prevent overconsumption and minimise the use of fast-moving consumer goods**
- **Stimulate high-value recycling of complex consumer goods**
- **Encourage the shared and long-term use of products**
- **Expand craftsmanship networks in neighbourhoods to repair and restore products**
- **Promote the creation and use of standardised and modular products to enable reuse, repair and recycling**


% off

Prevent overconsumption and minimise the use of fast-moving consumer goods

Fast-moving consumer goods are cheap, highly abundant products, such as clothing. As a result of their relatively low price, these products are easily sold and quickly thrown away. The increasing availability of these low-cost products contributes to a fast-paced consumerist and throw-away society. To prevent resource overconsumption, a fundamental (mind)shift is needed, not only in the way products are produced and consumed, but also in how consumer goods are valued. Innovative circular business models, materials and designs can help to reshape unsustainable production and consumption and maximise lifespans of consumer goods.

Impact visualisation of the direction according to the doughnut economy model

1. **CLIMATE CHANGE**

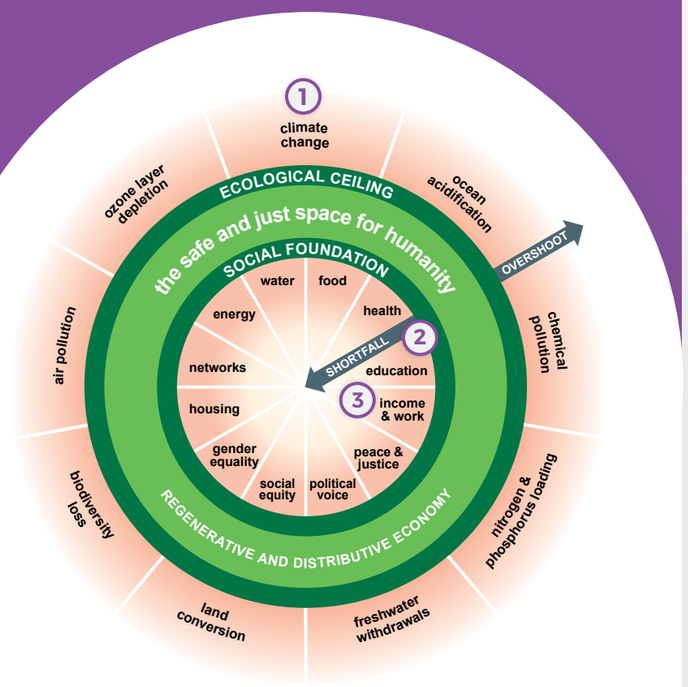
   Preventing overconsumption decreases the demand for products and will decrease carbon emissions associated with the production process.

2. **EDUCATION**

   Measures to prevent overconsumption can improve consumer awareness.

3. **INCOME & WORK**

   Reducing consumption of fast-moving consumer goods will decrease spending on those goods, which provides more spendable income. If, on the contrary, products are becoming more expensive, spendable income might be reduced.



Global resource consumption has been growing rapidly during the last decade[140] leading to overconsumption of resources. This trend is illustrated by the Earth Overshoot Day, which highlighted that by August 1st 2018, humanity's demand for ecological resources and services exceeded what Earth could regenerate in that same year.[141] Fashion and trends, together with advertising and media, escalate our need for buying new products. Old products appear to no longer have value, or to be out of style. Fashion is an example of a sector in which overconsumption is prevalent, with the aptly-named trend of 'fast-fashion'. Globally, more than $500 billion of value is lost every year as a result of discarded clothing underutilisation and the lack of recycling.[142]

Moving towards circular business models can help in breaking the current vicious cycle of unsustainable consumption. Product-as-a-service models, which have already been implemented for cars, mobile phones, and lighting, are changing the mode of consumption. They shift mindsets away from ownership towards access of products. However, changing mindsets is not easy. Efforts in education and regulation as well as the media and advertising can be deployed to realise this change in mindsets.

Impacts of the direction on Amsterdam

By disincentivising fast-moving products, the city of Amsterdam could stimulate and support manufacturers to produce more durable and high(er)-quality products and replace conventional sales approaches with product-as-a-service models. In such a way, the city could become well-known for the quality of its products and designs, while strengthening its exports. By making the infrastructure suitable for sustainable products, the city could become a commercial hub, and attract new businesses and startups. In the meantime, the city could invest in developing education and awareness campaigns to support the change of mindset amongst citizens.

CURRENT STATE OF AMSTERDAM

Some companies in Amsterdam already use alternative business models to decrease the need for purchasing products and, instead, stimulate leasing or renting of consumer goods and appliances. However, these alternative business models are yet to find mainstream adoption. Thus, the next phase in the transition to a circular economy should focus on supporting and scaling existing initiatives that are pioneering circular production and business models.

Examples of existing initiatives:

- In providing Light-as-a-Service (LaaS), the producer remains the owner and can easily take back the appliances for reuse. Resources are saved, which entails a cost reduction for the customer.[143]
- Bundles is a company leasing high-quality household appliances such as washing machines and coffee machines.[144]
- Car2go and Felyx are apps that offer an (electric) car and scooter sharing service, where citizens pay-per-use.[145] [146]
- Swapfiets is a company leasing bikes with an included repair service, for which users pay a monthly subscription fee.[147]
- Leasing of home furniture is available in the city.[148]
- LENA is a fashion library that rents out clothes.[149]
- Kringloopwinkels (second-hand stores) are, in total, 39 shops spread over Amsterdam.[150]

CITY OF AMSTERDAM

Direct financial support

- Demand high-quality and durable goods within public procurement processes.
- Support small stores selling durable or circular goods and limit opportunities for stores and global companies selling fast-moving consumer goods.

Knowledge, advice and information

- Inform citizens (e.g. through a campaign) on the harmful effects of overconsumption with the intention to discourage non-desirable consumption practices.
- Advertise on circular products and services only, and ban advertisements that stimulate consumption of harmful products.

Legislation

- Label products to give consumers insight into the social and environmental impacts of certain products, and help them to choose for circular products instead

Governance

- Lobby for regulation that boosts the recyclability of products and that encourages the use of recyclate in products.

