Guide

Room for the Circular Economy on Business Parks in and around the City

A practical guide

MOOI NL

Summary

The circular economy requires space on business parks

Business parks are crucial for the transition to a circular economy committed to the decreased use of primary raw materials and thereby contributing to climate protection, biodiversity, and strategic resource autonomy. To make the shift, sufficient physical space and suitable spatial conditions in business parks are crucial.

This guide offers inspiration by offering practical examples, knowledge, and spatial principles, so park managers and policymakers can systematically embed the circular economy into existing and new business parks. Target group: municipal account holders, park managers, business associations, and BIZ- representatives. The guide's focus is on the local spatial planning of regular business parks in and around the city.

Circular business parks need production and processing space for reuse and sorting, logistics space for the storage and transport of circular goods, and usage space for circular commercial buildings and public areas.

Space is scarce, so the efficient use of space and smart combinations will be required. Circular business parks actively contribute to the four national circular strategies for reduced use of non-renewable resources and waste reduction.

Typologies of circular business parks:

1. Circular innovation area: Campus-like environment with innovative companies, testing facilities, and close links with knowledge institutions.
2. Circular manufacturing district: Focused on circular manufacturing (light industry).
3. Circular materials park: For flows of high environmental category materials, including circular hubs like raw material stations or bio-based building hubs.

Essential for all types: Infrastructure for energy, water, and raw materials, both above and below ground, as well as multimodal transport links.

In short: circular enterprise requires strategically designed business parks that are flexible, efficient, and future-oriented.

Spatial building blocks as a foundation for the circular economy

Business parks must be physically prepared for circular economic activities. This guide introduces spatial building blocks as concrete spatial elements that contribute to circular activity. They are clustered on the basis of the four national circular strategies (NPCEs) and on the additional category of 'making room':

1. Making room for CE:
   - Redevelopment by way of linear companies leaving or relocating. When business parks come to include public functions like recycling centres and waste treatment plants, the space taken up thereby must be compensated by providing suitable space for businesses elsewhere.

2. NPCE strategy Reducing the use of raw materials:
   - Shared parking facilities, material storage, recharging docks.
   - Green-blue structures, water storage, barge terminals, energy generation and storage.

3. NPCE strategy Substitution of raw materials:
   - Biobased or biochemical factories, vertical farms, circular design.

4. NPCE strategy Lifetime extension:
   - Circular hubs, craft centres, circular light industry.

5. NPCE strategy High-quality processing:
   - Recycling plants, resource hubs, composting facilities, recycling centres.

Broad value development: CE as a carrier of broad prosperity

The circular economy contributes to economic, environmental, and social value creation. Circular activity can lead to market advantages by connecting to society's growing demand for responsible consumption. However, its realisation requires investments, ownership, and time. The three example scenarios for circular redevelopment in this guide show that multiple paths to more circular business parks exist. Which steps to take very much depends on the starting position of a company.

A Small-scale mixed-use site: Start with basic measures like shared storage.
B Medium-sized production-oriented site: Focus on hubs and industrial clustering.
C Large-scale logistics/industrial site: Focus on infrastructure, high-quality processing, and logistics.

Lessons learned from the example scenarios:

- Spatial development should be phased and be linked to the city and the region.
- Circular transition is spatially intertwined with infrastructure, energy, water, greenery, and data.
- High environmental category spaces are scarce, but necessary.
- Circular activity currently still demands that the cost of land be low.

Roadmap for an area-based approach:

A successful transition requires cooperation between entrepreneurs, government, and real estate parties, preferably through an organised BIZ.

Three starting points:

1. Circular awareness among entrepreneurs.
2. Supportive policies by the government.
3. Chain approach as a driver for change.

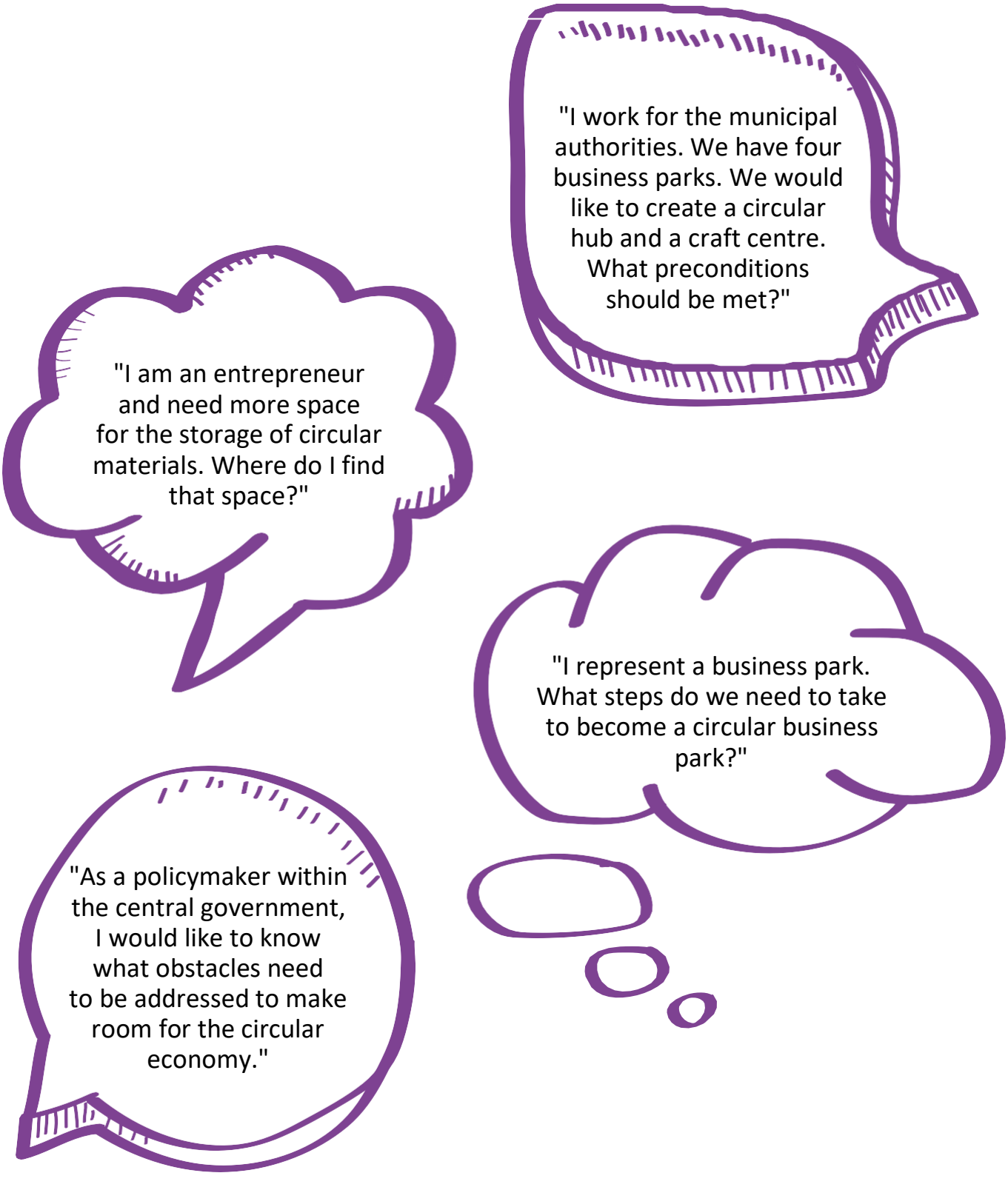
Five-phase approach:

1. Preparation: Organising, preconditions in place.
2. Strategy formation: Jointly setting the course.
3. Quick wins: Seizing short-term opportunities.
4. Infrastructure: Realising physical and spatial conditions.
5. Scaling up and specialisation: Building new chains over the long term.

