City of Amsterdam

From Innovation to Impact

Innovation and implementation programme for the circular economy

2019

Contents

Where have we come from?

Two programmes, *Circular Amsterdam: Learning by Doing* and *Circular Innovation Programme 2016-2018* have formed the foundation for our approach towards building a circular economy for Amsterdam. Each programme has lead towards the wide range of 'circular' projects that adopt the principles of circularity currently underway in the city. These projects are our collective source of inspiration and motivation, acting as a springboard towards new collaborations and through which the municipality is working hard to realise a more circular city. This is why, in 2019, the Board has decided to fully commit to the implementation of a circular economy and to showcase Amsterdam's breadth of existing projects in this document, *Innovation and implementation programme for the circular economy 2019*. Learning what works and what doesn't in practice is our first step towards creating a circular economy for Amsterdam.

The previous Board of Aldermen set out an initial concept for a circular economy for the city in its 2015 document *Circular Amsterdam: a vision and road map for city and region*. This vision has received widespread support from innovative businesses and start-ups, as well as citywide organisations, knowledge institutions and the public. Each of these actors is taking their first steps towards achieving the shared goal of a circular economy for Amsterdam by 2050.

Our approach is straight forward; instead of just talking, our focus is on action. As soon as *Circular Amsterdam: Learning by Doing* had been adopted in 2015, the *Circular Innovation Programme 2016-2018* and the *Waste Implementation Plan* programmes commenced in collaboration with our partners in the city. During these initial phases our focus was on experimentation and familiarisation with the circular economy concept, exploring our role as a municipality and establishing a strong knowledge base and database. Our work was driven by the actions 'to inform', 'to connect' and 'to make room for innovation'.

Part of our strategy derives from a bottom-up approach; we are moving towards a circular economy in collaboration with Amsterdam's residents and with businesses established in both the city and the port. Our collaborators include Circulair Buiksloterham, a new circular housing estate being developed with the help of its current and future residents; De Ceuvel, a circular 'living lab' in which a wide range of circular ideas are being tested; and Cirkelstad, a platform for leading businesses in the circular construction sector. Via Amsterdam Smart City (with approximately 6,000 members), Pakhuis de Zwijger (an independent platform attracting 150,000 visitors each year), the first-ever WeMakeThe.City festival (held over five days in 2018) and an increasing number of local events, we are engaging the people of Amsterdam in inviting them to participate and think pro-actively about their role as 'city makers'.

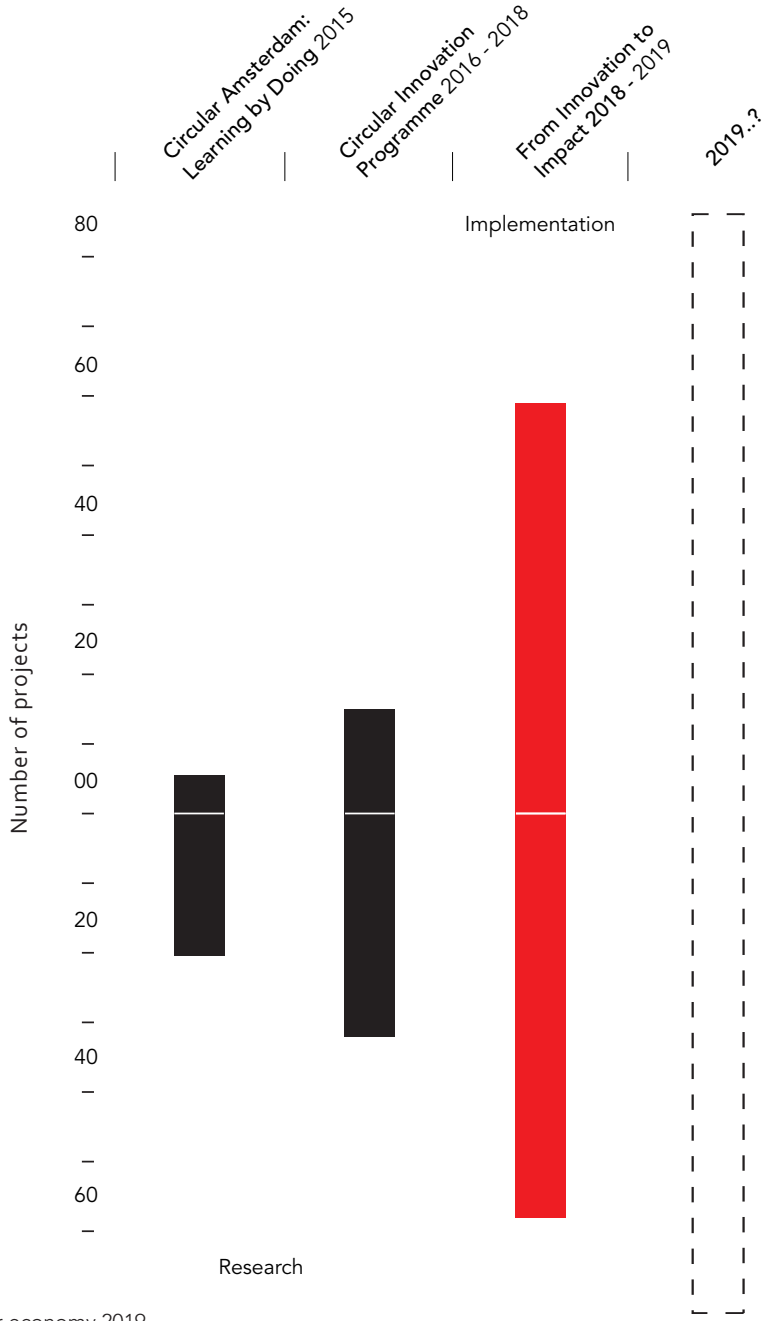
At a global level, Amsterdam is a leading city when it comes to building a circular knowledge base and database in terms of the content, data and methods used. The municipality collaborates with partners such as the Amsterdam Institute for Advanced Metropolitan Solutions (AMS), the Amsterdam University of Applied Sciences, as well as a broad range of specialised knowledge agencies and consultancies. These collaborations have resulted in a body of research that looks at the spatial implications of a circular economy and the impact of circular construction on building and investment costs.

One such project developed a road map for circular land allocation. Another, *Prospecting the Urban Mines of Amsterdam (PUMA),* researched the potential of Amsterdam as an 'urban mine'. Through mapping out the optimal way of reusing building materials we obtained our first insights into 'urban metabolism' - Amsterdam's waste and raw material flows. Other projects include Urban Pulse, which explores the temporal dynamics of material use; REPAiR, a European project linking spatial development with raw material usage in an area; and Afvalketen in Beeld (The Waste Chain in Focus), which presents data on Amsterdam's waste production. These projects have given us our first insights into the scope, origins and use of materials in the city and in the functioning of the circular economy. Building on this knowledge, various partners are currently gaining experience of recording the materials used in buildings in the city through materials passports.

The first Circular City Scan was also carried out in Amsterdam, which laid the foundations for a method that is now used for city scans all over the world. In 2018, the Smart City Scan project was launched with the aim of designing buildings and areas premised on the concept of urban metabolism.

In 2016 the European Commission awarded Amsterdam the title of European Capital of Innovation. In 2017 the city won the World Smart City Award for its circular innovation programme. Every week delegations from all over the world visit Amsterdam to observe and learn how the city is working with its partners and residents to realise the transition to a circular economy.

The number of circular projects in Amsterdam



The number of circular projects in Amsterdam is on the rise. A relative shift is witnessed from research-based projects towards implementation-focused projects.

Where are we now?

A new Board of Aldermen

In 2018, the new Board of Aldermen of Amsterdam started working on the urgent challenge of future-proofing the city.

The coalition agreement states: "We are the first generation to notice the consequences of climate change, and the last generation that will be able to do anything about it." If we want Amsterdam to be glowing with health when celebrating her 800th anniversary, we need to take decisive action now.

The coalition agreement focuses on challenging the market to build in an energy-positive and circular way and in doing so, aims to actively encourage circular area development projects and support initiatives from the bottom-up. The port is seen as a important partner when it comes to a clean energy transition and as a facilitator for sustainable and circular activities. The coalition agreement also sets out the city's ambition to invest in a sustainable waste ecosystem that will treat waste as raw materials. It also sets targets for reducing carbon emissions, with a 55% reduction set for 2030 and a 95% target for 2050.

Innovation and entrepreneurship will help us through one of the largest transitions ever experienced in our city. Technology and creativity will make a circular economy attainable. Participation and made-to-measure solutions will make it feasible. Working together in solidarity will make it affordable for everyone.

The starting point

At the end of 2017 the municipality carried out an evaluation of the circular programmes in place. The conclusion of the report was that a circular economy is both realistic and cost-effective. It is realistic because the technical possibilities are significant; both new and existing projects demonstrate that loops can be closed effectively and locally. It is cost-effective because circular projects are financially competitive when compared to traditional projects if external costs are taken into account. A circular economy reduces the environmental impact of the city, while at the same time boosting the local and regional economy. It increases localised materials processing and boosts employment in the region.