LEVERS

INNOVATION NETWORKS

TRUE AND FAIR PRICING

SYSTEMS THINKING

ROLES OF OTHER STAKEHOLDERS

REGIONAL, NATIONAL AND INTERNATIONAL GOVERNMENTS

- Regional government: **support local efforts by promoting and financially supporting initiatives and businesses that prevent overconsumption and minimise the use of fast-moving consumer goods; include product-as-a-service models in public procurement**
- National and international government: **provide incentives and regulatory means to decrease overconsumption; place a higher tax on products with a short life cycle to discourage people to buy these fast-moving consumer goods, that further decreases overconsumption**

BUSINESSES

- Industry and manufacturing firms: **produce products that prioritise longevity; communicate and advertise such products instead of fast-moving items; rethink business models to replace conventional sales approaches with product-as-a-service models**

NON-PROFIT ORGANISATIONS AND INTEREST GROUPS

- Local and national Non-Profit Organisations: **raise awareness; share knowledge and experience among companies**

UTILITY AND PUBLIC SERVICE PROVIDER

- Public service center: **provide advisory and educational programmes**

KNOWLEDGE/EDUCATIONAL INSTITUTIONS

- Schools: **implement education about conscious consumption**
- Universities: **investigate socio-economic themes that help to understand local consumer behaviour; assess business models and policies that derive new strategies to reduce overconsumption; provide impact assessments of products and services to facilitate more sustainable decisions in businesses and consumers**

CIVIL SOCIETY

- Citizens: **make more conscious decisions about their consumption**
- Local initiatives: **engage and educate consumers on more sustainable purchasing choices and lifestyles**

Stimulate high-value recycling of complex consumer goods

In a circular economy, products that can no longer be repaired or reused are recycled in order to retrieve valuable resources. Yet, many consumer goods are difficult to separate in the recycling process, such as textiles and electronics, leading to a loss of value. This is why advanced infrastructure and technologies are needed that can separate, recover and recycle valuable materials and components.

Impact visualisation of the direction according to the doughnut economy model

1 CLIMATE CHANGE

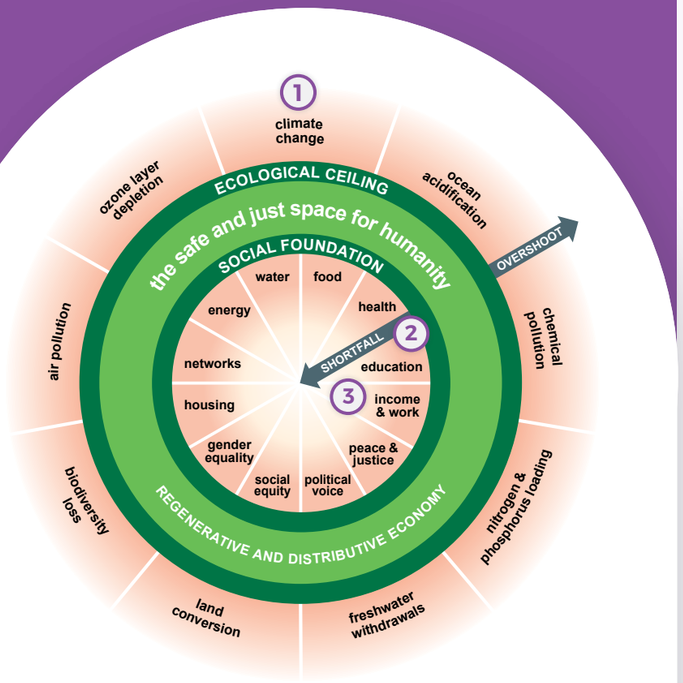
Increasing recycling practices of consumer products will reduce the need for extraction of virgin resources and their associated impacts on climate change.

2 EDUCATION

High-value recycling demands new skills and jobs, for which people will be trained and educated.

3 INCOME & WORK

New innovative solutions for high-value recycling provides new opportunities for businesses. This provides new (local) jobs, but jobs in the conventional production industry might be lost.



Priority should always be given to maximising the lifespan of products through local 'loops' of reuse and repair. Unfortunately, this is not always possible. However, many complex consumer products that carry high embodied impacts - such as textiles, electronics, packaging, and plastic products - are difficult to separate through conventional sorting and recycling systems and, as such, value and resources are lost.[151] [152] Advanced solutions have been developed to capture the materials and value that have been traditionally locked inside these complex consumer goods. One of these solutions is Fibersort, a technology that can sort post-consumer textiles by material type to enable further treatment. Another example is plasma technologies, which can extract precious metals from e-waste.[153] The growing arsenal of advanced recycling infrastructures and technologies are essential to close resource loops.

Impacts of the direction on Amsterdam

By exploring and stimulating innovative technologies for the high-value recycling of waste streams - and complex consumer products, in particular - Amsterdam has the opportunity to become a front-runner in waste management and recycling. The plastic recycling plant that is currently in planning at the Port of Amsterdam is a promising first step, and could be expanded with high-value approaches for waste streams with high environmental impacts, such as biomass, textiles, and e-waste.[154] When waste streams are turned into new materials and products, this allows for new businesses and jobs to arise, and new intersectoral collaborations could be created. Not only would this reduce the need for virgin materials and related impacts, but also strengthen the value of waste, leading to a more conscious consumption and wasteful behaviour in citizens and businesses.

CURRENT STATE OF **AMSTERDAM**

There are some companies that are already using innovative solutions for recycling of complex consumer goods. These solutions have to be further developed to allow for their wide-scale adoption.

Examples of existing initiatives:

- Weeelectric is a logistics service in which PostNL picks up used electrical appliances and lamps so that they can be recycled.[155]
- Fibresort is a technology that automatically sorts large volumes of mixed post-consumer textiles by fibre type, which is an important first step to enable recycling.[156]
- vanPlestik used 3D printing to transform plastic waste into plastic objects such as furniture or custom-made parts for the local industry.[157]
- Granuband is a company that recycles tires to create new rubber products.[158]
- Plastic Recycling Amsterdam (PRA) is a recycling plant that is being constructed in the Port of Amsterdam that uses innovative technologies to recycle plastic waste.[159]
- RECURF is a project by the Amsterdam University of Applied Sciences (AUAS) that researches how textile waste can get a new, high-value purpose rather than being burned or turned into insulation material.[160]

LEVERS

INNOVATION NETWORKS

LOGISTICS

JOBS AND SKILLS

SYSTEMS THINKING

CITY OF AMSTERDAM

Knowledge, advice and information

- Contribute to creating awareness about the importance of waste separation and processing waste at the highest value possible (according to the Waste Hierarchy or Ladder van Lansink). Furthermore, educate product designers on waste treatment processes.
- This direction requires research on innovative ways to process complex consumer goods.

Collaboration platforms and infrastructure

- Inform citizens (e.g. through a campaign) on the harmful effects of overconsumption with the intention to discourage non-desirable consumption practices.
- Advertise on circular products and services only, and ban advertisements that stimulate consumption of harmful products.