Conclusion:

The circular transition on business parks requires customisation, phasing, cooperation, and smart spatial planning. Using targeted building blocks, business parks can become future-proof, sustainable and economically attractive.

This guide expressly focuses on local spatial area planning and the spatial conditions of the circular economy on regular business parks within or on the edge of the city, whether or not connected to waterways. The below presents a few questions about the issue of space for the circular economy in business parks. This guide helps answer them.



Contents

Tip: if you want to use this text as a practical guide: consult chapters 1, 3, and 5.

Right from the start, each chapter reflects on the lessons brought in by entrepreneurs, park managers, and organisations involved with business parks. Next, these lessons are considered in depth.

Read here for more information about:

Who is this guide for, what are the purpose, scope, and importance of this guide? **H1**

What is a more circular business park? How to shift from linear to circular and what are the spatial consequences of such shift? **H2**

What spatial building blocks can be exploited? **H3**

What combinations of building blocks and which development paths allow business parks to become more circular? How is value created? **H4**

Do you want to immediately know what steps to take and the roles played by all actors? **H5**

Curious? Here is a practical list of terms, useful websites, and useful documents **Terms, websites and useful documents**

Separate annexes: the QuickScan and the exploration of the three areas ofstudy. **Annexes**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Heidelberg Materials

1 The circular economy requires space on business parks

The circular economy requires space. For storage and reprocessing, for instance. Business parks play a major role in this connection. It is important that existing space on business parks is protected and made better use of, and that strategic expansion takes place. Moreover, this must be done with the right physical preconditions (site characteristics) for circular activities in place. Hence why we have published this guide. The good news is that many companies are already making the shift to circular operations. This chapter discusses the urgency and purpose of this guide.

Learning from practice

This is the practical guide on the circular economy on business parks in and around the city. Business parks play a key role in the transition to a circular economy. However, they do need the physical space to play that role - both for literally providing room for circular activities and for creating the right physical preconditions.
Entrepreneurs, owners, and representatives of business parks, acting in tandem with governments and other organisations, are working hard to create this space. During interviews held with various representatives of the above-mentioned parties in the context of this handbook, they all displayed abundant ambition, guts, and tenacity. However, it also became clear there was a need for inspiration, a set of dos & don'ts, and a roadmap based on practical experience. This guide provides a helping hand.

This guide is part of a set of guides published as part of the Ministry of Housing and Spatial Planning's Beautiful Netherlands programme. They are meant to serve as an inspiration when addressing key spatial challenges in the Netherlands. See the annexe for a justification of the approach.

Annexes

Urgency

Today's economy uses large amounts of finite and mostly fossil resources in linear production chains that generate waste streams and pollution. This not only affects the Netherlands: our use of raw materials also leads to depletion and environmental damage in other parts of the world. This linear system is no longer sustainable: it breaks through the ecological ceiling and increasingly sinks through the social foundation (see Kate Raworth, Doughnut Economics). We owe it to future generations to ensure that our planet remains liveable. Moreover, it is important to become less dependent on other countries for raw materials and energy. A circular economy is necessary to achieve this.

For this reason, the Dutch economy will have to have completely moved from a linear to a circular economy by 2050. In order to realise this, the National Circular Economy Programme (NPCE) and other initiatives have been launched, while an update of the national targets is currently under way (Central Government, 2024, see List of sources).

What would happen if we do not make room for the circular economy? Should economic and spatial policies aimed at sustainable and circular business parks not take off, society will become more vulnerable. This will lead to increased risks of, for example, damage from climate change, resource shortages and rising

List of sources

costs, and a polluted environment.

A circular economy uses less raw (primary) materials, for example by using fewer materials and products, using them for a longer time, and reusing them (see the glossary for an explanation).
Companies will gradually reduce raw material use, come to process waste streams in a high-quality manner, replace raw materials with sustainable, reused, or reusable materials, and extend the life of assets.

This helps combat climate damage, climate change, and biodiversity decline. It also helps to become more strategically autonomous in terms of (critical) raw materials. This subject is receiving increasing attention within the EU, as there is a push for new green industrial policies. Refer to the Critical Raw Material Act, the Draghi 2024 report, or the OECD opinion on the circular economy (see List of sources).
For this to succeed, sufficient physical space and the presence of the right physical conditions on business parks are a necessary precondition.

Companies and business parks play a crucial role in the circular transition.

A great many companies are located in the approximately 3,700 regular business parks in and around cities in the Netherlands.
As a result, these are the spots playing a leading role in the shift from a linear to a circular economy. At present, these sites account for about 2.5 million jobs and about 30% of the added value in the Dutch economy (Stec 2023, see List of sources).

The circular economy is not a new development: it is something that has been worked on for years now and numerous companies are showing that it really can be done. This guide contains good examples.
The shift to a more circular economy is far from always a visible phenomenon on business parks. For example, changes can be effected within company buildings or in the way a company is organised or realises it procurement and/or sales. Yet the circular transition also involves a spatial change – as room is required for storage and the processing of return flows, for example.
How can business parks make room for the changing economy in time? If room to scale up or make the shift is lacking, the circular transition will not get off to a good start.
Entrepreneurs have few opportunities to deal with this complex issue. Hence this guide, which provides inspiration on how to design space for the circular economy.

Purpose and target audience of the guide

This document aims to provide inspiration by sharing knowledge and examples from practice, while also offering directly applicable spatial principles. It aims to provide guidance on the spatial incorporation of the circular economy, on future, but especially on existing, business parks.

Its contents are primarily geared towards the municipal account holders and the representatives of business parks, such as intermediaries and park managers, boards of business associations, and representatives of business investment zones (BIZ). The second target audience circle consists of governments, entrepreneurs, land and property owners, developers, and interested parties (for policy reasons or otherwise).