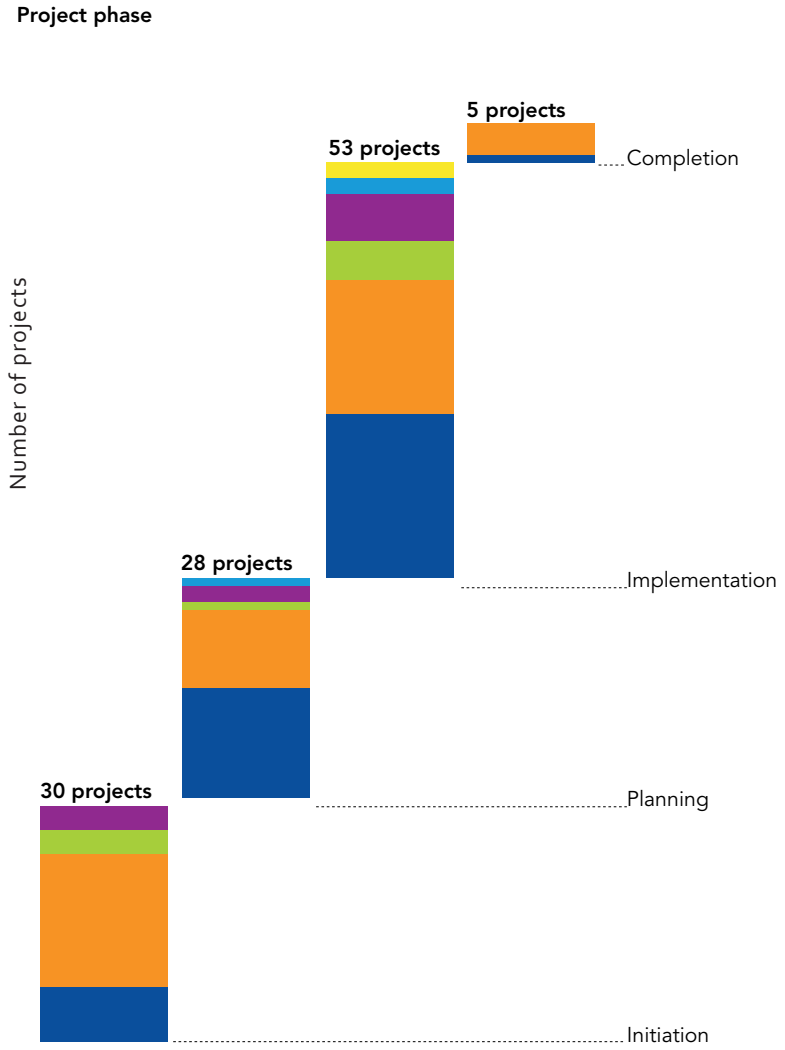
The evaluation also contains important recommendations for follow-up action. The construction, biomass & food and consumer goods value chains show the most potential for immediate change, therefore the municipality will be able to make a significant contribution in the development of a new, circular standard for these chains. In addition, the purchasing and knowledge instruments (research, education, networking and knowledge exchange) show the greatest potential for accelerating transitions within these chains.

The strategy of 'learning by doing', which sees the municipality, market players and knowledge institutions sharing knowledge and experiences with each other has proved successful.

New insights into CO_2 emissions

In 2018, studies carried out by the PBL Netherlands Environmental Assessment Agency, the Netherlands Organization for Applied Scientific Research and Circle Economy showed that a circular economy can contribute to a far greater reduction in carbon emissions than previously thought, thereby helping us meet our climate targets. These studies were the first to examine carbon emissions across the entire production chain, from the extraction of resources, to the production of materials, to the manufacture of semi-finished goods, to the manufacture and consumption of end products, up to and including the waste phase.

By bringing into focus the entire production chain – from extraction, production, use and waste – the indirect emissions from greenhouse gases and other environmentally harmful substances can be taken into account. In doing so these various studies have shown that 50-70% of emissions are a consequence of material use and consumption. Since the energy transition is primarily aimed at reducing direct emissions originating from the use of energy for heating, lighting and transport, creating a circular economy will actively facilitate the meeting of our emissions targets. A circular economy is good for both environment and climate.



Almost half the projects are now in the implementation phase. Many projects are also still in the pipeline. We will be following the progress of these projects in the years to come.

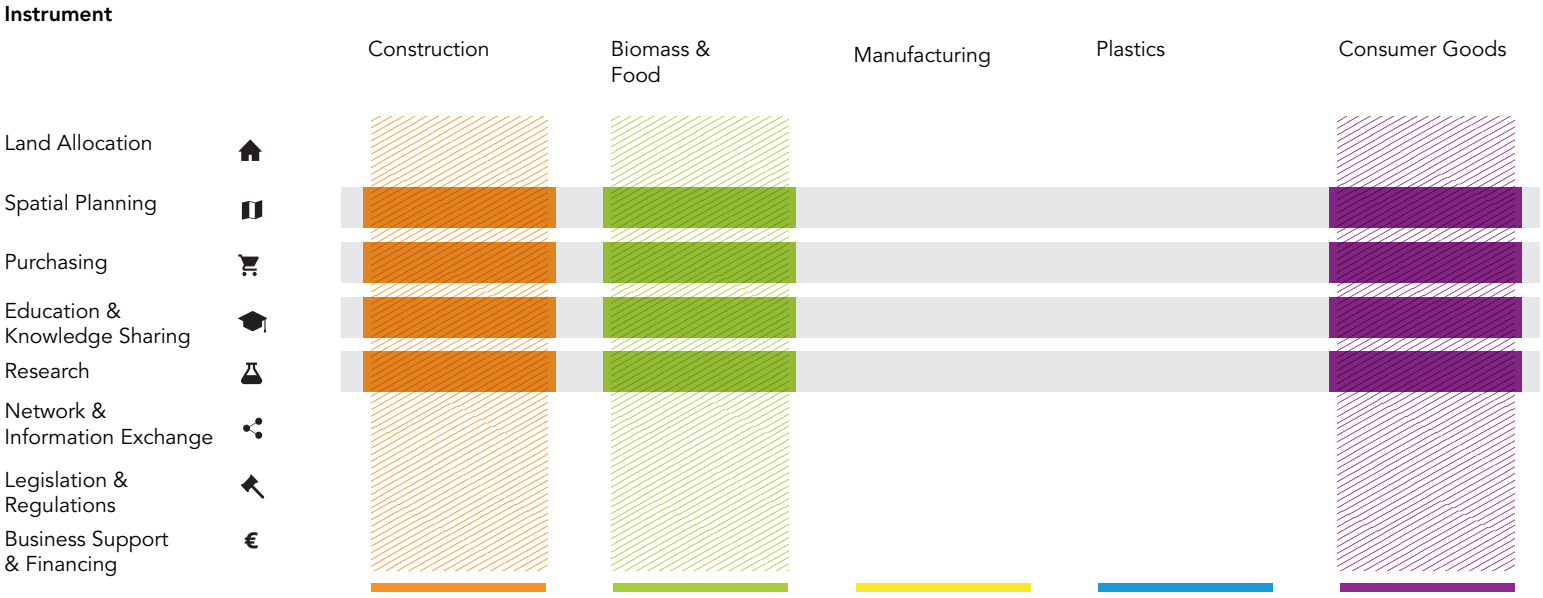
Where are we heading?

On 11 September 2018 the Board of Aldermen adopted its plan entitled '*A new spring, a new sound. Ambition and implementation programme 2019*'. This document set out six ambitions, one of which called for a 'Healthy and sustainable city'.

One of the action points stated the following:

"We will draw up a new strategy for the transition to a circular economy and sustainable waste ecosystem covering the period 2020 to 2025, with a view towards 2030. This strategy will both continue and expand on the activities aimed at making the construction sector circular, and distribute spaces for activities linked to the circular economy in the urban areas and the port."

The city's ambitions relating to circularity are just as big today. Over the coming years, we want to continue to lead the way in creating a circular economy. It is our ambition to show that a circular economy is a realistic, cost-effective and inspiring alternative to the current linear economy. Through collective innovation and experimentation we have built up a strong knowledge base. Now is the time to built on these insights towards a city where the circular economy is the 'new normal'.

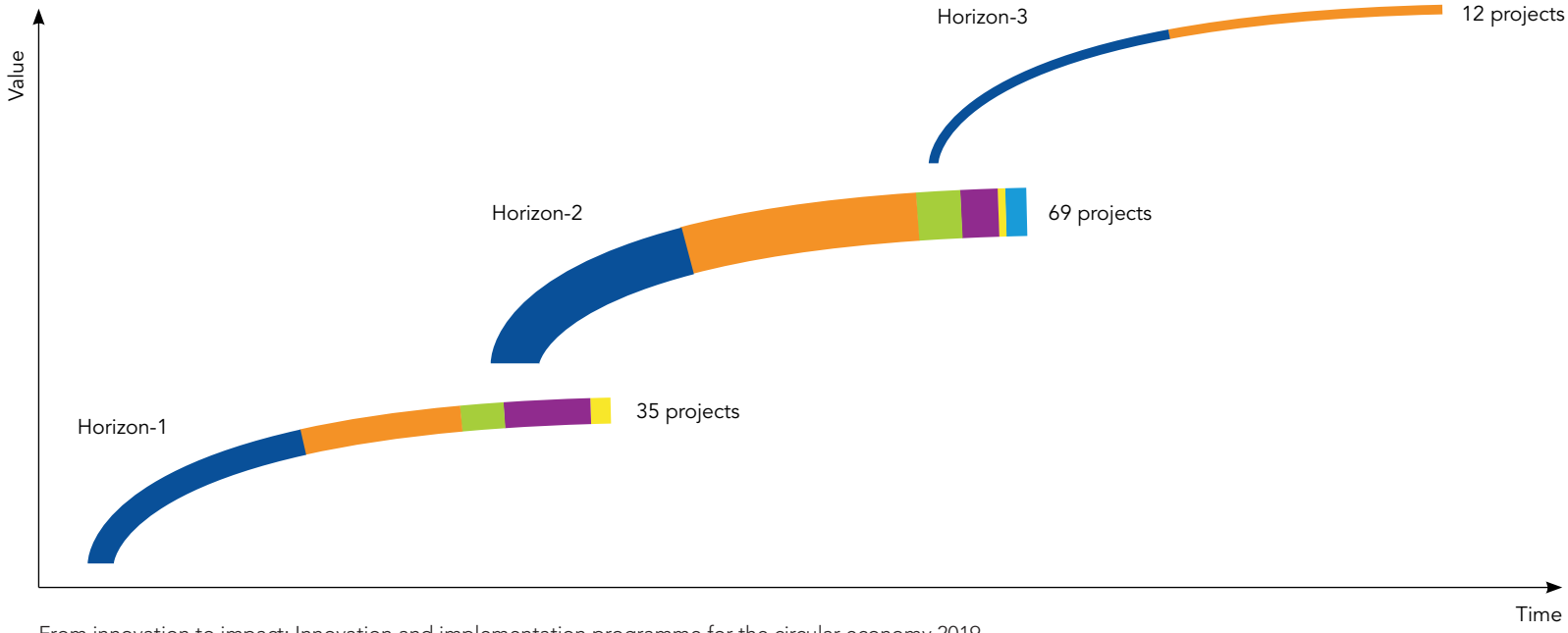


Circular Strategy 2020-2025

The municipality is working with its partners in the city on the new strategy for a circular economy 2020-2025, with a view to 2030. This strategy focuses on the interim target for 2030; a reduction of 50% in primary resources used. By signing up to the National Agreement on the Circular Economy, Amsterdam has committed to meeting this national target. The new strategy is being translated into a new *Innovation and Implementation Programme for a Circular Economy* and the *Waste and Raw Materials Implementation Plan* covering the period 2020 to 2025.