Governance

- Facilitate research into new local nutrient recovery.

Economic frameworks

- Support public-private partnerships that bring together innovative solutions from the private sector with the public sector in order to accelerate the transition towards more high-value recycling.
- Demand extended producer responsibility for complex consumer goods.

ROLES OF OTHER **STAKEHOLDERS**

REGIONAL, NATIONAL AND INTERNATIONAL GOVERNMENTS

- Local government: **support R&D of high-value recycling materials and technologies; invest in recycling centres that adhere to the newest standards; facilitate better sorting and collection of recyclable waste**
- International government (e.g. EU): **develop programmes that engage international research and practice around high-value recycling, align regulations and legislation; set favourable regulation to boost the recyclability of products, e.g. setting a fee on residual waste or complex consumer goods**

BUSINESSES

- Manufacturing firms: **invest into R&D to explore potentials in how their products can be designed to enable easy high-value recycling after their initial use**
- Waste and Recycling businesses:[161] **develop technologies for high-value recycling**
- Plastic producers: **focus on mono-stream plastics that are recyclable, reusable and harmless to human health**

NON-PROFIT ORGANISATIONS AND INTEREST GROUPS

- Sector Associations: **enable collaboration and knowledge transfer about recent materials and recycling technologies and procedures**
- Intersectoral collaborations (e.g. Afvalfonds verpakkingen): **share expertise and data on (waste) products that feed the material choices for new products**

UTILITY AND PUBLIC SERVICE PROVIDER

- Public waste collection service provider and municipal waste department, public waste and recycling centers (e.g. AEB, Recycling Service centre): **collect complex products; invest in new waste processing and recycling technologies; provide workplaces for people with a distance to the labour market**

KNOWLEDGE/EDUCATIONAL INSTITUTIONS

- Universities: **carry out research about international best practice examples and new waste processing and recycling technologies; share insights with practitioners**

CIVIL SOCIETY

- Citizens: **dispose their complex products correctly after their use**

Encourage the shared and long-term use of products

By encouraging and adopting the shared use of products, fewer products are needed per capita, thereby reducing the overall quantity of resources required. Shared use can apply to a broad range of consumer goods, such as cars, homes, appliances and tools.

Impact visualisation of the direction according to the doughnut economy model

1 CLIMATE CHANGE

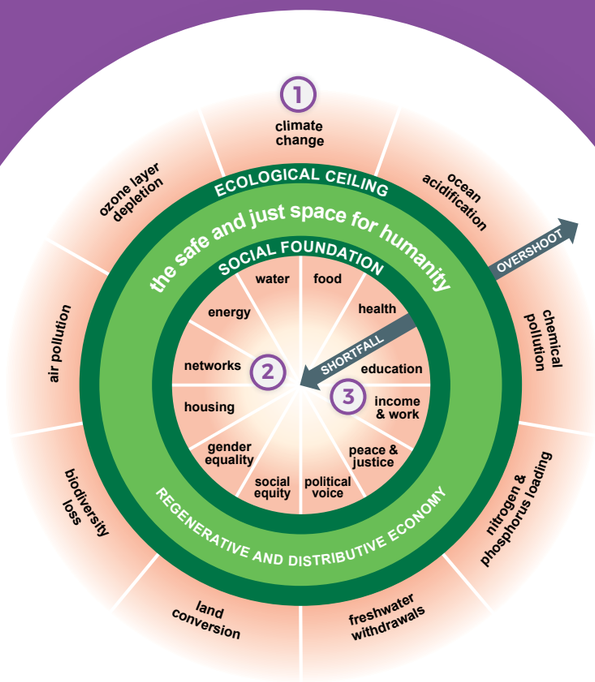
Shared use of products will enhance a dematerialisation in the long-run, as less products are needed because they are used more efficiently. This will reduce climate emissions from production.

2 NETWORKS

Shared use of products is about network-based activities. These foster collaboration between actors in the city.

3 INCOME & WORK

Shared use makes products more accessible to everybody. This can reduce inequality.



Each year, thousands of tonnes of materials are extracted to produce new products. Yet, for much of the time, these items sit idle - the average car sits unused for over 90% of the time.[162] [163] Collaborative consumption or shared use of consumer goods has the potential to increase the time that products are used, while decreasing overall material demand.[164]

For instance, product owners can grant access to or sell underutilised assets to subsequent customers. One of the main differences with leasing is that the typical period of usage is generally shorter. This is why the term “collaborative consumption” is applied. Examples include clothing libraries and the use of the same tools by multiple households. Shared use of products can have an impact on the way space is used (such as reducing the need for parking spaces). Cities can prepare their spatial planning to facilitate such changes. Furthermore, digital tools would be important drivers for advancing the use of such products.[165]

Impacts of the direction on Amsterdam

Collaborative consumption models can support Amsterdam to reduce the overall quantity of products, and associated resources, that are consumed in the city. Furthermore, total emissions can be cut, helping to reduce the city’s carbon footprint. To implement this direction, a change of mindset is desirable, and can be promoted through communication and education campaigns.

CURRENT STATE OF **AMSTERDAM**

There are already many ongoing efforts and activities in Amsterdam concerning the shared and more effective use of various vehicles and tools. Towards the future, this can be expanded to include other types of consumer goods.

Examples of existing initiatives:

- Snappcar is an online platform where people can rent a car from their neighbours.[166]
- Camptoo is an online platform for people to rent out their camper or caravan.[167]
- Peerby is an online platform where people can rent products from their neighbours.[168]
- Timebank is a community exchange bank where skills and knowledge are shared in exchange of time instead of money.[169]
- Thuisafgehaald is an online platform that facilitates the sharing of meals between neighbours.[170]

LEVERS

DIGITALISATION

CITY OF AMSTERDAM

Knowledge, advice and information

- Encourage sharing by initiating a campaign to change mindsets by showing the benefits of shared use. This direction requires a mindset change from ownership towards access-to-products.

Regulation

- Provide physical spaces (e.g. hubs on the neighbourhood level) to increase accessibility of shared products. Community centres, government buildings and schools can act as a sharing hub and can therefore be considered in spatial planning.

Economic frameworks

- Support public-private partnerships aiming to bring together innovative business models, based on shared use of products, and the public sector.