Scope

The scope of this guide is expressly limited to local spatial area planning and the spatial conditions of the circular economy on regular business parks within or on the edge of the city, whether or not connected to waterways. Large-scale industrial and port clusters, logistics centres, specific innovation environments like campuses, and small-scale business locations are therefore outside the scope of this study. Moreover, this guide focuses primarily on the redevelopment, or conversion, of existing business parks.

Disclaimer

Space (and specifically space on regular business parks) only forms a small part of the story of the transition to a circular economy. Spatial development requires a broad view and the transition is linked to many other themes, such as energy. This guide aims to do justice to that wider context.

For the room to manoeuvre is ultimately limited. Changing (existing) business parks is complex and requires cooperation, time, and money. Too, regulations have a not to be underestimated impact on a company's business case. Nevertheless, this guide proceeds on the basis of optimism and ambition. For urgency is high.

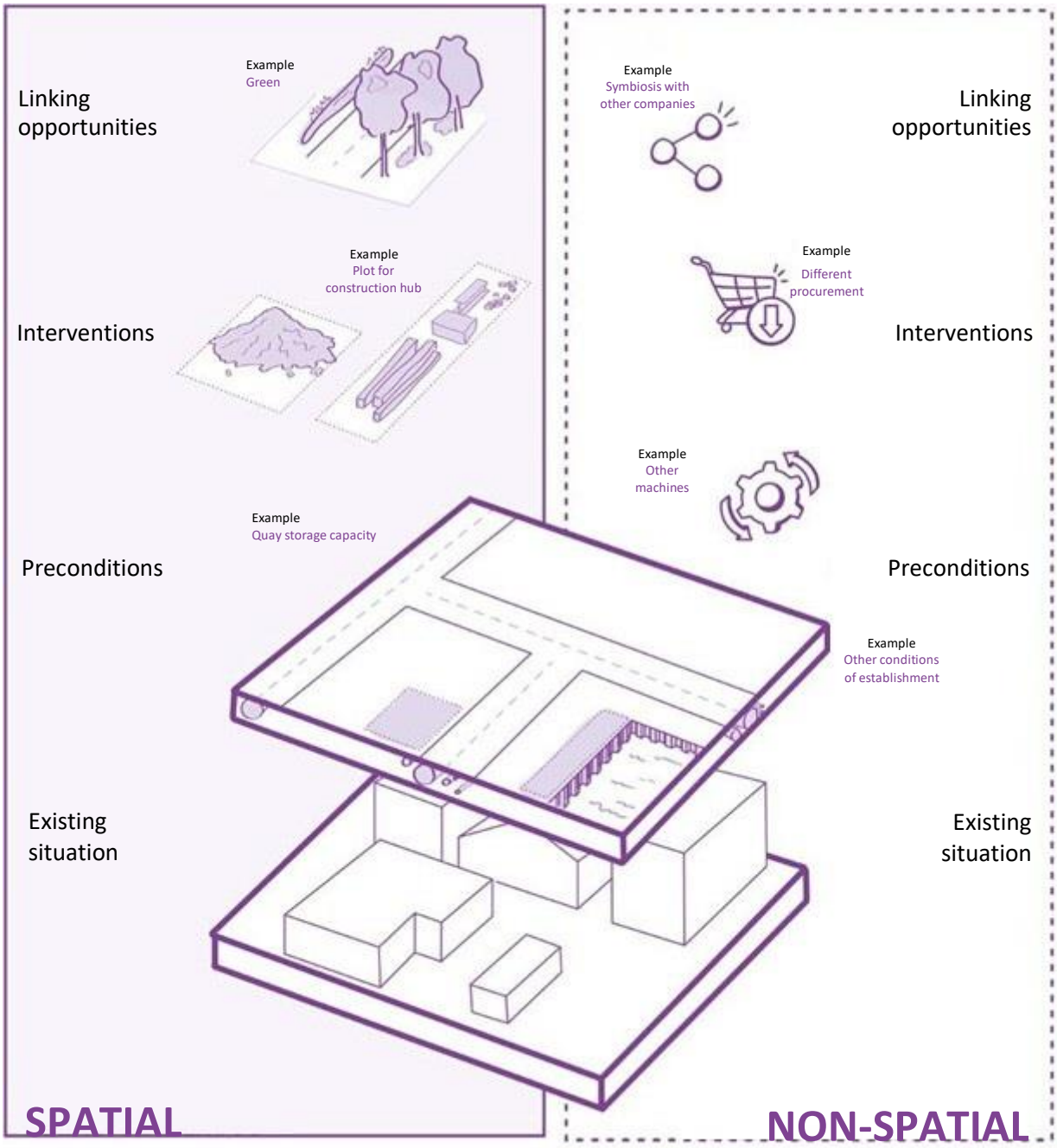

Figure 1: This guide focuses on local spatial area planning and the spatial conditions of the circular economy on regular business parks within or on the edge of the city, whether or not connected to waterways.


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2

What is needed to create a (more) circular business park?

This chapter describes the spatial requirements for making the switch to a circular business park. We will first share lessons and experiences collected from the interviews held during the working meetings at the business parks. Next, we go deeper into the subject: what is a circular business park and what role does spatial quality play? The chapter ends with three examples of circular business parks - three targets to aim for.

This has become evident from QuickScan and on-site working meetings

The QuickScan (see annexe) shows that, in recent years, few business parks are being added in and around the city (space is scarce). Existing sites are therefore extra costly for the circular economy. This in particular goes for the sites that feature a higher environmental category (abbreviated as HMC - this is now called an 'environmental space'). Having a high environmental category is a necessary precondition for recycling plants, for example. It prevents nuisance, reduces impact on the living environment, and ensures safety. Due to the continuing growth of cities, easily accessible business parks for high environmental category production functions are coming under increasing pressure.

Annexes

Having access to quays and water is a necessity for processing large material flows and, if present, an opportunity for various circular activities. Circular activities appear to have only limited dependence on the size of a site. Even smaller sites can host a great diversity of circular business activities, from small-scale development and testing to large-scale stream processing and mass production. However, it can be noted that circular activities are of a more mixed and diverse nature the more they are embedded in the urban environment, in which case other circular activities aimed at using fewer raw materials and extending lifespan are also present, like rent/share options, repair services, and thrift shops.

Does a 'circular business park' look any different? When you visit business parks that house circular activities, you will see company buildings, indoor en outdoor storage sites, and sometimes quays and machinery. Entrepreneurs proudly demonstrate the certified circular products and materials going around and explain how the storage systems are space-efficient. They say that, for entrepreneurs, the sound spatial incorporation of circular activities revolves around the design and incorporation of port facilities, the spatial incorporation of storage sites for raw materials and waste/residual streams, the design of site edges and fences, the incorporation of renewable energy, the circular design of public spaces, and embedding knowledge functions on or near the site. While having room for companies to do business is paramount, good accessibility and site design do count and are important for employees. Combining functions that require space is a smart and efficient approach. The circular economy is (currently) more space-extensive than the linear economy is. More space is needed for the storage, transshipment, and processing of the ever-growing flows of materials and products. Nevertheless, things do not look very different from a physical spatial point of view. The design challenge at this point does not appear to be fundamentally different from that existing at regular sites.