In effect, the strategy forms the new policy and assessment framework to ensure that Amsterdam meets the interim target set for 2030, including cutting back on the use of primary resources and contributing to the reduction of indirect carbon emissions. The strategy therefore complements the *Climate-neutral Amsterdam Road Map 2050*, which focuses primarily on the energy transition and reduction of direct carbon emissions. The key features of the new strategy will be adopted by the Board of Aldermen before the summer of 2019. The strategy will then be shared and discussed actively with concerned parties in the city, with the aim of adopting the final strategy and resultant implementation programmes at the end of 2019.

The three innovation horizons



From innovation to impact: Innovation and implementation programme for the circular economy 2019

Value chains

- **C**onstruction
- **B**iomass & Food
- Consumer **G**oods
- **P**lastics
- **M**anufacturing
- Cross-**S**ectoral

The three innovation horizons

This model is used to make a distinction between various types of innovation.

Horizon 1 - Innovations are incremental or improvements on existing products.

Horizon 2 - Innovations involve or create new products.

Horizon 3 - Innovations look to the distant future, factoring in uncertainty and in many cases, systemic change. These innovations will potentially yield the greatest impact.

Project index

Implementation

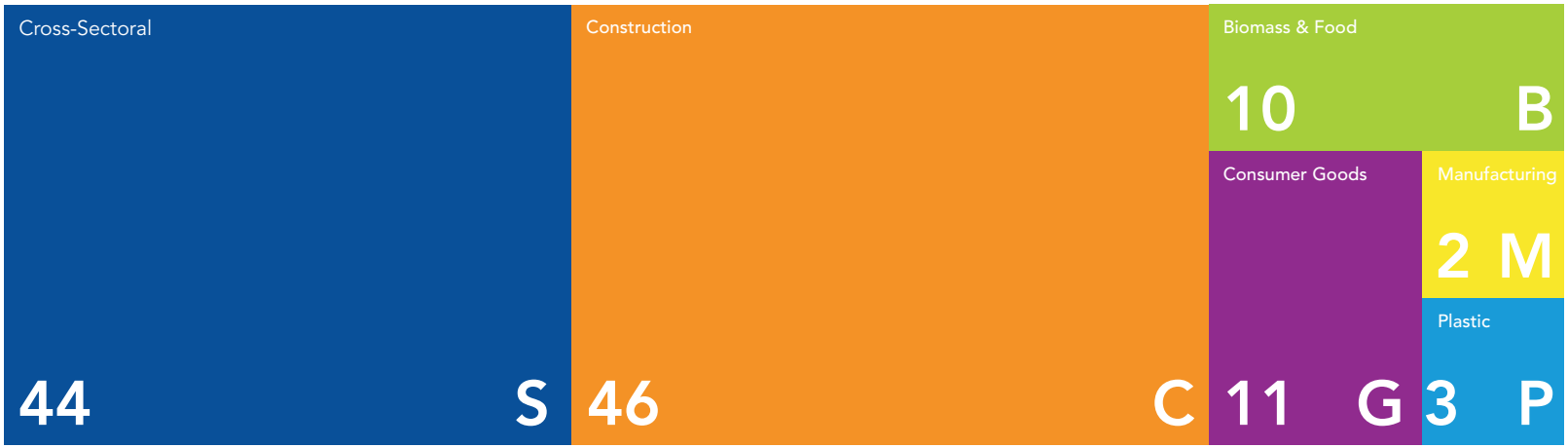
The Innovation and implementation programme for a circular economy 2019 foregrounds what is currently happening in the city and the new projects that have been initiated towards the realisation of a circular economy. This programme showcases a circular economy that is tangible and concrete and where possible, focuses on impact.

Both local initiatives and large-scale area development projects are included, as well as circular land allocation practices. Aiming toward implementation lays a firm foundation for the development of the new strategy. We are learning what works well and what does not in practice, as well as where innovation and scaling up is required. Grouping projects run by the municipality, businesses and knowledge institutions makes it easier for acquired knowledge to be exchanged and in doing so, encourages projects to thrive through working together.

Quadruple Helix

A total of 116 projects are listed. Within the value chains the projects are divided by type. In each section, we highlight a few projects.

Projects per value chain (including cross-sectoral projects and programmes)



116 Projects


Flexibel gebouw Sluisbuurt
C16
Programma duurzame gebiedsont-wikkeling
C21
Innovatief experiment aanscherpen MPG norm
C27
Amsterdam Logistic Cityhub
C32
Smart Roof 2.0
C37
Biomass & Food
GreenPee Circulair
B2
Biodiesel uit gebruikte frituurvetten
B4
RE-STORE
B6
Lokaal composteren
B8
Vondeltuin
C17
Thematische studie circulaire
C22
Smart City Scan
C28
Smart uitwisselings-platform voor materialen
C33
IJburglaan: gerecycled WC papier
C38
Wormenhotels
B1
RUMORE
B3
Biobased plaatmateriaal tomatenplanten
B5
RECURF-UP!
B7
Grassbloxxx
B9
Quisquiliae
B10
Crossover
C18
Prijsvraag Circulair en Aardgasvrij
C23
Project energiepositief en circulair bouwen
C29
Scheidings-installatie industrieel
C34
Duurzaam bouwen aan de Rechtboomssloot
C39
Raamovereen-komst Verhardingen Amsterdam
C43
Consumer Goods
Hoogwaardig hergebruik zeep
G4
Pilot 9 straatjes
G7
Dienstverlening afvoer ICT
C11
Repair Cafés
M1
Developing circular construction knowledge
Inventarisatie instrumenten Circulair Slopen en Bouwen
C24
The Circular Kitchen
C30
Circulaire businesscases in de MRA
C35
Circulair straatmeubilair
C40
Raamovereen-komst Bomen
C44
DISRUBT
G1
Upcycling Latexverf
G5
Lokaal recyclepunt uitbreiden
G8
Manufacturing
City-Zen
M2
Bouw-programma MRA
C19
Implementeren BIM gemeentelijke panden
C25
Processing and exchange of construction materials
Circular management & asset maintenance
Marktplaats speeltoestellen
C41
Plantaardige bitumen in de Gooiseweg
C45
Pilot Fairphone as a Service
G2
Waste & recycling
Groente & Fruit inzameling
G9
Plastics
Plastic Fabriek
P2
REHAB: REnovation for post-war HABitats
C20
Pilot materialen-paspoort Arena Poort via BIM
C26
Circulaire Bouwhub Amsterdam
C31
Innovatie-partnerschap Kademuren
C36
Hergebruik gebakken klinkers
C42
Betonketen Amsterdam
C46
Textiel
G3
Slim inzamelen bedrijfsafval Amsterdam Zuidoost
G6
Zero Waste Lab
G10
Pyrolyse van niet-recyclebare plastics in biobrandstof
P1
Plastic Recycling Amsterdam
P3

Network of partners

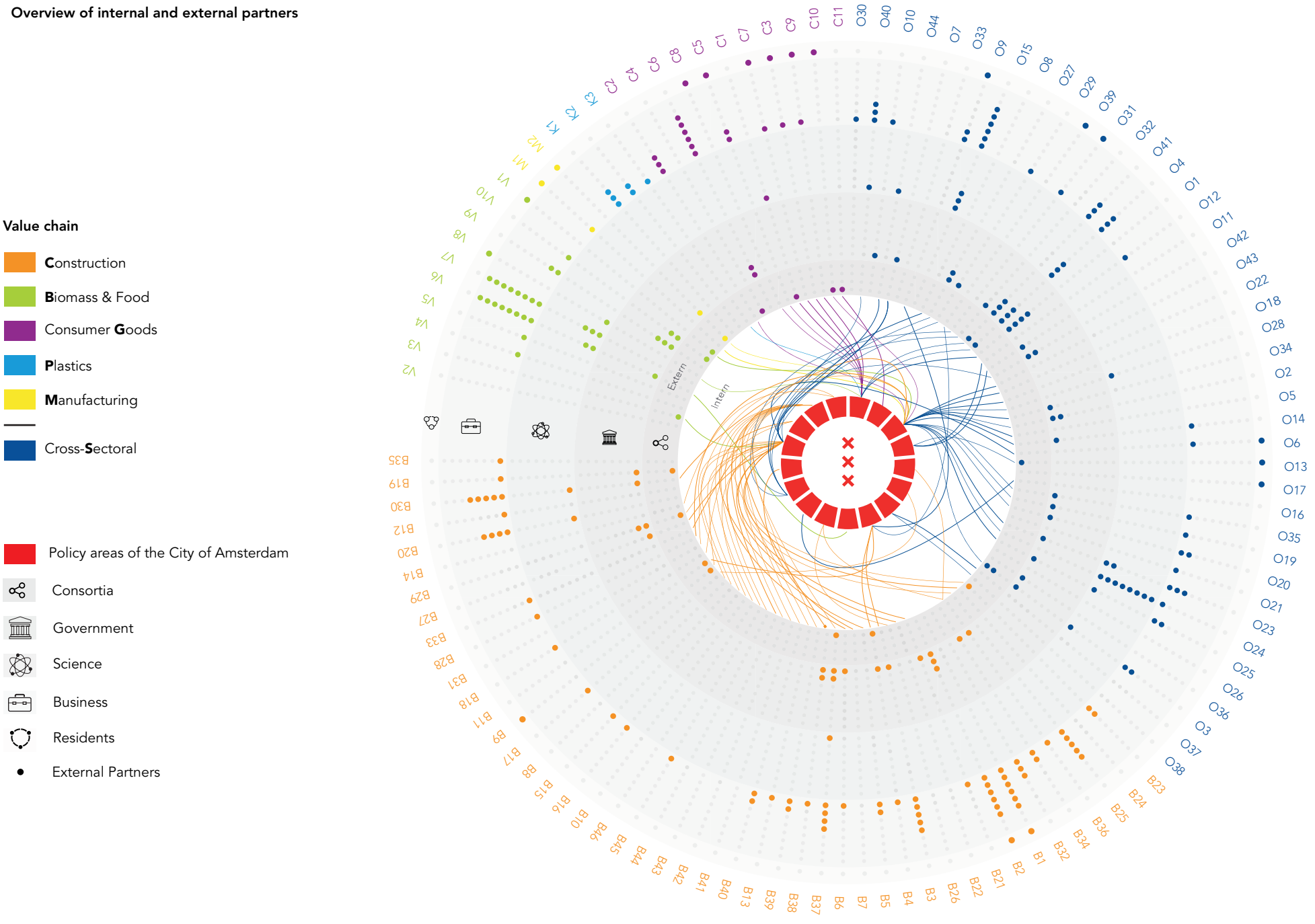
Gaining a foothold on the circular economy