ROLES OF OTHER **STAKEHOLDERS**

REGIONAL, NATIONAL AND INTERNATIONAL GOVERNMENTS

Regional government: **support and promote shared use of products, for instance through awareness campaigns**

- National and international government: **enable the development and expansion of shared use of products by eliminating legislative barriers; develop financial support for scale-ups**

BUSINESSES

- Manufacturing businesses: **develop products and services that prioritise longevity, simple usability, and standardised properties**
- IT-businesses: **build digital infrastructure for shared use of products**
- Urban planners and architects: **integrate shared use of products in the design of the city and buildings**

NON-PROFIT ORGANISATIONS AND INTEREST GROUPS

- Local Non-Profit Organisations: **foster awareness-raising about the benefits of shared use over purchasing**

UTILITY AND PUBLIC SERVICE PROVIDER

- Public service centres: **provide information about the possibilities; give advice and assistance concerning the use of these systems**

KNOWLEDGE/EDUCATIONAL INSTITUTIONS

- Universities: **conduct research on innovative business models around the shared use of products**

CIVIL SOCIETY

- Citizens and local communities: **use the opportunity to increase the number of products that are share**d
- Community centres and other local initiatives: **educate and train people in the local community to involve them in these possibilities; enhance collaboration between civil society and the public/private sector to support this development**

Expand craftsmanship networks in neighbourhoods to repair and restore products

Local craftsmanship and repair shops can be a low-entry point for the repair and reuse of products at a neighbourhood level. This reduces the demand of primary materials in the manufacturing of new products and transportation associated with logistics.

Impact visualisation of the direction according to the doughnut economy model

1 CLIMATE CHANGE

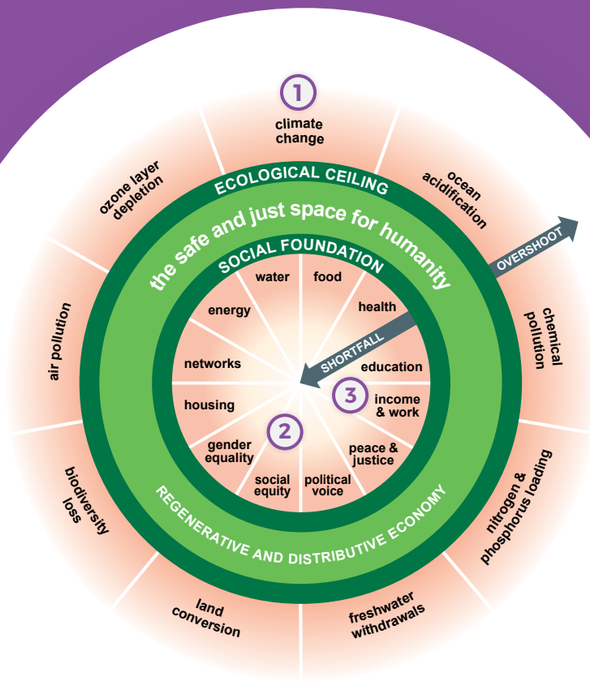
By repairing and reusing products, fewer new products are needed. This reduces the production-associated impacts on climate change.

2 SOCIAL EQUITY

Craftsmanship networks may employ people that are distanced to the labour market, which increases social participation in the city.

3 INCOME & WORK

The expansion of craftsmanship networks in neighbourhoods will encourage citizens and shops to engage in repair of products. This can create more local jobs.



Broken products and secondary materials can be brought directly to local craft- and repair shops rather than being disposed of in waste management facilities, thereby reducing the need for transportation and providing employment opportunities in neighborhoods. Craftsmanship networks, local repair shops, or circular shopping centres, such as seen in Sweden,[171] fulfill both the needs to repair and refurbish damaged items, as well as upcycle and produce new circular products. In this way, these local craftsmanship networks can serve as innovation hubs.

Impacts of the direction on Amsterdam

Local repair hubs and digital platforms in the city of Amsterdam could help establish networks between consumers and local craftsmanship/repair initiatives. Paired with awareness-raising campaigns, interactive workshops and education programmes could be organised. This can stimulate and empower citizens to invest in repair, refurbish, upcycling, and reuse of goods instead of discarding them. As a result, product life spans can be extended, and the need for virgin materials and related environmental impacts from the manufacturing of new products reduced.[172] Through this direction, more local jobs could be created - notably sheltered workspaces for those with a disability or distance to the labour market. New sources of income can be created, and the social foundation of the city.

CURRENT STATE OF AMSTERDAM

There is great potential to initiate new and expand existing craftsmanship networks in Amsterdam. Repair services for certain consumer products, such as bicycles and clothes, are already ongoing on a small scale. It is important to focus on upscaling such initiatives and bring them together in hubs to increase their accessibility and appeal.

Examples of existing initiatives:

- Repair cafés are spaces where citizens gather to repair products such as electrical appliances, bicycles and clothes.[173]
- Wasted is a local initiative offering the opportunity for citizens to return separated waste streams to shops, receiving discounts to products and services in reward.[174]
- The local recycling centre in De Pijp district is initiated, maintained, and used by people living in the neighbourhood, and should become a hub in which circular initiatives will be made more visible.[175]
- Ex'tax is a Dutch think tank that strives towards a tax shift from labour to natural resource use in order to make services more affordable and boost craftsmanship.[176]
- Roetz-Bikes reuses components of bicycles to create new bicycles and trains people to repair and upcycle bicycles.[177]

LEVERS

INNOVATION NETWORKS

JOBS AND SKILLS

EXPERIMENTATION

CITY OF AMSTERDAM

Regulation

- Provide physical spaces, which can be reserved in spatial plans.

Collaboration platforms and infrastructure

- Create a business climate that is attractive to small companies and facilitate an affordable physical space for repair stores and reuse activities.

Knowledge, advice and information

- Marketing should be used to stimulate demand for repaired or upcycled products.
- There is a need for a change in mindset towards understanding the value of materials and products, appreciation of quality rather than novelty, and repairing rather than throwing away. An information campaign or education on these topics can contribute to increased awareness. Furthermore, this direction requires repairing skills, which can be obtained by training.

Governance

- Lobby for lower tax on labour and repair services and increased tax on primary resources to financially stimulate the repair of products.