Conclusion from the working meetings

Although return flows of materials and products are increasing and require more space, a 'circular business park' will not, in the future, look strikingly different from a regular business park. The difference is that some parts of business parks are becoming more important, such as quays and storage sites, and that new types of businesses are becoming visible, such as biomaterials processing, concrete recycling, or manufacturing. Buildings and public spaces can be designed more heavily with circular principles and materials in mind. We will discuss this in more detail in the next chapter.

Cry from the heart

Do you wish to become circular? Entrepreneurs and park managers and municipal authorities have the following tips to give:

- Guarantee the (high environmental category) environmental space for the future, as it is necessary for many circular activities
- Ensure good multimodal accessibility
- Realise access to sufficient energy
- Be careful of - and make the best use of - water-connected sites and existing quayside functions
- Provide a good working environment featuring spatial quality, combine functions efficiently, and exploit linking opportunities such as greening or renewable energy

In-depth coverage for those who want to know more

Moving from linear to circular is different for every company

The transition to a more circular economy involves major changes for the Dutch economy and the way production chains are organised. A 100% circular economy fundamentally touches the production processes of all economic activities (design, procurement, production process, sales - even returns). Companies are different, customers and suppliers are currently located in many different places, and economic relationships are both intricate and globally branched out. (While choices have consequences for the value chain, the existing value chain in turn affects choices we make now.) Linking up material and product chains in a circular way requires interplay and the process differs from one situation to another. The route towards a circular economy is therefore a diverse one. Moreover, initiatives and innovations arise in very different places, by very different parties. This is by no means always spatially visible, as such processes sometimes takes place on site, as part of business operations.

For this reason, it is complicated to define what circularity means at the level of business parks. It can mean something different for each individual company. Each has a different function as links in a material/product chain. Business parks house many types of companies. Some are leaders, as they guide the largest material flows or supply a specific circular product. Others are followers, only procuring in a circular fashion and carefully handling residual streams. An overview of economic circular activities occurring on business parks as known to the Netherlands Environmental Assessment Agency (PBL) based on SBI codes is included in the annexe. This guide also considers the circular built environment (buildings and outdoor space). By now, a great many research results about the circular economy have been made available from the central and regional governments and the picture of the spatial consequences it will entail is also becoming sharper. Refer, for example, to the CE and Space Knowledge Survey studies by the Ministry of Infrastructure & Water Management, the Space for the Circular Economy study by the PBL, the study on the qualitative demand for space on business parks performed by Erasmus University/ Rienstra, or the Zuid-Holland Circular Spatial Strategy and the Noord-Holland Circular Work Locations Exploration.

Spatial quality as a guide to good solutions

Becoming circular will require space: space for circular activities on existing business parks and additional physical space to be obtained by business parks, for example for specific high environmental categories or to allow for business relocations (source PBL/Icer, see List of sources).

List of sources

Business parks can be become more circular in many ways

Circular business parks are part of a future circular economy in the Netherlands, just like a circular built environment or circular agriculture are. There is no conclusive definition of a 'circular business park'. For the sake of convenience, we nevertheless use the term within this guide, because it expresses the ambition well.

Circular business park: a business park that, as a whole, actively engages with the four national circular strategies (see glossary for more explanation), thereby providing space and opportunities for economic activities that ensure the decreased and more efficient use of non-renewable resources and that counteract (excessive) waste.

Glossary

At the bottom line, there should be a positive business case. By looking more at the regional level and starting from a chain perspective, it is possible to determine the function a business park plays as a link in the chain. This allows for considering how this affects the issue of space. Is a qualitative change in space required? Is more or less space needed?

Examples of types of circular business parks

Considered through an economic lens, it makes a difference whether a business park focuses more on the local/regional economy or more on global flows. Whether the companies present and the layout at the sites are geared towards manufacturing or services is also of import. In the following chapters, we will use those differences to consider the circular opportunities for a business park or part thereof.

Chapter 4

Looking through a spatial lens, we can broadly see three categories of circular business parks, as shown here. At site level, they occur in various mixes. The three categories are examples for inspiration, but they also fit well with the classification used by Ecorys/ BRO in the Noord-Holland Province Circular Work Locations Spatial Exploration (2024).
We will provide some practical examples.

> *"Which parts of these illustrations do you recognise as applying to your business park? Where do you see development opportunities?"*

Circular Innovation Area

Circular Manufacturing District

Circular Materials Park

Supporting infrastructure

Above-ground and underground infrastructures for transporting energy, water, raw materials and products via different modalities are prerequisites for each of these three types of business parks featuring circular activities. This supporting infrastructure takes up space and is part of what a circular business park looks like. This concerns a spatial infrastructure of:

- Logistics avenues and storage and transhipment systems like quays and mooring facilities, cranes, container areas for circular materials;
- A green-blue structure for water collection and purification, including for water used for rinsing and spraying in the context of materials processing;
- Areas with cables and pipes and technical rooms for renewable energy and data.

This framework is the supporting system for the material flow management (raw materials, products, waste, residual flows, data, energy, water) associated with circular activities and is part of the spatial quality and experience of the work location.

Circular Innovation Area

What it is: A small or large campus-like (part of a) business park with many and various innovative companies and test facilities and a link to educational and knowledge institutions.

Spatial quality: Area with a technological feel, halls, office environments and laboratories, green spaces, focused on research, meeting and knowledge exchange. The area has good public transport accessibility.

Types of businesses: This type of area is home to companies that fit an innovation environment: it is the foremost place for innovative ecosystems, where knowledge institutions cluster with companies and research institutions (refer to the Spatial Economic Vision of the Ministry of Economic Affairs). Examples include bio-based or circular product development and specialised manufacturing industries geared, for instance, to prototyping or the applications of new materials.

The Circular Innovation Area provides environmental use space in environmental categories 3 to 5 - and in highly exceptional cases involving certain (bio)chemical activities, like in Bargermeer, category 6.

Examples are the Green Chemistry Campus in Bergen op Zoom and IPKW in Arnhem; Bargermeer partly forms an example, as well.