The most significant conclusion we are able to draw from the diagram on the following page is that there is growth in breadth and depth in the number of circular projects in Amsterdam. If we zoom into the project contents we observe a strengthening of knowledge and an intensification in the creation of new insights. We are beginning to better understand how the circular economy works for Amsterdam and what is required for the successful practical implementation of circular principles.

The circular economy also seems to be broadening its impact; increasing numbers of citizens, businesses, knowledge institutions and other organisations are becoming active participants in the transition.

This diagram illustrates how each of the parties involved are connected to each other through a wide network and spectrum of projects. The city of Amsterdam's participation across multiple policy areas can clearly be seen. We can also see how the municipality's efforts to establish cooperation between the public and private sectors over recent years has impacted on the number of cross-sectoral partnerships.

Overview of internal and external partners



Cross-sectoral

In this programme the 'cross-sectoral' category has been included for the first time. To create a circular economy that works for everyone we need new forms of collaboration, in particular intensive collaborations with knowledge institutions. Increasingly, the ideas behind a circular economy and the working methods involved are being embedded in various curricula, however we also need to transition the employment market to climate-neutral and circular practices in order to addresses through our workforce the challenges society is facing.

The municipality is developing policy frameworks to guide society towards a circular economy. These policies range from an environmental strategy to a business park strategy. Businesses offering innovative solutions relating to the circular economy will benefit from an international platform facilitated by the municipality, providing market support for new concepts. The municipality facilitates this since innovation in business assists the adoption of circular practices by the city.

Prerequisite programmes

Omgevingsvisie Amsterdam 2050

Development of a strategic vision for the future of Amsterdam, 2050.

S1 Waternet; Port of Amsterdam; GGD; Omgevingsdienst; Veiligheidsregio

New MRA agenda

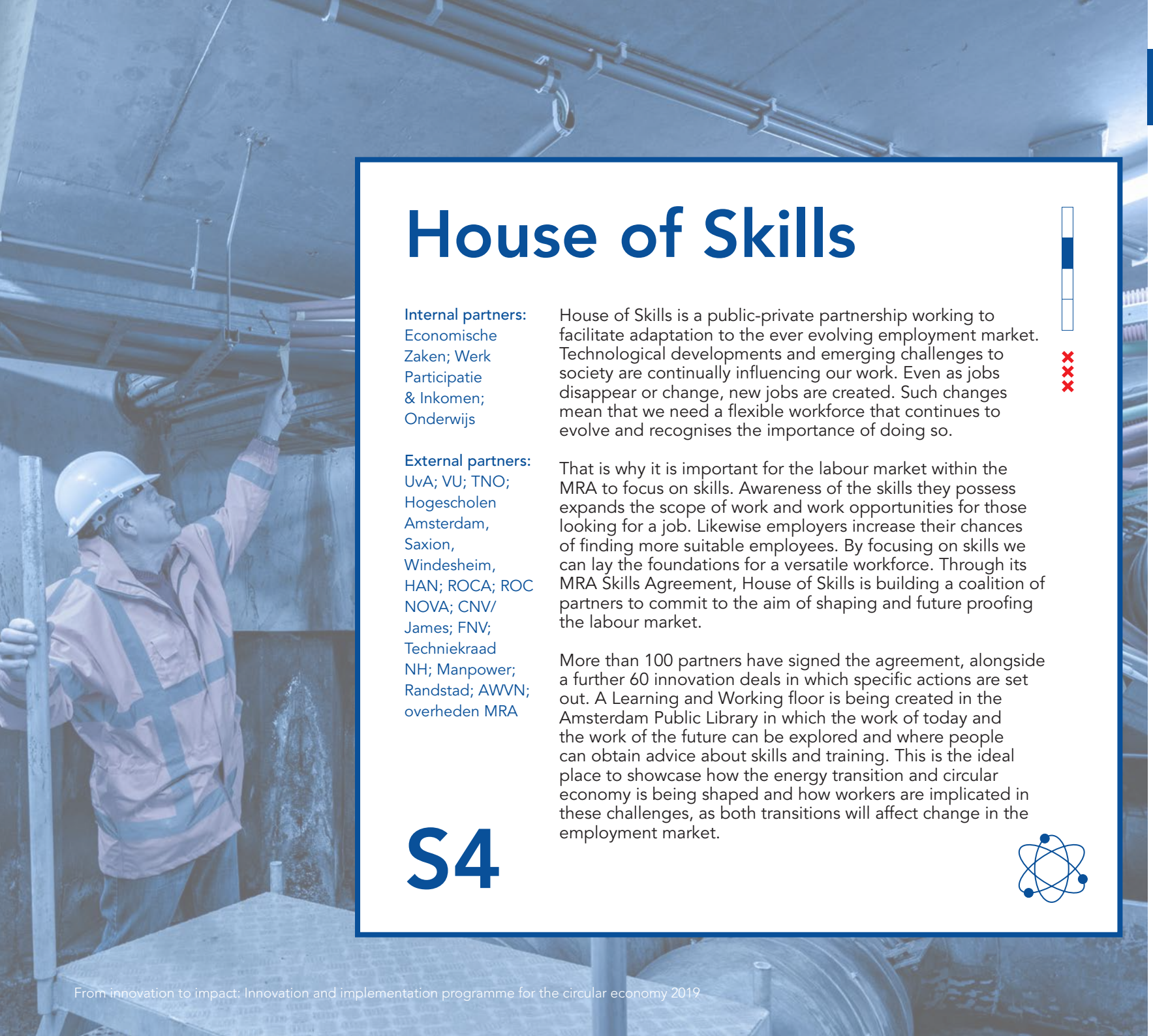
Revision of the current Metropolitan Region of Amsterdam (MRA) agenda. Working with our MRA partners we will draft a new agenda in 2019. There are still links to be drawn between our environmental strategy and other projects.

S2 Metropoolregio Amsterdam

MRA Grondstoffen transitieprogramma

A raw materials transition programme based on keeping material flows and products in the loop, to avoid resource wastage as much as possible.

S3 Metropoolregio Amsterdam



House of Skills

Internal partners:
Economische Zaken; Werk Participatie & Inkomen; Onderwijs

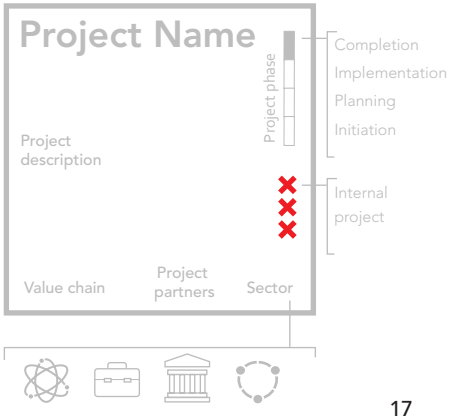
External partners:
UvA; VU; TNO; Hogescholen Amsterdam, Saxion, Windesheim, HAN; ROCA; ROC NOVA; CNV/ James; FNV; Techniekraad NH; Manpower; Randstad; AWVN; overheden MRA

House of Skills is a public-private partnership working to facilitate adaptation to the ever evolving employment market. Technological developments and emerging challenges to society are continually influencing our work. Even as jobs disappear or change, new jobs are created. Such changes mean that we need a flexible workforce that continues to evolve and recognises the importance of doing so.

That is why it is important for the labour market within the MRA to focus on skills. Awareness of the skills they possess expands the scope of work and work opportunities for those looking for a job. Likewise employers increase their chances of finding more suitable employees. By focusing on skills we can lay the foundations for a versatile workforce. Through its MRA Skills Agreement, House of Skills is building a coalition of partners to commit to the aim of shaping and future proofing the labour market.

More than 100 partners have signed the agreement, alongside a further 60 innovation deals in which specific actions are set out. A Learning and Working floor is being created in the Amsterdam Public Library in which the work of today and the work of the future can be explored and where people can obtain advice about skills and training. This is the ideal place to showcase how the energy transition and circular economy is being shaped and how workers are implicated in these challenges, as both transitions will affect change in the employment market.

S4



Boosting the circular innovation ecosystem

Bedrijventerreinen-strategie

A strategy for creating and maintaining space for businesses in and around the city, and for matching the right companies to the right spaces.