ROLES OF OTHER STAKEHOLDERS

REGIONAL, NATIONAL AND INTERNATIONAL GOVERNMENTS

- Regional government: **promote initiatives that provide repair services or information and education around repairing; engage citizens and businesses in repair activities**
- National and international government: **develop financial support and reward programmes to accelerate and incentivise repair centres and services; lower tax on labour and repair services and increase tax on primary resources to financially stimulate the repair of products**

BUSINESSES

- Businesses or entrepreneurs in manufacturing: **design products in a way that enables repair, refurbishing, and upcycling; provide transparent information about product components and repair possibilities; provide take-back and repair services**
- Repair businesses: **provide expertise and know-how for the repair centers; change location to repair centers; collaborate with others to maximise offering**
- Housing associations: **integrate repair sites in long-term strategy and planning**
- Urban planners and architects: **integrate repair sites in planning and design**

NON-PROFIT ORGANISATIONS AND INTEREST GROUPS

- Support entrepreneurs: **entrepreneurs in developing new ideas around product design, repair, refurbishment, and upcycling; enhance collaboration and knowledge exchange**

UTILITY AND PUBLIC SERVICE PROVIDER

- Public service centre: **provide information and assistance about available repair centres and initiatives**

KNOWLEDGE/EDUCATIONAL INSTITUTIONS

- Schools, and universities: **promote the importance of repair, refurbishing, and upcycling activities; teach know-how about repair of products**

CIVIL SOCIETY

- Customers: **buy products that are designed for modular repair; use and engage in local repair centres**
- Local community initiatives: **engage the local society in local repair centres; provide information and support for citizens to repair products themselves; enhance collaboration between civil society and the public/private sector to support the development of new services around repair, refurbishing, and upcycling**

Promote the creation and use of standardised and modular products to enable reuse, repair and recycling

Modularity is an integral part of the circular economy and entails designing products in such a way that parts can be easily repaired, replaced or upgraded and, where possible, recycled. This decreases the need for purchasing an entirely new product. Through standardisation, products and components are more easily exchangeable with other products, further enabling modular repair, reuse and high-value recycling.

Impact visualisation of the direction according to the doughnut economy model

1 CLIMATE CHANGE

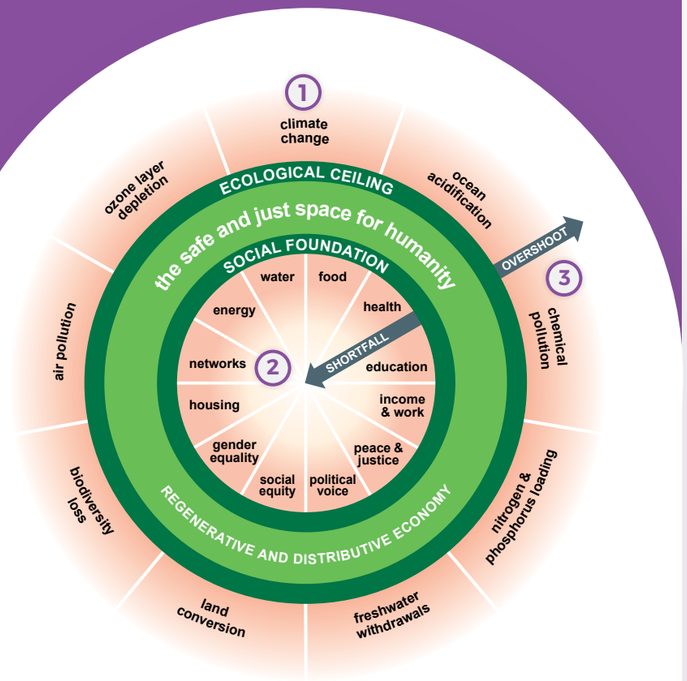
A larger proportion of modular and standardised products ensures that components can be easily exchanged and repaired. Because of this, less primary resources are needed for new products, which reduces CO2 emissions during the production process.

2 NETWORKS

The promotion of uniform and modular products demands collaboration throughout the whole value chain and between producers.

3 CHEMICAL POLLUTION

Uniform and modular products will decrease the overall amount of products and components that are needed and incorrectly disposed ending up in the environment.



With advances in technology over the past decade, the complexity of consumer goods has increased, with smart sensors embedded in seemingly every element of our daily lives. With this increased complexity, products and components are becoming more difficult to disassemble for repair. Oftentimes, the failure of one component, such as the battery of a phone, readers the entire product (and all of the materials that it is comprised of) waste. Compounding this challenge, the lack of standardisation throughout seemingly similar products, reduces the uniformity of repair practices and the potential for economies of scale which, ultimately, increasing the cost of repairs. Combined with a proliferation of low-cost, consumer goods, it is open cheaper to purchase an entirely new product, rather than repairing the one damaged component.

An example of the potential benefits of standardisation (and modularity) is the USB phone charger that can be used by almost all phones. Before its mainstream adoption, more than 30 different types of charger on the market created unnecessary electronic waste.[178] Standardisation and modularity allow for a system where products and components are more easily exchanged, creating economies of scale in their repair and recycling systems. Promoting standardised and modular products requires setting the right criteria in procurement and stimulating innovation.

Impacts of the direction on Amsterdam

By stimulating standardised and modular product design, repair of consumer products could be facilitated and their lifespan could be prolonged. This would not only benefit consumers, but also attract and stimulate new businesses that provide repair services or produce replaceable spare parts. Collaboration between different actors (from product designers to producers, repair shops and recycling companies) could be fostered. In that way, Amsterdam could become well-known for innovations in product design and durability and strengthen its exports. Through awareness campaigns and education, the city could support customers to take more informed purchasing decisions in favour of standardised and modular products, and encourage product repair and reuse. As a result, fewer new products would be purchased in the primary market, minimising the use of virgin materials and the production of waste.

CURRENT STATE OF **AMSTERDAM**

There is one example that embraces modularity into products design. Beyond this notable case, there is still great potential to embed modularity in different types of consumer goods, such as from vehicles to household appliances.

Examples of existing initiatives:

- Fairphone is an Amsterdam-based company producing modular smartphones that enables for easy replacement of components.[179]

LEVERS


INNOVATION NETWORKS


LOGISTICS


EXPERIMENTATION

CITY OF AMSTERDAM

Direct financial support

- Promote the benefits of modular products by (financially) rewarding companies that are moving in the right direction.
- Demand modular and standardised products within public procurement processes. Public procurement can also prioritise the innovation of new, modular products.

Knowledge, advice and information

- The development of standardised and modular products requires advanced design and production techniques, and advanced disassembly and remanufacturing skills and techniques. The municipality can stimulate education in the field of modular design (for instance by attracting students by showing them the opportunities on the labour market).
- Attract the best designers and use marketing to make modular products appealing to a large crowd.

Governance

- Lobby for regulations that support the disassembly of reusable materials, standards for product design and aspects such as quality control, hygiene, safety and data protection.