Example

IPKW (Industriepark Kleefse Waard, Arnhem)

Source: https://www.connectr.nu/tour/cleantech-park-

An innovative business park focused on clean technology:

- Features: 90 hectares with more than 100 companies employing around 3,500 persons
- Circular initiatives:
  - Sustainable energy system featuring local generation and storage
  - Companies work together to close material chains
  - Centre for innovation in renewable energy and the circular economy

https://www.ipkw.nl/

Example

Greenville (Houthalen-Helchteren)

https://greenville.be/

Cleantech incubator and business centre:

- Features: Repurposed 30-hectare mine site
- Circular initiatives:
  - Cleantech Campus with a focus on innovation
  - Material flows are mapped and optimised
  - The circular economy forms the core theme for all activities

https://greenville.be/

Example

MAAK-C district (Haarlem)

Source: https://www.maakhaarlem.nl/

Hub for innovative and circular manufacturing:

- Features: 2 hectares, encompassing a wide range of themes, including bio-based materials, crafts, smart technology, etc.
  - Circlefied: makes sheet material out of recycled plastic.
  - The Bicycle Courier delivers all your parcels, medicines and mail by bike.
  - Enz-remake designs, engineers and makes circular furnishings for offices, restaurants, schools, and healthcare facilities.

https://www.maakhaarlem.nl/wat-is-maak/

Circular Manufacturing District

What it is: A (part of a) business park specialising in circular manufacturing (light industrial).

Spatial quality: The site features efficiently stacked functions, including industrial units for processing, storage facilities, and office space. It also provides room for shared use, reuse, and repair facilities close to the city. Logistics hubs of limited size are present to allow for urban distribution or, for example, 'cross docks', to serve circular construction projects in the city. The Circular Manufacturing District is a people-friendly environment with good accessibility for employees and visitors, featuring green public spaces and, often, halls with heritage value.

The spatial structures (green-blue, roads) are properly interwoven with the structure of the nearby city. Having access to water is not necessary. Social initiatives are often present, as well.

Types of businesses: A wide variety, from carpentry and window frame stores to mechanical engineering or algae farming.

Limited storage space required, environmental category 3 to 4.2.

Examples are Werkspoorkwartier and, in the future, Strijkviertel in Utrecht, Binckhorst in The Hague, M4H in Rotterdam.

Example
Werkspoorkwartier (Utrecht)

Source : https://www.utrecht.nl/

This former industrial estate has been transformed into a creative and circular hub:

- Features: Reuse of historic industrial buildings, including former Dutch Railways workshops
- Circular initiatives:
  - The Hof of Cartesius: built with recycled materials in modular form
  - The Werkspoor Factory: creative breeding ground for circular entrepreneurs
  - Buurman Utrecht: workshop where residual materials get a second life

https://werkspoorkwartier.nl/

Example
Strijkviertel (Utrecht)

https://www.utrecht.nl

A newly to be developed circular business park:

- Features: 30 hectares of new land classified as category 3, 'light industrial'
- Circular principles:
  - Plots to be developed by developers
  - Circular area design
  - Focus on affordable space for circular entrepreneurs

https://stadszaken.nl/artikel/5715/strijkviertel-utrecht-vliegwiel-voor-transitie-naar-circulaire-stad

Example
Morgenstadt Werkstatt (Stuttgart)

https://www.morgenstadt.de/en/ueberuns.html

This innovation centre for sustainable urban development integrates circular principles into business environments:

- Tests new circular business models in a controlled environment
- Develops smart logistics solutions for material flows
- Works with digital platforms for industrial symbiosis

https://www.morgenstadt.de

Circular Materials Park

What is it: A (part of a) business park with a high environmental category, focused on large flows of materials. This business park revolves around private and/or public circular hubs, which could be a raw materials station, a municipal city hub for public works, or, for example, a construction hub with bio-based building elements.

Spatial quality: There is plenty of storage capacity and space available for rinsing, sorting, and machine processing, among other things. The materials park implements smart noise and dust control measures. A strict separation of heavy goods traffic and slow traffic is needed to ensure safety.

Types of businesses: A circular materials park is home to various companies, including from the construction, metals processing, green processing, or wastewater treatment sectors.

A circular materials park often has access to water and features environmental categories 3 to 5.

Examples include Beatrixhaven, Lage Weide, Bargermeer (in part), business parks along the Wilhelmina Canal near Oosterhout-Raamsdonkveer.

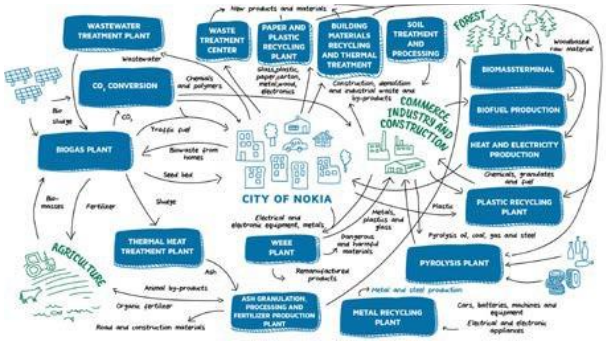
Example
TPN-West (Nijmegen)


Source: https://www.tpnwest.nl/

TPN-West (270 hectares) accommodates some 450 companies, including enterprises active in the higher environmental categories 4 and 5. The site houses companies involved in businesses ranging from recycling to power generation, from retail to manufacturing and logistics, and from (wholesale) trading to car dealers.

https://www.tpnwest.nl/wp-content/uploads/2020/01/Brochure-TPN-West-Samen-Circulair-en-Energiebewust.pdf

Example
ECO3 industrial park (Nokia, Finland)



Source: https://eco3.fi/en/

A multidisciplinary, innovative and industrial business park focused on the bio-economy and circular economy. It is an important competence centre and demonstration and pilot environment in Finland. The on-site activities inter alia focus on biomass and wood waste processing, debris, packaging, and waste disposal.

https://eco3.fi/en

Example
Theodorushaven (Bergen op Zoom)


Source: Province of Noord-Brabant

This business park near Bergen op Zoom of over 300 ha houses a diverse range of companies and plays an important role in the energy transition, countering climate change, making business processes more sustainable, and moving towards a circular economy. The waste with most potential in Theodorushaven consists of vegetable materials and construction and demolition materials.

https://circulair.biz/theodorushaven/

Example
Innofase (Duiven)


Source: https://www.innofase.com/nl/

Industrial park with a focus on the energy transition and the circular economy:

- Features: 110 hectares with a focus on energy and raw materials plants
- Circular initiatives:
  - AVR waste plant supplying residual heat to surrounding businesses
  - Composting plant producing biogas
  - Plastic recyclers

InnoFase synergy park

3

Spatial building blocks for the circular economy on business parks

What spatial layout and preconditions are involved in developing a circular business park? This chapter contains inspiring spatial building blocks. They are sorted according to the four strategies from the National Circular Economy Programme. The building blocks are briefly described and illustrated by way of examples. We start with lessons from practice. What lessons do park managers, entrepreneurs, and municipal authorities have to teach?

National strategies

Lessons from practice

Following the QuickScan of 25 sites, we zoomed in on three business park clusters spread across the Netherlands: Bargermeer (Emmen), Lage Weide, Werkspoorkwartier and Strijkviertel (Utrecht), Beatrixhaven and Willem- Alexander (Maastricht and Roermond). They were examined in more detail and a working session was organised with government authorities, entrepreneurs, civil society organisations and educational institutions at each site.