S5 Haven-Stad; Provincie; Plabeka

Routekaart circulair opdrachtgeven en inkopen

Implementation of a road map for circular purchasing practices. This details how the MRA will achieve a 50% implementation of such practices by 2025.

S7 Metropoolregio Amsterdam

Vervolgstudie Circle Scan rapportage

A follow-up study to the report by Circle Economy. How can this report be used? How are we going to elaborate on our circularity related ambitions over the coming years?

S6 GVB Infra B.V.; Circle Economy

Kantorenstrategie

Through its Office Strategy, Amsterdam's municipal authority is aiming to ensure that empty buildings in the city are used in the best possible way.

S8

Evenementenbeleid

A new, sustainable events policy that encompasses circular practices. This involves the collection of urine for the recovery of nutrients, no single-use plastic, the compulsory use of reusable cups and the possibility of setting up a recycling hub.

S9 Green Events; Sea Events

Circulair Innovatie Ecosysteem Noord-Holland

Creating an ecosystem of circular businesses in order to accelerate innovation.

S10 **Project lead:** Impact Hub Amsterdam

Prodock

External partners:
Port of Amsterdam

Prodock is the innovation hub of the Port of Amsterdam, where ambitious new and established entrepreneurs can develop their products, processes and propositions in a rapid and effective way.

Prodock provides industrial workshop, office and outdoor space that can be rented on a 'plug-and-play' basis. Prodock incubates entrepreneurs within a diverse community, offering opportunities for cross-pollination as well as a platform for exposure.

S11

Smart City Hub B.Amsterdam

External partners:
B.Amsterdam

From 1 January 2019, approximately 24,000m^2 of space for industry will become available for let at Johan Huizingalaan 763 in Amsterdam.

The property is located next to Start-up Incubator B. Amsterdam. Together they are transformed into the B. Smart City Hub.
The property offers the largest leasable area currently available in the vicinity and is the closest to the centre of Amsterdam.

S12

Transitiepad Circulaire Economie

Creating an ecosystem of circular businesses in order to accelerate innovation.

S14 Project lead: Amsterdam Smart City

Pakhuis de Zwijger: Dossier Circulaire Stad

This cultural organisation has occupied a unique position since opening its doors in 2006. It has since grown to become the leading independent platform in and for the city of Amsterdam.

S16

Startup in Residence Duurzaam

The Start-up in Residence programme links start-ups and scale-ups to major societal challenges in Amsterdam.

S18

CIRCO circulaire business design tracks Noord-Holland

The Province of North Holland aims to be fully circular by 2050. The provincial authorities are working with CIRCO to organise Circular Design Programmes for SMEs and start-ups in the manufacturing industry.

S20 Provincie Noord-Holland; CIRCO; ClickNL

Circular Blueprint

Making DGTL festival (and a number of external events) more sustainable.
It focuses on two topics:
1. Closing the Loop (circularity)
2. Eliminating Emissions (carbon reductions)

S15 Project lead: Stitching Revolution

WeMakeThe.City

WeMakeThe.City - the festival that makes cities better - focuses on making cities more inclusive for everyone, with special attention to the transition towards a circular economy.

Pakhuis de Zwijger

S17

GO!NH versnellings-programma

The GO!NH Accelerators accelerate the activities of SMEs and start-ups.

S19 Provincie Noord-Holland; Innomics

Programma Investeringsgereed Innovatief MKB

The Investment-Ready Innovative SMEs Programme North Holland helps innovative and sustainable SMEs with financing issues.

S21 Provincie Noord-Holland; KplusV; HaarlemValley; ACE

Fashion for Good

Internal partners:
Chief Technology Office

External partners:
C&A Foundation

Fashion for Good is a circular innovation hub for the fashion industry in the centre of Amsterdam. The hub was opened on Rokin in 2017 and brings established names and start-ups together.

Through this innovation platform, new technologies are developed and up-scaled with the aim of bringing about a transition in the fashion industry.

Innovators are provided with support through an acceleration programme, a scale-up programme and the Good Fashion Fund, helping them to achieve maximum scale-up and impact.

Fashion For Good also organises an experience centre in partnership with a vibrant community, where best practices are shared with the general public.

S13

Knowledge building & education

Ovalentafel Circulaire economie & Energie

Internal partners:
Chief Technology Office

External partners:
AMS Institute

Each circular project in the city produces a large quantity of data and technical knowledge.

In order to upscale the circular economy, gain insights in the current state of life cycle analyses (LCAs) and urban metabolisms as well as identify knowledge gaps, it is important that such information is aggregated.

Working with AMS, the City of Amsterdam is initiating a Circular Economy and Energy 'Periodic Table'.

S22

REPAiR

REPAiR takes a 'geo-design' approach for mapping out the challenges relating to waste and resource management. It creates maps using life cycle analyses (LCAs) and analyses of urban metabolisms.

S23 Project lead: AMS Institute

ENLARGE

'Enlarge' focuses on the development of future-proof cities using technology hubs that generate action-oriented information through an analysis of food, water and energy flows to and from the city.

S24 Project lead: AMS Institute

The Moveable Nexus (M-NEX)

This project will develop innovative and practical solutions through living labs in six different biospheres across the world, in order to be able to implement current FEW Nexus research.

S25 Project lead: AMS Institute

Circulaire stedelijke monitor

This project involves the setting up of a monitoring network for measuring progress towards a circular economy.

S27 CBS; PBL

MRA Dashboard

A project for the development of a dashboard for presenting progress towards a circular economy.

Metropoolregio Amsterdam; Amsterdam Economic Board

S29

WASCOM

This project strives to produce top-quality, lightweight composites from ALE and cellulose. In this way two waste streams are efficiently reprocessed to make a high-grade product that achieves significant energy savings.

S26 Project lead: AMS Institute

Living Roadmap CO_2

The 'Living Roadmap CO2' consists of a progress monitor, an innovation route and, in addition to the indicators for energy transition, will also include circular indicators that contribute to carbon reductions.

S28

Circulaire design- & afstudeerprojecten

Masters students work on assignments related to the analysis and design of new business models and circular innovations, in the form of graduation projects.

S30 Project lead: Amsterdam Business School - UvA

Inzetten van het lesprogramma Wonderwel op basisscholen in 3 gebieden

Internal partners:
Afval & Grondstoffen;
Onderwijs

External partners:
Amsterdam Economic Board

Wonderwel is a cross-curricular teaching programme for primary schools.

The curriculum covers topics like drinking water, sewer systems, electricity, food, natural gas and waste. These are told through inspiring stories based on daily life, nature and smart technologies.

S31

Eco Schools

Eco Schools is an international quality standard for sustainable schools. At Eco Schools, pupils make their school more sustainable from the inside out.

Middelbare Scholen

S32

Onderzoek naar verandering van bewustzijn

Research into raising awareness of circular issues using innovative techniques in AR & VR.

Radboud Universiteit

S34

Studentenproject De Circulaire Stad

Students from the Built Environment programme are working on The Circular City. Departments include Urban Development, Mobility, Water and Asset Management.

S33

Project lead:
Hogeschool van Amsterdam

Circle Lab for Cities

Circle Economy is developing a large number of digital aids for cities, enabling them to measure and analyse their own performance when it comes to circularity.

Project lead: Circle Economy

S35

Metabolic Cities Program

The Metabolic Cities Program helps cities to decide what, where and how various circular interventions can be implemented so that they have a major impact and are as cost-effective as possible.

S36

Project lead: Metabolic

Green Office Amsterdam

This project provides support to public-sector workers as they integrate sustainability and circularity into their daily work.

Europese Green Office Netwerk; Amsterdams Green Office Netwerk; PIANOo; Rijk; MRA, Knowledge Mile

S37

Duurzame Gemeentelijke Organisatie

This project puts into effect the ambition of municipal organisations to be climate neutral by 2030.

S38

Circularity consortia & area initiatives

BIZzen

Amsterdam will be working with entrepreneur collectives to initiate projects relating to sustainability and quality of life in neighbourhoods. Examples of projects include waste collection schemes, disposal logistics and street and shopfront lighting.

S39

Koplopergroep Circulaire Hotels

Internal partners:
Ruimte & Duurzaamheid;
Afval & Grondstoffen

External partners:
Hotels;
Workonprogress linnengoed;
BeeBlue hotelzeep;
Universiteit Utrecht
Voedselverspilling

A core group of 14 hotels in the city are exchanging knowledge and implementing projects that contribute to the transition towards a circular economy.

Other parties can also participate in the projects. Projects include the use of circular linen, implementing residual waste streams for hotel soap and strategies to reduce packaging.

S40

Intercity networking & upscaling

Internationalisering van Nederlandse circulaire bedrijven

Internationalisation of Dutch circular businesses within the NL Smart City strategy.

Amsterdam Smart City; Amsterdam Economic Board; C-Creators; Holland Circular hotspot; RVO, Trade & Innovate NL; NlinBusiness; Cirkelstad

S41

G5 smart city strategie en roadmap circulaire economie

Internal partners:
Chief Technology Office

External partners:
G5 Gemeenten; VNG

In 2016, the five largest municipal authorities in the Netherlands (Rotterdam, The Hague, Utrecht, Eindhoven and Amsterdam) worked together to draw up a Smart City strategy.

This strategy was authored by more than 40 representatives from these cities, as well as 60 employees working for 40 businesses and 30 scientists through a process of co-creation.

In 2019 the strategy will be adapted and will result in a road map and action agenda. Amsterdam is acting as initiator where the topic of a circular economy is concerned.

S42

Duurzaam West

Duurzaam West brings together a group of sustainable initiatives in the west of the city, which the city of Amsterdam will facilitate and stimulate.

S43

Cirkelstad

Cirkelstad facilitates public and private leaders in the region. How can we reuse residual waste streams? How can we ensure talent across districts is effectively used? Through working together and maintaining an open dialogue, new perspectives and solutions emerge.