ROLES OF OTHER **STAKEHOLDERS**

REGIONAL, NATIONAL AND INTERNATIONAL GOVERNMENTS

- Regional and national governments: **develop financial support and reward programmes to accelerate and incentivise the design of modular products; support modular products through public procurement**
- National Government: **design regulations that promote the disassembly of reusable materials; develop uniform production design standard; establish regulations for quality control, hygiene, safety, and data protection**
- World-wide regulatory body for production (consumer product safety authority): **put respective regulations and legislation into place to support standardisation and modularity in products**
- EU: **develop programmes that engage and motivate governments and businesses to explore the potential of modularity, uniformity and return logistics**

BUSINESSES

- Manufacturing firms: **design modular products that enable reuse and repair; develop return services; collaborate with competitors to enable uniformity**
- Logistic businesses: **facilitate return logistics of modular products**

NON-PROFIT ORGANISATIONS AND INTEREST GROUPS

- Sector organisations / business associations: **enable collaboration and knowledge transfer amongst different stakeholders in the value chain of modular products, including return logistics, and repair services**

UTILITY AND PUBLIC SERVICE PROVIDER

- AEB (waste and energy company) and RSC (Recycling Service centre): **promote and invest into modularity and uniformity; demand those criteria from their (sub) contractors and supply chain partners AEB (waste and energy company) and RSC (Recycling Service centre): promote and invest into modularity and uniformity; demand those criteria from their (sub)contractors and supply chain partners**

KNOWLEDGE/EDUCATIONAL INSTITUTIONS

- Universities: **encompass modular-thinking in courses around product design; conduct research on modular product design, and how the transition to more standardisation and modularity can be facilitated**
- Knowledge institutions (e.g. KEMA or TÜV): **provide knowledge, experience, and data that can feed the design of future modularity and uniformity**

FOOTNOTES

1. https://www.amsterdam.nl/en/policy/sustainability/circular-economy/
2. Ibid.
3. Circle Economy (2019).
4. European Commission (2015).
5. European Commission (2019b).
6. Ministry of Infrastructure and the Environment (I&M) and Ministry of Economic Affairs (EZ) (2016).
7. https://www.amsterdam.nl/bestuur-organisatie/volg-beleid/innovatie/circulaire-innovatie/
8. Raworth (2017).
9. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
10. Circle Economy, Copper8, and Gemeente Amsterdam (2018).
11. The policy instruments are further developed based on the Amsterdam Circular: Evaluation and Action Perspectives report.
12. The levers have been formulated based on the expertise of Circle Economy and other organisations, such as the Ellen MacArthur Foundation. We list those that can enable, facilitate and foster the suggested directions.
13. Gemeente Amsterdam, Circle Economy, and EHERO (2018).
14. https://circle-lab.com/knowledge-hub/policy-instruments
15. http://www.mfe.govt.nz/sites/default/files/value-of-urban-design-full-report-jun05_0.pdf
16. Circle Economy, Circular Finance Lab, Nederland Circulair (2019).
17. https://cloudfront.escholarship.org/dist/prd/content/qt8pf8s47q/qt8pf8s47q.pdf
18. https://www.urbandesignmentalhealth.com/journal-3---la-regenerative.html
19. Gemeente Amsterdam (2017b).
20. https://www.eigenhaard.nl/projecten/nw_stadstuinovertoom
21. https://www.bajeskwartier.com/
22. https://www.amsterdam.nl/projecten/buiksloterham/circulair/
23. Biophilic design responds to the innate human need to connect with nature.
24. Biomimetics or biomimicry is the science and art of imitating ideas originating from nature to invent or improve human applications, or make them more sustainable.
25. European Commission (2019c): “Circular procurement can be defined as the process by which public authorities purchase works, goods or services that seek to contribute to closed energy and material loops within supply chains, whilst minimising, and in the best case avoiding, negative environmental impacts and waste creation across their whole life-cycle.”
26. Circle Economy, DGBC, Metabolic, SGS Search, and Redeco Foundation (2018).
27. Rijksoverheid (2018b).
28. In projects of transforming area’s like Haven-Stad and Sloterdijk, there is a lot of land owned by private parties; there the municipality does not have a strong position to demand more than the regulations such as “bouwbesluit” stipulate.
29. The municipality of Amsterdam owns the majority (80%) of Amsterdam’s land (Organisation for Economic Co-operation and Development, 2017). It can use its power and create demand for circular criteria as a condition to build on municipal land.
30. Circle Economy, DGBC, Metabolic, SGS Search, and Redevco Foundation (2018).
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APPENDIX I:
POLICY INSTRUMENTS

INSTRUMENTS[180]

REGULATORY AND LEGISLATIVE INSTRUMENTS	REGELATION	Strategy & targets
		Spatial planning
		Environmental assessments & permits
		Monitoring & enforcement
	LEGISLATION	Bans
		Performance standards
		Technology standards
		Labelling
		Other legislations
ECONOMIC INSTRUMENTS	FISCAL FRAMEWORKS	Positive price instruments
		Negative price instruments
	DIRECT FINANCIAL SUPPORT	**Grants**
		Circular procurement & infrastructure
		Debt financing
	ECONOMIC FRAMEWORKS	Tradable permits
		Extended producer responsibility
		Public-private partnerships
SOFT INSTRUMENTS	KNOWLEDGE, ADVICE AND INFORMATION	**Conducting research**
		Education programmes
		Information campaigns
		Capacity building
	COLLABORATION PLATFORMS AND INFRASTRUCTURE	Data & information sharing platforms
		Matchmaking platforms
		Participatory platforms
		Living labs
	GOVERNANCE	Institutional design
		Public-public partnerships
		Voluntary agreements
		Lobby

APPENDIX II: INTERNATIONAL CONTEXT

i. Schaalniveaus voor een circulaire economie

To successfully transition towards a circular economy, concerted efforts are required by all stakeholders across different spatial scales, from local, and regional, to national and international levels. In order to design a holistic strategy for a circular Amsterdam 2020-2025, it is important to appreciate Amsterdam as an entity that is nested within, and influenced by, these different spatial scales. As such the most important targets and policies that are relevant to Amsterdam on an EU, national, and city level were analysed. Table 1 lists the key targets concerning the circular economy for the EU, the Netherlands and Amsterdam.