We looked at existing circular initiatives, the available opportunities, but also the obstacles present. During these working sessions, spatial building blocks were provided that can help accommodate the circular economy on a business park.

Chapters 4 and 5 delve more deeply into what is needed for the change towards a more circular business park. Some of the general findings from the field trips and discussions with the representatives of these study areas were the following:

- Only a few percent of all companies present at the business park are circular when considering the SBI codes that, according to the PBL, apply a circular/R strategy (Map of the Circular Economy, PBL 2018). Circular companies are mostly active in the recycling or re-use sectors, and in the construction sector.
- According to the parties actually engaged in it, giving space to the circular economy is still in its early stages.
- Operators handling large material flows (primarily construction materials and metals) estimate that around 20% more storage space will be needed over the next 10 years (Limburg).
- The supply of secondary materials impacts an area of about 100 kilometres in circumference (Limburg, Emmen).
- Symbiosis is rare, but exploiting business-to-business corporate waste can be done more smartly when working together (Limburg).
- A lack of options to connect to power grids and high energy prices is seen as a major bottleneck (every area).
- Larger flows absolutely require access to waterways; this fact is being rediscovered in many areas (all). Smaller flows travel by road and also via containers (Limburg, Utrecht).
- Circular activities are often located in cheaper areas of the park (each site).
- Recycling companies are often clustered. The noise allowance is predominantly restrictive (any site near a city).

- Green-blue is desirable for future-proof development (Utrecht). The greenery present is highly variable, the spatial quality of the sites visited varies. Bargermeer and Werkspoorkwartier stand out for having a lot of greenery and a high-quality design of public spaces, respectively.

Conclusion

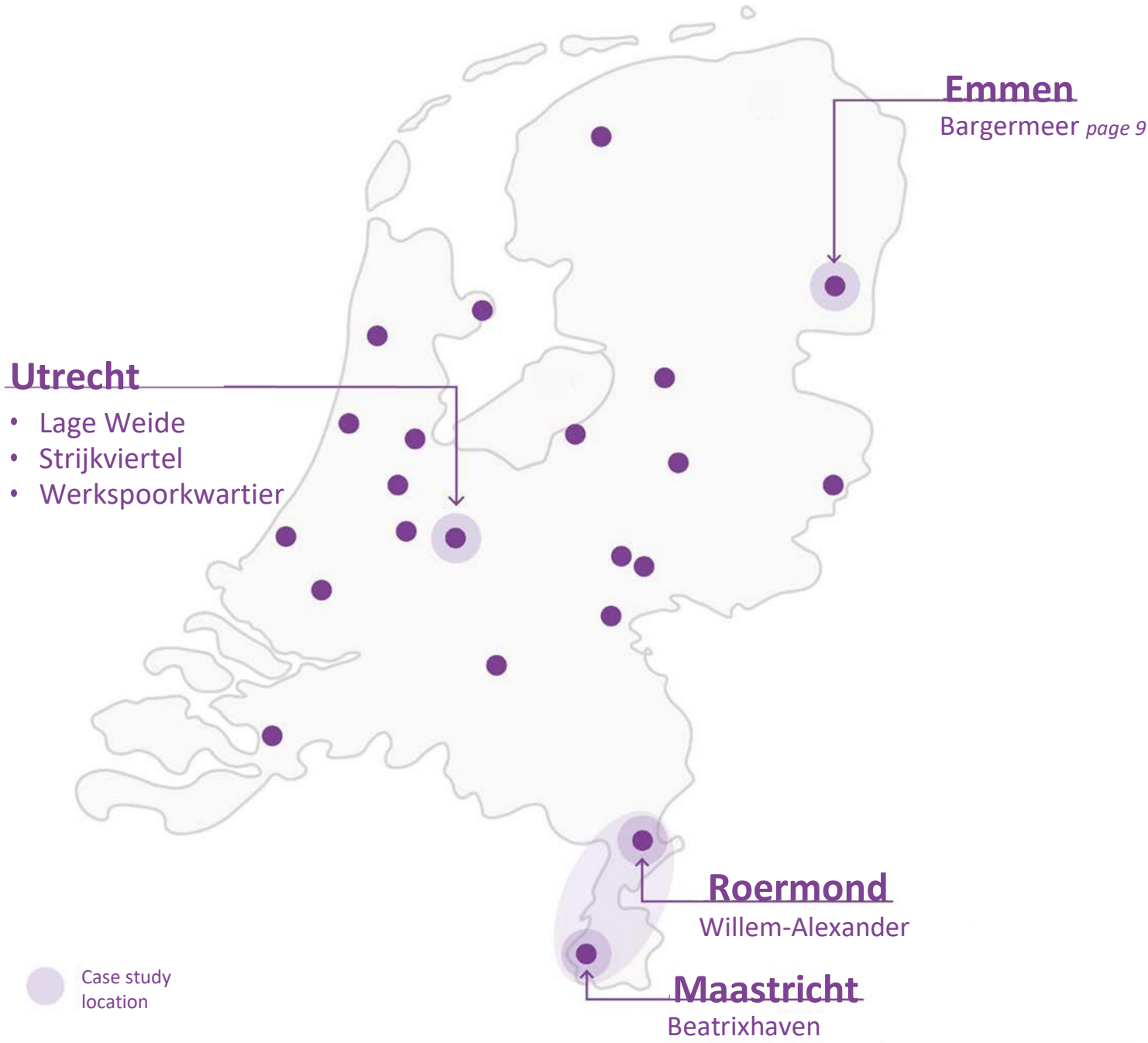
- Learning together and moving beyond the pioneering stage requires cooperation and flexibility.
- There is a desire for guidance and looking ahead when providing space for the circular economy, even if entrepreneurs as yet experience little urgency and few opportunities (park management / municipal authorities).
- The four strategies in the National Circular Economy Programme (NPCE) provide a start for action, provided they are made concrete and spatial preconditions become clear.

Cry from the heart

What matters according to entrepreneurs and park managers:

- Keep the space needed for the circular transition in mind on the business park. Entrepreneurs, park management, and municipal authorities should jointly select what is needed and where to start: pick one or more appropriate building blocks.