S44 AMS Institute

Construction

The construction value chain features the largest number of projects related to circularity; this was one of the priorities of the municipality over the last several years. Various parts of the city are now being developed or redeveloped in accordance with circular principles wherever possible. These initiatives involve privately developed buildings and public spaces, as well as the circular development of municipal assets. Investments are also being made to facilitate practical knowledge building. Since circular construction requires greater investment in reused materials, businesses are increasingly taking the initiative to store materials at logistics hubs located on the outskirts of the city.

Circular area development

Schoonschip

Schoonschip is the most sustainable floating residential area in Europe, comprising a total of 46 households and just over 100 residents.

Project lead: Space and Matter

C1

De Ceuvel - Living lab voor circulaire innovatie

De Ceuvel is a sustainable breeding ground for creative social enterprises, located at a former shipyard on the Van Hasselt Canal in the Amsterdam North district.

C2

Project lead: Space and Matter

Arenapoort Waste Transformer

This project links the waste system to The Waste Transformers (organic waste) and the separation of paper, to convert residual waste into biodiesel/electricity.

C3

Johan Cruijff Arena; TNO; Wastetransformers; DNV GL; Alliander; Engie en Arcadis

Arenapoort Smart City

As a municipality we would like to be able to report on greenhouse gas emissions and resource savings digitally. To achieve this, A.O. sensors are being attached to lampposts.

C4

Naturalis; KNMI; Johan Cruijf Arena

Circulaire gebiedsontwikkeling H-buurt

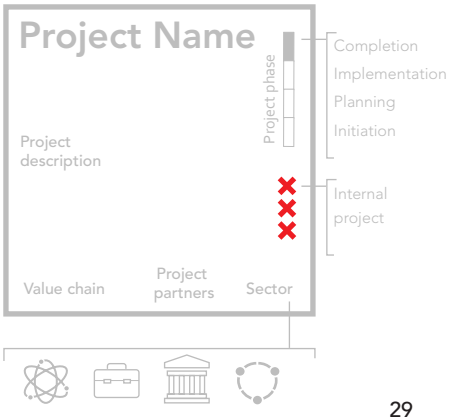
Internal partners:
Ruimte & Duurzaamheid

External partners:
Metabolic; Spectral

Through research carried out by Metabolic and using the H-buurt residential district as a case study, a detailed approach towards circular area development has been developed. It includes closing the resource loop, renewable energy usage, sustainable water extraction and source site restoration, in turn boosting biodiversity, maintaining a healthy society and culture, promoting human health and well-being, and expressing the value of human activities in more than just financial terms.

Through wide-ranging, all-encompassing research within a particular area, a list of specific interventions and innovations for this area can be developed. This makes it possible to work in an area-specific way, taking all elements and innovations relating to sustainability and circularity into account.

C5



Upcycle Amstel-Stad

Internal partners:
Ruimte & Duurzaamheid;
Ingenieursbureau;
Beeld & Data

External partners:
GXN
Kopenhagen;
TNO

Upcycle Amstel-Stad develops the area in accordance with circular principles. It comprises different sub-areas: Amstel-Station, Groot Amstelkwartier, ABP, Duivendrecht station, De Nieuwe Kern, ArenA poort, Amstel III and AMC/MBP.

Amstel-Stad is characterised by a number of noteworthy aspects:

1. The area represents the highest added value per square kilometre in the Netherlands (see research carried out by Bureau Louter in June 2017). It is home to the head office of the De Bijenkorf chain of department stores, as well as the Johan Cruijff Arena and countless financial institutions and national headquarters (ING, ABNAmro and DAS insurance among them).

2. A large infrastructure network serves the area, comprising the Amsterdam metro, train, and the A9 and A2 motorways. This makes it extremely accessible and suitable for substantially growing its number of residents, given that the area is located relatively close to the centre of Amsterdam. There are also excellent regional and national connections.

3. Over the coming four years, 10,000 homes will be developed in this area, with a total of approximately 50,000 more anticipated in the future.

C6

Circulaire bouwhub Amstel III

A former depot located at Sijsjesbergweg 2 is being used as a circular hub and materials depot for construction, civic and hydraulic engineering purposes. It is staffed using social return principles.

C7

Haven-Stad

The Haven-Stad development strategy includes numerous ambitions relating to circularity. In 2019, methods for monitoring these ambitions and linking them to the environmental impact and residential landscape assessments are being developed.

C8

Circulair Buiksloterham

Buiksloterham, once one of the most polluting areas in Amsterdam, is transforming itself to become a circular urban district in which people live and work.

C9 Manifest Buiksloterham

Sloterdijk | Zuid

Sloterdijk I Zuid will transform over the next 15 years from an industrial estate to a residential neighbourhood, creating 4,700 new homes and 90,000 sites with a non-residential function. Construction in accordance with circular principles is one of the ambitions for this development.

C11 Cirkelstad

Drie tenders voor circulaire gebiedsontwikkeling

In 2019 the City of Amsterdam is earmarking three tenders in which circular (including energy-neutral) practices will be required.

C13

Hamerkwartier

The Hamerkwartier is transforming itself from an industrial estate into an urban district with 6,700 homes and ample work related spaces.

C10

Strandeiland

This project will assess and put into practice the sustainable and circular ambitions set out in the urban development plan for Strandeiland.

C12 Project lead: Metabolic

Kenniskwartier kavel 2A

This 'Knowledge District' is being developed according to circular principles, creating 46-58,000 m² gross floor area for offices, market rate homes, medium- priced rental properties, amenities at ground floor level and a cinema.

C14

Circular construction

Flexibel gebouw in Sluisbuurt

Sukunfuku Studio (the winner of a European competition) was commissioned to work on a design following flexible building principals for a building in Sluisbuurt.

C16 Sukunfuku Studio

Centrumeiland: Circular building Juf Nienke

BuildingForLife is developing the circular entrance building for Centrumeiland, which consists of a mixed-use plan with market-rate homes and homes in the medium-sized rental sector.

C15 Building for Life

Crossover

A mixed-use building with office space, amenities and homes for students and asylum permit holders. 40% of the materials are circular and 98% are reusable.

C18 AM

Vondeltuin

Internal partners:
Gemeentelijk Vastgoed; Ruimte & Duurzaamheid, Stadsdeel Zuid

External partners:
Copper8

C17

Developing circular construction knowledge

Bouwprogramma MRA

The Metropolitan Region of Amsterdam (MRA) construction programme details all the activities aimed at scaling up towards a construction industry based on circular practices.

C19 Cirkelstad; EIB; TNO; C-Creators

Programma duurzame gebiedsontwikkeling

This programme organises knowledge production, implementation and sharing in order to realise sustainable area developments in Amsterdam.

C21 Alliander; Waternet

REHAB

A study whose objective is to develop solutions for the circular renovation of late post-war housing stock. The project's name is a combination of letters from the words 'renovation' and 'habitat'.

C20 Project lead: AMS Institute

Thematische studie Circulaire Gebiedsontwikkeling

This study examines which spatial interventions are required within a city, area or project in order to realise circular area development, taking project financing into consideration.

C22

Pilot materialenpaspoort Arena Poort via BIM

A pilot scheme in anticipation of Madaster, currently creating materials passports for public projects in the Zuidoost district.

C26

Prijsvraag Circulair en Aardgasvrij

A competition around the question of how essential renovations can be carried out for a city, meeting circular ambitions and without using natural gas.

C23

Inventarisatie instrumenten Circulair Slopen en Bouwen

Graduation research project investigating the instruments used for demolition and construction in Haven-Stad, applying circular principles.

C24

Implementeren BIM gemeentelijke panden

Using BIM for the management and maintenance of six municipal properties, allowing material passports to be generated.

C25 Cad & Company; Planon; Humble Building; Bres; W4Y BREEAM; Madaster

Experiment aanscherpen MPG norm

Speculative research exploring the possibilities for sharpening the statutory environmental performance baseline for buildings built according to public code.

C27 OD-NZKG

Smart City Scan

Internal partners:
Chief Technology Office

External partners:
FABRICations

The Smart City Scan project brings together a consortium of parties from the fields of construction, area development and architecture, as well as data collection and GIS specialists.

Through a multidisciplinary approach the aim is to develop a new form of data-driven design that has urban metabolism as its focus.

C28

Project Energiepositief en circulair bouwen

Building infrastructure that is both energy-positive and circular can result in tensions. This project explores these aspects.

C29

Cirkelstad; OD NZKG; Bouwend Nederland

Processing and exchange of construction materials

The Circular Kitchen (CIK)

CIK is creating a circular kitchen in order to facilitate cooking in a more energy-efficient and sustainable way. The aim is for these kitchens to be installed in projects for social kitchens.

C30

Project lead: AMS Institute

Circulaire Bouwhub Amsterdam

VolkerWessels and Beelen are setting up the first circular construction hub in Amsterdam's western dock area.

C31

Project lead: Volkerwessels en Beelen

Amsterdam Logistic Cityhub

Project lead: Port of Amsterdam

External partners: LaRuimte & Duurzaamheidael Investments; Beelen Groep; VolkerWessels

VolkerWessels and Beelen's initiative to set up the first circular construction hub in Amsterdam's western dock area.

This will be a multi-modal urban distribution centre, from which goods and materials for construction projects will be bundled for transportation by water to the centre of the city.

Reverse logistics will be used for removing residual waste, goods and materials from construction projects in the city.

Some of these waste streams will be processed and stored at the dock, ready for reuse.

C32

Smart uitwisselingsplatform voor materialen

The municipality is establishing a public-private partnership in order to ensure that sufficient support is created for a smart exchange platform for materials.

C33 Excess Materials Exchange

Circulaire businesscases in de MRA

The MRA is developing circular revenue models with a potential value of €832 million, extracted from the efficient use of residual waste streams from construction, demolition and e-waste.

C35 Project lead: Metabolic

Innovatiepartnerschap Kademuren

The City of Amsterdam is seeking to establish partnerships between start-ups, thought leaders, engineering firms and builders in order to successfully renovate the city centre's quay walls.