The European Union

The European Commission adopted the so-called Circular Economy Action Plan in 2015, to stimulate the EU's transition towards a circular economy, boost global competitiveness, foster sustainable economic growth and generate new jobs. In order to "close the loop" of product life cycles, five priority sectors have been identified to accelerate the transition: food waste, critical raw materials, construction and demolition, biomass and bio-based materials, and plastics.[182] Laws, regulations and economic incentives on the EU-level have a large impact. Increasingly, European countries, including the Netherlands, Finland and France, are developing their own circular ambitions, from reducing landfilling and resource consumption, to increasing plastic recycling rates and eco-innovation.[183] [184]

The Netherlands

According to the national Transition Agendas for the Circular Economy presented in 2018, the Dutch economy should be fully circular by 2050, using 50% fewer primary raw materials by 2030.[185] Over 325 parties have endorsed this ambition by signing the Resources Agreement. Five priority value-chains have been developed, and each Agenda provides concrete measures that contribute to the realisation of these ambitions. In addition to the Transition Agendas, the Environmental and Planning Act (Omgevingswet) (taking effect in 2021) offers new opportunities for the realisation of circular ambitions. This is because it should better align plans in the fields of spatial planning, environment and nature. Besides, sustainable projects should be stimulated and municipalities, provinces and water boards should be given more freedom to achieve their specific objectives.[186]

Amsterdam

Ratifying national ambitions on the local level, the city of Amsterdam plans to move towards a circular economy as quickly as possible - and by 2050 at the very latest.[187] A relevant sub-goal that the city has set is: by 2030, 50% reduction in the use of primary raw materials must be achieved.[188] To transition towards a circular economy, the municipality has adopted circular programmes, including Amsterdam Circular: Learning by doing, and the Circular Innovation Programme.[189]

GENERAL TARGETS FOR THE CIRCULAR ECONOMY

	Target/policy	Strategy/activity for achieving this target
EU	**Circular Economy Package**[190] • Providing funding • Development of quality standards for secondary raw materials • Bans on landfilling on separately collected waste and promotion of economic instruments to discourage landfilling • Development of actions and strategies (e.g. on water reuse and recyclability and biodegradability of plastics) • Revision of regulations on fertiliser	• 65% recycling of municipal waste by 2030 • 75% recycling packaging waste by 2030 • Reduce landfill to maximum 10% municipal waste by 2030
National	**Programme The Nederlands Circular in 2050**[191] • A sustainable, circular economy by 2050 • 50% less usage of primary (mineral, fossil and metal) resources by 2030 **Programma VANG - Huishoudelijk afval** • Separate 75% of household waste by 2020	
Local	**Coalition agreement**[193] • Invest in a sustainable waste chain. The waste chain should become a resource factory • Improve separated waste collection	
	Doelenboom[194] • 9.1.3. Contribute to the circular economy and transition to a gas-free city through sewage and drinking water • 9.2.1. Amsterdam prevents waste • 9.2.2. Any remaining waste is sustainably collected and processed at the highest possible value • 9.3.1. Amsterdam meets the objective of the Paris Climate Agreement by making the city natural gas-free before 2040 and reducing CO_2 emissions by 95% by 2050 and is a city with clean air where waste is used as raw material	• Activity 9.1.3.1 Recover resources and thermal energy from the water cycle • Activities 9.2.1.1-2 Stimulate prevention of waste and responsibility of producers; Stimulate reuse of materials and products • Activities 9.2.2.1-4 Collecting waste sustainably; improve waste collection facilities; recycle waste at its highest possible value, create value and make it marketable; inform and involve citizens in waste collection and processing • Activity 9.3.1.1 Contribute to the transition to a circular economy
	Action perspectives from Amsterdam circular evaluation and action perspectives[195] • To boost the transition of the value chains Biomass and Food, Construction and Consumer goods, the current use of municipal instruments could be expanded or additional instruments could be used • The procurement instrument as well as the knowledge tools (Education & Information provision, Research and Networks & Knowledge exchange) help to speed up the transition when applied in the value chains.	
	Declaration of intent with Amsterdam Metropolitan Area[196] • To boost the development of the circular economy, MA-partners have signed a declaration of intent for circular procurement. In the municipality tenders there will be: • At least 10% circular procurement in 2022 • At least 50% circular procurement in 2025	
	Innovatie- en Uitvoeringsprogramma Circulaire Economie 2019[197] • Taking the programmes “Amsterdam Circular: Learning by Doing” and the “Circular Innovation Programme 2016-2018” a step further to the implementation of circular projects and expansion of collaboration.	

ii. The circular economy across priority value chains

To focus the momentum towards circular transition, the report Amsterdam Circular: Evaluation and Action Perspectives identified three value chains with great transformative potential for the city of Amsterdam. The three value chains are Construction, Biomass and Food, and Consumer goods and are set to lead the Amsterdam's circular transition.

While specifically identified by the city of Amsterdam, circularity within these priority value chains is also being pursued at the (inter-)national stage, with circular ambitions, targets and directions being developed at each scale.

iii. Circular Ambitions for Construction

In the Circular Economy Action Plan, the EU identified construction and demolition waste (CDW) as a priority waste stream.[198] CDW accounts for 25-30% of all waste generated in the EU and holds great potential for recycling and reuse.[199]

At the national level, the Netherlands have similarly established targets for a circular economy in the construction sector, that are also mainly focused on high-value reuse and use of renewable resources in order to limit consumption of finite resources and in that way contribute to achieving climate goals.

The city of Amsterdam has also recognised the importance of construction within a circular economy, with local targets mentioning a need for circular and energy-positive construction.[200] At the same time, the municipality of Amsterdam is equally focussed on social aspects such as ensuring sufficient and affordable housing for all citizens. Practically, one of the Action Perspectives for the city as described on the report Amsterdam Circular: Evaluation and Action Perspectives, is that buildings should be constructed to be flexible (being able to respond to changing needs) and easily disassembled.

TARGETS FOR A CIRCULAR CONSTRUCTION SECTOR

	Target/policy	Strategy/activity for achieving this target
EU	**Waste Framework Directive 2008**[201] • By 2020, a minimum of 70% (by weight) of non-hazardous construction and demolition waste excluding naturally occurring material shall be prepared for reuse, recycled or undergo other material recovery.	
National	**Transition agenda Construction**[202] • In construction, mainly use renewable resources • Material use along the life cycle is optimised (maintaining value, less costs, more reuse and less environmental impact) • Reduce CO_2 emissions as much as possible, in the production, construction and use phases • The construction sector is an innovative sector that proactively responds to changes in society and market and consumer demand • All public tendering should be circular by 2023, and all public procurement should be circular by 2030	• Optimal usage of materials in all phases in the construction cycle • Make use of 'infinite' resources as much as possible; more and high value reuse in construction and at the end of the use phase • Use finite resources as efficiently as possible
Local	**Coalition agreement**[203] • Build 7,500 dwellings per year, of which 2,500 in the social housing sector • In the coming 4 years, build at least 10,500 temporary and/or permanent dwellings aimed at students or young people • Gas-free Amsterdam by 2040 • The municipality challenges the market to build in an energy-positive and circular way • Stimulate circular area development	
	Doelenboom[204] • 11.1.1 Sufficient availability of affordable and decent homes • 11.1.3. Amsterdam is built in a safe and healthy way	• Activity 11.1.1.1/4 Facilitate investments and guarantee quality of dwellings; stimulate appropriate housing for all target groups • Activity 11.1.3.1 Companies and citizens meet requirements concerning safety, construction safety and infrastructure