Case studies from 3 study areas



Case study

Emmen: Bargermeer

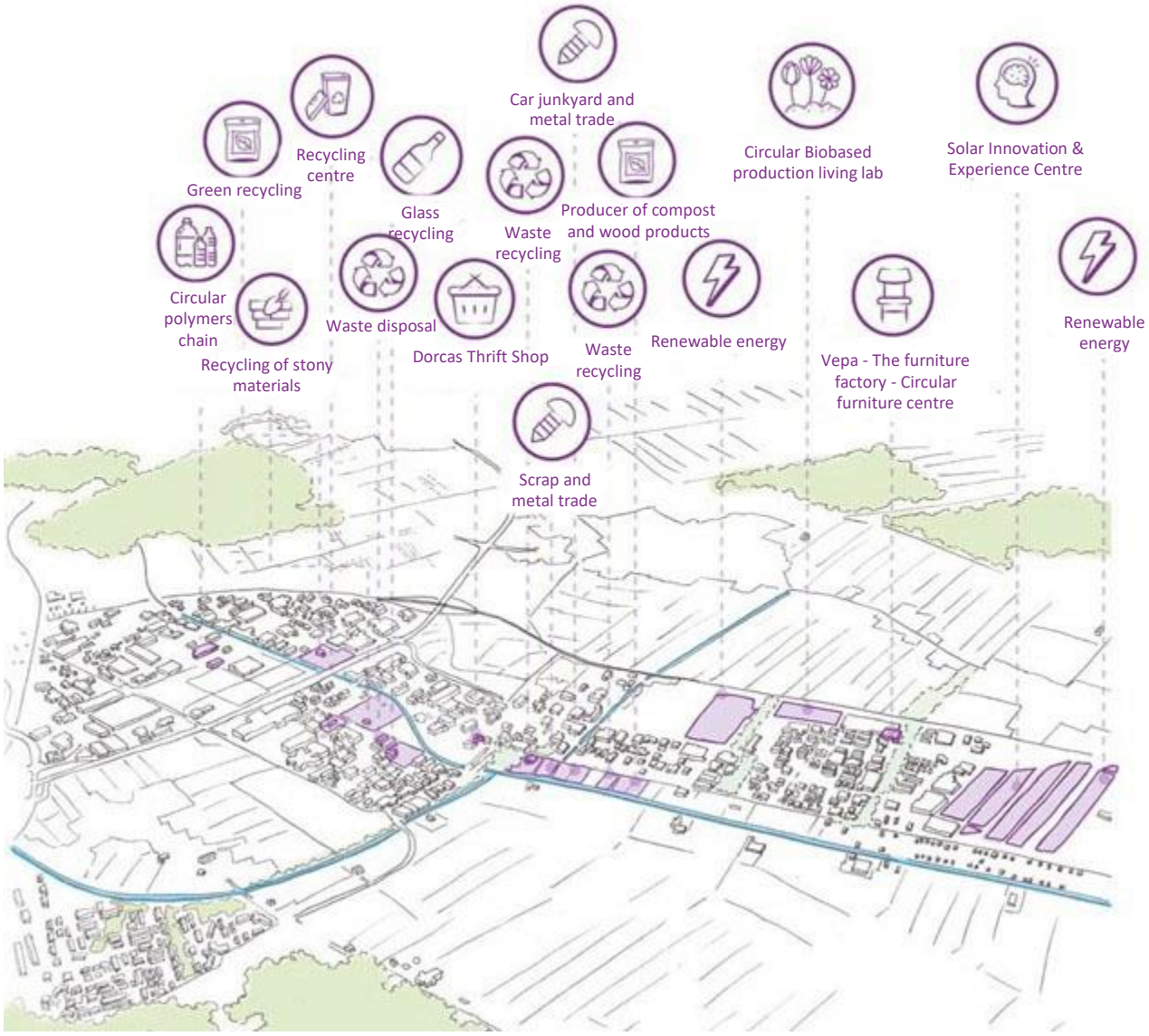
Bargermeer is the largest business park in the northern Netherlands, covering more than 600 hectares and stretching from the edge of the city (oldest part) to well into the outskirts. Bargermeer has grown around AKU (Akzo Nobel) and its spin-offs. It has spacious plots, competitive land prices and excellent location conditions. It is the largest industrial centre in the northern Netherlands and the largest chemical cluster in Europe for the production of industrial yarns and fibres. In addition, Bargermeer has a strong position in manufacturing, High Tech Systems and Materials, greenhouse horticulture and logistics, development field labs (e.g. GZI-Next and Oranjepoort solar park). One spatial carrier is the canal, formerly used for transport. Currently, it is a valuable green-blue structure. The site has gradually grown into the landscape structure and contains valuable wooded banks and beautiful trees. Several recycling plants are located in the canal zone. Bargermeer is accessed by a provincial road (ring road). The site offers space in all environmental categories. In Emmen municipality's economic strategy, the future focus is on circular plastics and the manufacturing industry. Bargermeer also houses an education and knowledge cluster: the Greenwise campus. The municipality has drawn up a CE Action Plan to foster the circular transition. Opportunities for the future include the plots still available (up to category 6!) and the Action Plan with its clear focal points. Further development of the campus in combination with a craft centre also seems promising.

Striking spatial building blocks: Mini environmental street, Biochemical plant, Green-blue structure

Our rule: 'Insight creates Duty.'

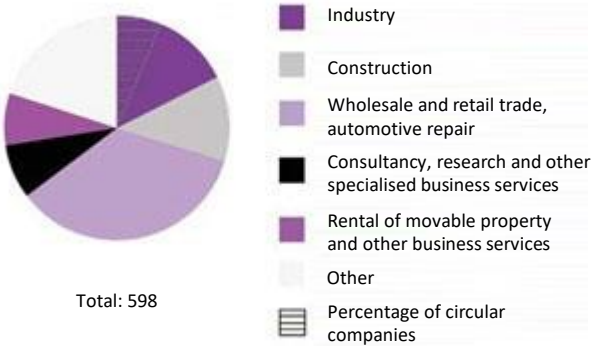
'Our park management is closest to the entrepreneurs and is best positioned to achieve results when it comes to creating space for the circular economy. So we set the targets and follow through.'

Bargermeer



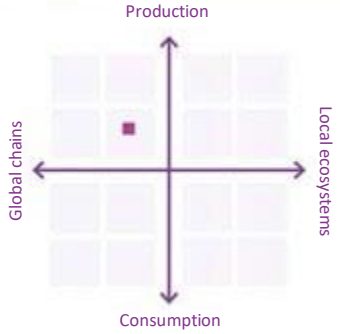
Quickscan

Distribution of companies by main sector



Total: 598

Site categorisation



Which CE strategy	Lifetime extension High-quality processing

Case study

Utrecht: Werkspoorkwartier, Lage Weide, and Strijkviertel

The city of Utrecht has three business parks close to each other that (will) play a major role in the circular economy. The Werkspoorkwartier is a compact mixed business park, almost entirely surrounded by the city. The area grew up around the Royal Dutch Tool and Railway Material Factory. The main halls are now the focal point of circular innovations and initiatives. The Hof van Cartesius and its Buurman Utrecht, too, is a successful hotspot connecting circular economy and social issues.