Ministerie van Economische Zaken en Klimaat; PIANOo

C36

Scheidingsinstallatie industrieel

A separation plant for residual flows from construction and demolition projects, retail and industry. This allows for the use of secondary raw materials (plastic, wood and glass) in new construction projects, instead of virgin resources.

C34 Project lead: Port of Amsterdam

Circular management & asset maintenance

Smart Roof 2.0

A pilot project contributing to Amsterdam's climate resilience by transforming conventional roof surfaces into blue-green roof surfaces.

Marineterrein; Watertechnologie programma NL; Waternet; Drain Products; Aedes Real Estate; KWR Water Cycle Research Institute

C37

IJburglaan: gerecycled WC-papier

The asphalt used on the road on the IJburglaan contains cellulose obtained from toilet paper. This material is reclaimed from the sewage system at water treatment plants.

C38 KWS; Waternet; Rijkswaterstaat

Circulair straatmeubilair

The aim of this circular street furniture project is to reduce the environmental impact of products by making them reusable.

C40 HR groep; MOSO

Hergebruik gebakken klinkers

As part of large-scale renovation projects, Amsterdam removes clinker bricks from the streets, cleans them and replaces them at the same location, or at a different location in the city.

C42

Duurzaam bouwen aan de Rechtboomssloot

A project for the sustainable replacement of a quay wall on the Rechtboomssloot using emission-free logistics, equipment and circular materials.

C39 Rutte Wegenbouw; Van het Heck aannemers

Marktplaats speeltoestellen

Project for reusing playground equipment in good condition at different sites in the city.

C41

Raamovereenkomst Verhardingen Amsterdam

We use framework agreements spanning several years to boost the development of sustainable and circular innovations in the market for roads and hard surfaces.

C43

Raamovereenkomst Bomen

This framework agreement covers the purchase, planting and care of all new trees in Amsterdam, creating a sustainable tree database.

C44

Plantaardige bitumen in de Gooiseweg

The aim of this project is to use KonweBio 40 (a binder consisting of 40% plant-based bitumen) on the Gooiseweg by 2020.

C45 KWS

Betonketen Amsterdam

The role of the city of Amsterdam is to boost the development of circular innovations across various markets.

This applies when it comes to the market for concrete and concrete products. The municipality is currently meeting with a host of market players including concrete product suppliers, contractors and processing businesses.

At the end of 2018 the municipality started preparing an invitation to tender the new contract for the supply of concrete materials to the city, which includes concrete stones, curbs and paving stones.

C46

Biomass & Food

Over recent years numerous projects have been established across this value chain across diverse areas, from local composting to the manufacture of building blocks for the greening of the chemical industry. With increasing frequency organic waste streams are being used to make new products, with a number of different initiatives started this year. At the same time there is a great need for new knowledge both in understanding how organic residual waste can best be used for new products and to identify which technologies add the most value. Entrepreneurs are starting to innovate more and more across this sector, creating a significant need for knowledge sharing. The municipality is playing a key role supporting business networks across this sector at both the national and European level.

Wormenhotels

The Buurtcompost organisation provides residents in the Netherlands with the knowledge and opportunities they need to process fruit, vegetable and garden waste locally, turning it into raw materials for soil treatment.

B1 Buurtcompost

RUMORE

Rumore is an EU project in which Amsterdam is cooperating with eight other European partners. Amsterdam is focusing on knowledge sharing between the city and region and innovating across the circular agri-food cycle within the MRA.

B3 EU-partners

Biodiesel uit gebruikte frituurvetten

After years of lying dormant, a biodiesel factory is being renovated, converted and put to use for the production of biodiesel, using UCO (Used Cooking Oils) as feedstock.

B4 Project lead: Port of Amsterdam

GreenPee Circulair

Internal partners:
Ruimte & Duurzaamheid Stadswerken; Verkeer & Openbare Ruimte; Waternet; Stadsdeel Centrum

External partners:
Urban Senses

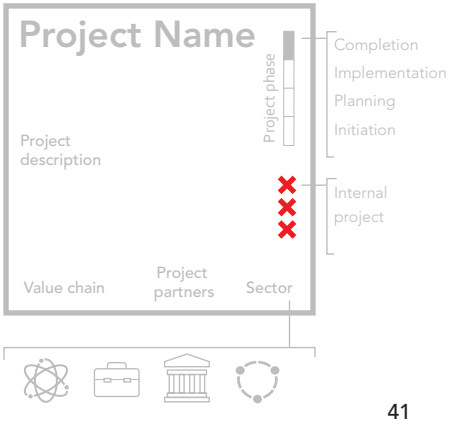
The GreenPee urinals on the Rembrandtplein provide a raw material, urine, which is mixed with hemp. This waste product is currently disposed of.

Rather than being simply a measure to prevent people urinating in public, GreenPee could take its initiative further.

With an organised, circular process, GreenPee could use the waste material generated in other applications.

We will be looking for possible applications in Amsterdam. Composting is one option but there may be others.

B2



Re-stORe

Re-StORe is a simulation model and measurement system that provides businesses and local authorities with insights into the financial, ecological and social effects of various forms of composting and biofermentation, from the small scale to the large scale.

B6

Lokaal composteren

Composting kitchen waste locally provides insights into closing material loops locally. Through this project, primary schools become involved in local composting.

Middelbare Scholen

B8

RECURF-UP!

RECURF-UP develops new biocomposites by combining residual textile waste - composed of denim, jute and wool - with bio-based (natural) plastics. The objective is to make use of textile residual waste originating from the Metropolitan Region of Amsterdam (MRA), turning it into industrial, circular and economically viable products such as acoustic wall and ceiling panels.

Internal partners:
Hogeschool van Amsterdam; HvA Product Design, HvA Engineering Design & Innovation, HvA Technische Bedrijfskunde, HvA Minor Nieuwe Materialen

External partners:
Saxion Hogeschool; Hogeschool Zeeland (HZ); Avans Hogeschool; MODINT; NRK; FME; Sympany; AhRuimte & Duurzaamheid; Starbucks; Frankenhuis; Havivank; Natural Plastics; NPSP; Omefa; VRK Isolatie; Graypants; HB3D; Studio Bas Froon; Design Studio PlanQ; Merford; Acosorb; ReBlend; Rodenburg Biopolymers; Paul de Ruiter; IBN Productie

B7

Grassbloxxx

Grassbloxxx is a consortium of various parties turning grass cuttings from public parks into fibres and juices. The fibres can be used for the production of organic insulation materials, while the juices are used to make a de-icing agent.

B9 Project lead: Amsterdam Economic Board

Quisquiliae

This project aims to valorise organic waste streams from the agricultural and food industries.

Project lead:
Amsterdam Economic Board

B10

Biobased plaatmateriaal van tomatenplanten

Project lead: Port of Amsterdam

External partners: Stiching Agrodome; Ecoboard

Ecoboard collects the dried residues of tomato plants from the south of Spain once the tomatoes have been harvested. It aims to turn this raw material into a bio-based board for use in construction projects.

B5

Manufacturing

Repair Cafés

External partners:
Repair Café

Repair cafés are places where people can meet, free of charge, to repair products together.

Residents can make use of the tools and materials available at repair cafés to help them repair clothes, furniture, electrical appliances, bikes, table wear, toys, etc. Experienced volunteers with various technical skills are on hand to help and advise.

The Repair Café movement is a global phenomenon, with more than 1,500 branches established so far. At the beginning of 2019 around 20 repair cafés were active in Amsterdam.

M1

The manufacturing value chain was included in the National Agreement on the Circular Economy 2017. It is therefore included in this programme and is now represented by two different projects. As part of a large-scale European project, various organisations are working with local residents on innovative solutions for their neighbourhoods.

.

City-Zen

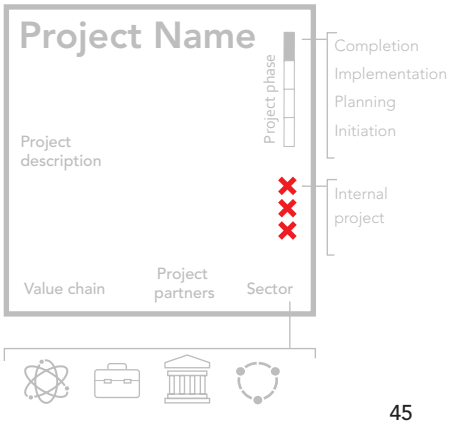
External partners:
City-Zen,
Amsterdam Smart City

In City-Zen, the residents of the two urban districts involved are the focus.

The applications provide residents with greater freedom of choice when it comes to how they use energy.

The following projects have been implemented in Amsterdam: Intelligent Net; sustainable heat network; drinking water for cooling an industrial estate; serious gaming; and the City Zero Energy road map.

M2



Consumer Goods

Consumables

This value chain was included in the National Agreement on the Circular Economy 2017 since the consumption and production of consumer goods uses significant volumes of raw materials and results in large quantities of CO_2 emissions. Amsterdam is joining the effort to make this value chain more sustainable. We are witnessing a rise in the number and variety of consumer products being designed to be repaired rather than disposed of at the end of their initial lifecycle. More hubs are being created were old items can be collected from residents so that they can be reused or made into new products locally. Waste is now being seen as a raw material by the sector and as a resource with which to make new products.

DISRUBT

In collaboration with the University of Groningen, a sustainable process for turning old inner tubes into a new, sustainable product is being developed. The municipality is here acting as purchaser in order to make the business case possible.

G1 Disrupt;
Universiteit Groningen

Pilot Fairphone als eern service

This pilot scheme tests a service model for smartphones within the company.