	Action perspectives from Amsterdam circular evaluation and action perspectives[205]
	• Construct buildings, carry out civil engineering projects and organise public space in such a way that buildings and components are always used at a high-value level
	  • Design a construction project in such a way that buildings are flexible and easily disassembled
	  • Only use materials with the lowest possible impact on the climate
	  • High-quality reuse of existing buildings or of components from the built environment
		• Focus on five instruments
		  • Spatial planning
		  • Land issue
		  • Legislation & Regulations
		  • Procurement
		  • Research

iv. Circular Ambitions for Biomass and Food

By 2035, the EU wants 65% of urban waste, including organic waste, to be recycled. In addition, objectives were formulated so that measures can be taken to prevent food waste.

The Netherlands also has strategies in place to decrease food waste. Another national target is the sustainable or regenerative production of biomass. The aim is to use biomass at the highest value possible, which was also addressed in the report Amsterdam Circular: Evaluation and Action Perspectives. Finally, recovering nutrients and fostering urban agriculture are reflected in both national and local goals.

TARGETS FOR A CIRCULAR BIOMASS AND FOOD SECTOR

	Target/policy	Strategy/activity for achieving this target
EU	**Circular economy package**[206] • EU-target: recycle 65% of urban waste by 2035 • Separate collection obligations for bio-waste by end 2023	• Prevention objectives reinforced requiring Member States to take specific measures to tackle food waste
National	**Transition agenda biomass and food**[207] • Sustainable/regenerative production of a sufficient amount of biomass with extensive closing of nutrient cycles on a geographic scale that is a small as possible and as big as needed • Optimal usage of biomass and food by keeping raw materials and (half-)products in the value chain for as long as possible (by complete utilisation of resources, use biomass at a high value and recycling of waste flows. Also, make use of biomass as efficiently as possible, for instance by preventing (food-)waste, preventing waste materials and dosed fertiliser application and efficient combustion) • Reduce the use of non-renewable resources and replace them with renewable resources (recyclate and sustainably produced biomass) • Develop and implement new ways of producing and consuming, which leads to improvements and reversed trends in the handling of biomass and food.	• Vergroten van de levering van duurzaam geproduceerde biomassa • De bodem en nutriënten op circulaire wijze gebruiken • Optimale waarde creëren door biomassa en afvalstromen om te zetten in circulaire, op biomaterialen gebaseerde producten • Tegengaan van voedselverspilling • Qua proteïnen overstappen op meer plantaardige proteïnen • Voeden en vergroenen van megasteden als Nederlands verdienmodel
Local	**Coalition agreement**[208] • Foster urban agriculture • Food strategy will be continued • Water board as partner in recovering resources from wastewater • Separated waste collection should improve. The successful pilots on organic waste will be expanded.	
	Doelenboom[209] Biomass: • 9.1.3 Contribute to the circular economy and transition to a gas-free city through sewage and drinking water Food: • No related targets	Biomass • Activity 9.1.3.1 Recover resources and thermal energy from the water cycle

	Amsterdam Aanpak Gezond Gewicht[210]
	• In 2033, all of Amsterdam's children have a healthy weight
		• Focus on three instruments:
		  • Business & Financial support
		  • Spatial planning
		  • Legislation & Regulations
		• This value chain also requires research and the use of networks

	Action perspectives from Amsterdam circular evaluation and action perspectives[211]
	• All biological residual flows are reused at high value
	  • Cascading: valuable substances of high value can be used
	  • Reuse: create a product from a residual stream or extract raw materials from waste
	  • A low-value - and therefore less desirable option - involves producing energy by composting or incinerating organic residual streams	

v. Circular Ambitions for Consumer Goods

On the EU level, consumer goods are not explicitly identified within the Circular Economy Action Plan. However, with growing concerns over plastic pollution and packaging wastes, consumer goods hold an important role in Europe's circular transition. Recognising this, requirements to promote and extend producer responsibility are already being implemented.

In the Netherlands, targets to promote circularity in consumer goods are based on using products and resources as high as possible on the R-ladder, using circular design principles and new business models that allow for more intensive use of products (e.g. by sharing).

The municipality of Amsterdam recognises the connection between the consumption of consumer goods and citizen well-being. The report Circular Amsterdam: Evaluation and Action Perspectives also stressed the importance of new business models to allow for high-value reuse of products, their parts and materials.

TARGETS FOR A CIRCULAR CONSUMER GOODS SECTOR

	Target/policy	Strategy/activity for achieving this target
EU	**Pakket Circulaire Economie**[215] • Minimum requirements are established for extended producer responsibility schemes to improve their governance and cost efficiency • Separate collection obligations for textiles by end 2025	
National	**Transitieagenda Consumptiegoederen**[216] • The transition to a circular economy leads to social, ecological and financial value creation • By 2030, no non-necessary short-cycle products are used, and all new product combinations brought onto the market are based on circular design principles • By 2030, new business models realise optimal use of products • By 2030, use all products and resources as high as possible on the R-ladder (giving preference to reuse, repair and reuse of parts)	• Use recycled and renewable materials for products with short life cycles • Develop alternatives to packaging and disposable materials • Do not use products with medium- to long life cycles that are becoming short-cycle, such as furniture and clothing. • More intensive use of products by sharing • Short-cycle products: • Design for recycling • Use eco-design principles and dialogue between recycling and production industries • Align collection with recycling • Medium to long cycle products: • Design for repair, repurpose, upgrade and recycling • Repair to use them for a longer amount of time • Reuse of products by others (second hand) • New business models • Dialogue between recycling- and production sector
Local	**Coalition agreement**[217] • Research opportunities for a platform for shared mobility	
	Doelenboom[218] • Geen gerelateerde doelstellingen	

	Action perspectives from Amsterdam circular evaluation and action perspectives[219]
	• Keep goods and associated packaging in the value chain at as high a level of value as possible
	• High-value reuse of products, their parts and their materials
		• Look more closely at two instruments:
		  • Business & Financial support
		  • Education & Information provision
		• Also, a lot of additional research is needed, especially into the economic and financial incentives for production, use and processing of a product