G2 Fairphone;
Centralpoint

Textiel

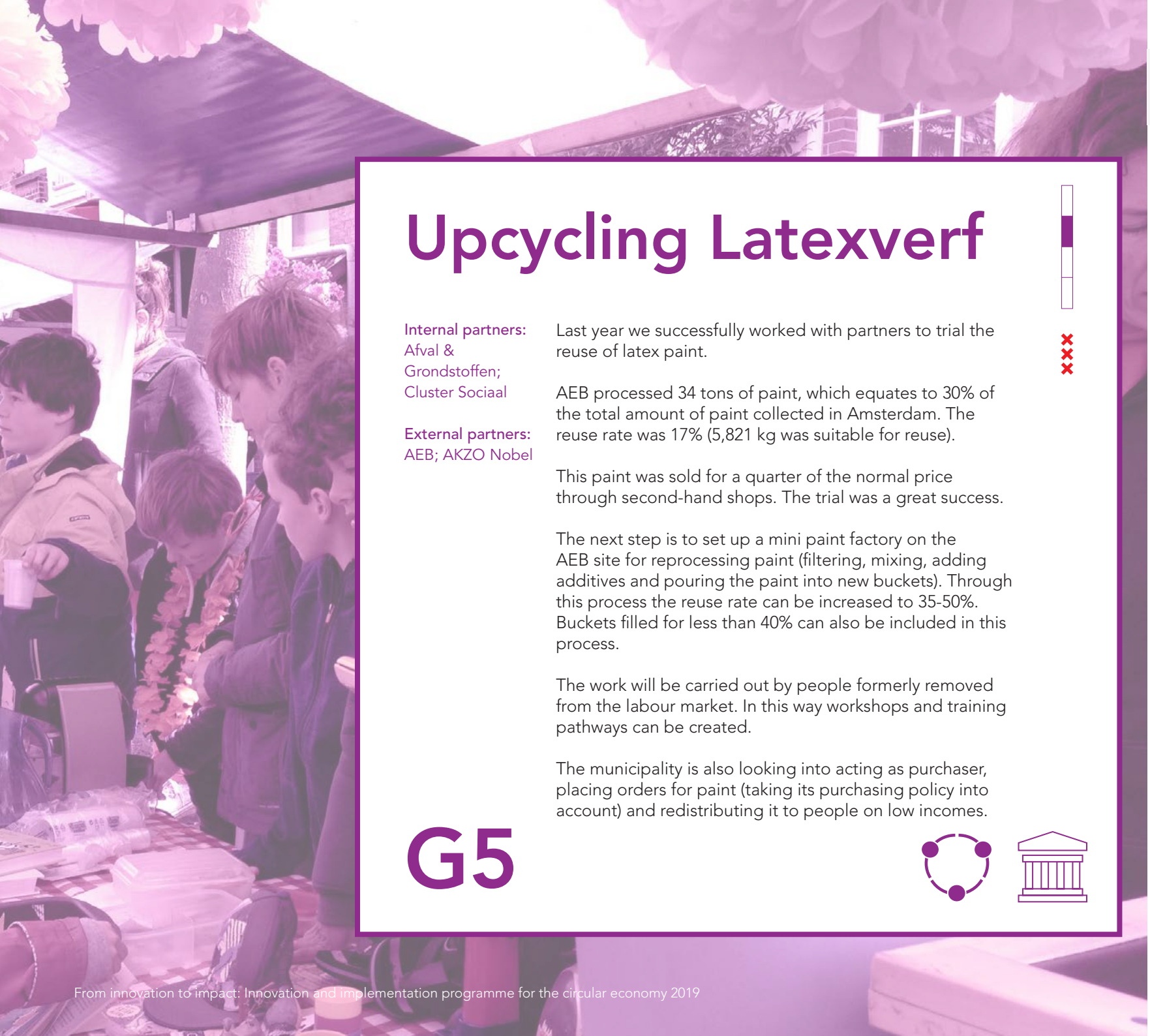
In collaboration with the University of Groningen, a sustainable process for turning old inner tubes into a new, sustainable product is being developed. The municipality is here acting as purchaser in order to make the business case possible.

G3

Hoogwaardig hergebruik zeep

Clean the World Ventures collects and recycles residual waste soap and cosmetic products from hotel rooms in Amsterdam, the Netherlands and across Europe.

G4 **Project lead:**
Port of Amsterdam



Upcycling Latexverf

Internal partners:
Afval & Grondstoffen; Cluster Sociaal

External partners:
AEB; AKZO Nobel

Last year we successfully worked with partners to trial the reuse of latex paint.

AEB processed 34 tons of paint, which equates to 30% of the total amount of paint collected in Amsterdam. The reuse rate was 17% (5,821 kg was suitable for reuse).

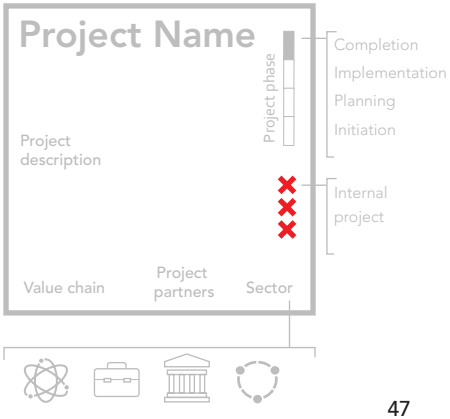
This paint was sold for a quarter of the normal price through second-hand shops. The trial was a great success.

The next step is to set up a mini paint factory on the AEB site for reprocessing paint (filtering, mixing, adding additives and pouring the paint into new buckets). Through this process the reuse rate can be increased to 35-50%. Buckets filled for less than 40% can also be included in this process.

The work will be carried out by people formerly removed from the labour market. In this way workshops and training pathways can be created.

The municipality is also looking into acting as purchaser, placing orders for paint (taking its purchasing policy into account) and redistributing it to people on low incomes.

G5



Waste & recycling

Slim inzamelen bedrijfsafval Amsterdam Zuidoost

This project focuses on smart collection methods for industrial waste in order to reduce the burden caused by waste collection in public spaces, reduce the emission of harmful substances and promote a fine grained way of collecting raw materials.

G6

Project lead: Hogeschool van Amsterdam

Lokaal recyclepunt uitbreiden

This recycling point in De Pijp was set up by local residents and entrepreneurs and is well used by people delivering or swapping items, or simply stopping to have a chat.

The recycling point is evolving and has every chance of becoming a small hub for visible circular initiatives.

As originally planned, a second recycling point will be established on a second square in De Pijp. Following an initial evaluation, a budget proposal will be made for scaling up the project in 2020.

G8

Groente en Fruit inzameling

This project focuses on recovering organic materials (fruit and vegetables) from residual waste through collecting waste separately, and incorporating local composting and food waste disposal units in new builds.

G9

Zero Waste Lab

The Zero Waste Lab is a local site for the collection and upcycling of separated waste.

Project lead: De Gezonde Stad

G10

Pilot 9 Straatjes

The municipality will be implementing a pilot scheme in the '9 Straatjes' (9 Streets) area of Amsterdam. The objectives of this scheme are as follows:

- To increase waste separation rates from 12% to 75% within five years.
- To reduce the amount of residual waste from 5,624 tons annually to 1,583 tons.
- To ban heavy-duty trucks from the area (now an average of 9.1 trucks per day).
- To improve air quality.
- To ensure waste free streets.
- To increase the quality of materials available for reuse.
- To improve cooperation within the supply chains and create clear roles for stakeholders.

In order for the municipality to take on the overall coordinating role, allowing for the coordinated collection of commercial waste in the 9 Straatjes area, the Board of Aldermen has made a request under the Crisis and Recovery Act. It is the strategy of the municipality that the market comes up with the solutions; the municipality will then coordinate matters based on results. As much waste as possible must be separated and processed in the most desirable way. The municipality will then put the waste collected from the area on the market through a European tendering process. The municipality will not itself bid.

G7

Dienstverlening afvoer ICT

This is a collaboration between the municipality and AEB for the circular removal and processing of ICT hardware and accessories.

G11 AEB

Plastics

Many products are made of plastic. This value chain is also included in the National Agreement on the Circular Economy 2017. Amsterdam is making concerted efforts to ensure that as much plastic as possible is reused and that single-use packaging is reduced. Various projects are included in this programme, focusing (among other things) on the reuse of different types of plastic.

Pyrolyse van niet-recyclebare plastics in transportbrandstof

Project lead;
Port of Amsterdam

External partners:
IGES; PARO;
David Hart Groep

IGES uses pyrolysis to turn non-recyclable plastics (such as the plastic film used for meat products and vegetables) into transport fuel. This process also results in the production of naphtha, a resource used in the production of plastic.

The ultimate goal is to refine the process so that it results in full naphtha output, which would make the process fully circular through chemical recycling.

P1

Plastic fabriek

The municipality purchases mixed plastics that are difficult to recycle from the post-separation processing plant for household waste, with the intention that they are used in the production of new goods. Sale of post-separation waste is made from the plastics factory in Almere.

P2

Plastic Recycling Amsterdam

Project lead:
Port of Amsterdam

External partners:
Umincorp; MSN

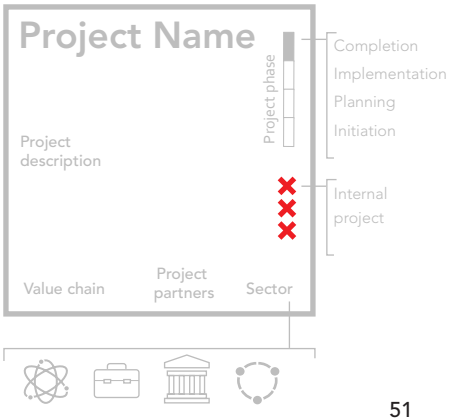
Plastic Recycling Amsterdam collects plastic packaging materials and then washes and shreds them. The shredded material then undergoes a magnetic density separation process which sorts the various plastic fractions, resulting in a purity of 99%.

This is a higher separation rate than achieved through traditional separation methods using sensors.

For an overview of the process, see Umincorp.com.

Finally, the separated plastic fractions can be sorted according to colour. They are then delivered to a processor where they are used to manufacture new plastics.

K3



Appendix

Innovation and implementation programme 2019
Approved by the Board of Aldermen on 26 February 2019.

Visualization and layout
UNSfutures / UNSTUDIO