Lage Weide is a 408-hectare, environmental category 5 waterfront site along the Amsterdam-Rhine Canal. It is home to many companies handling large material flows related to the construction and recycling industries. The municipality has set up it Funnel Meadow resource hub here. Work is currently being done on smart zoning, green-blue lacing, and a slow traffic system. Companies are allowed to stack functions, but this proves difficult in practice for some of the entrepreneurs here, as not all functions can be played out on top of material processing depots.

Strijkviertel is a 30-hectare new (greenfield) circular business park to be developed, category 3: light industrial. The municipality is working on a plan containing lots of greenery. The focus is on plots developed and leased by development combinations.

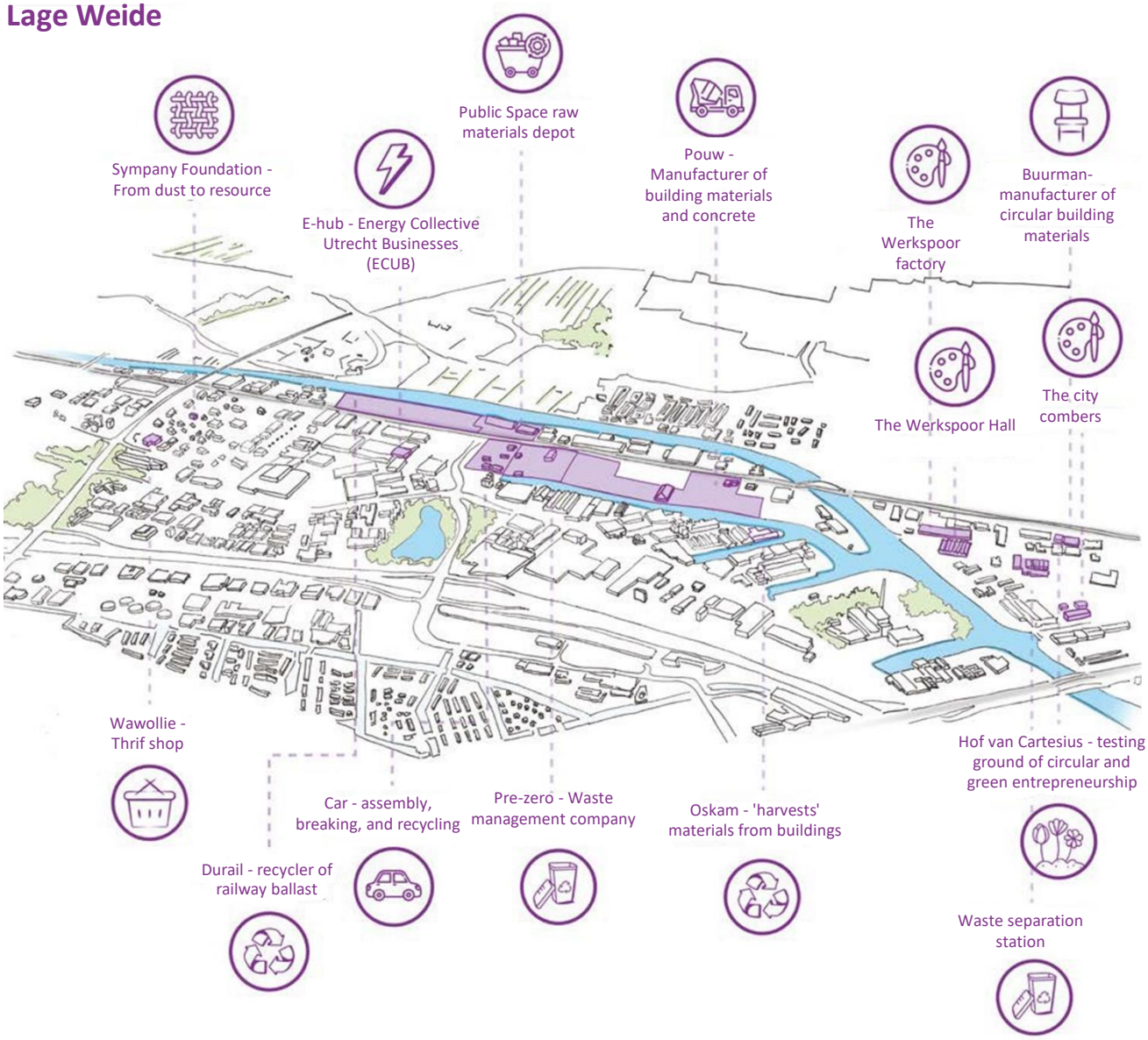
Opportunities are found in the cooperation between the 3 sites and with Liesboschhaven, providing an interesting interplay of establishment conditions and opportunities to share functions, such as collective storage or creating a hub. The Province of Utrecht faces a major construction challenge. These sites can play an essential role in meeting it, by establishing the construction chain as the primary value chain. With respect to Strijkviertel, it is important that affordable space for circular entrepreneurs remains available, as well.

Striking spatial building blocks: Manufacturing district/Light Industry, Circular innovation area, Raw materials hub

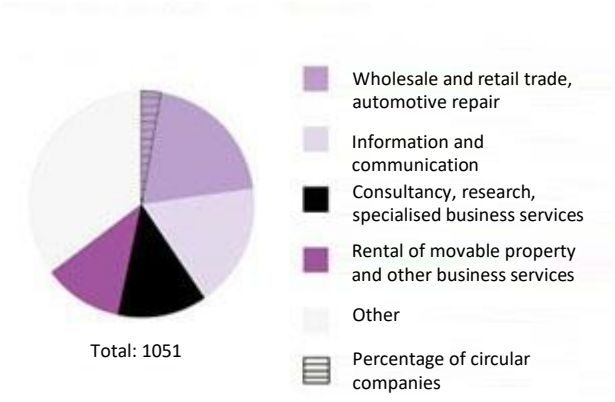
'Circular businesses are run from the heart, have a social component, and really work differently than linear businesses do: improve the regulations.'

'Circular collaboration between business parks offers the greatest chance of success.'

Lage Weide

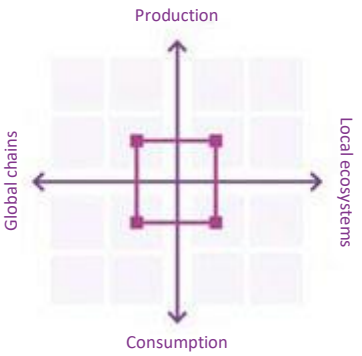


Quickscan



Total: 1051

Site categorisation



Which CE strategy

Lifetime extension
High-quality processing
Chain facilitation

Case study

Limburg: Beatrixhaven Maastricht and Willem-Alexander Roermond

In Limburg, we examined two business parks along the Meuse River.

Willem Alexander, near Roermond, is 81 hectares in size, is labelled category 5, features an industrial port, and houses a large paper mill and paper recycling. This site has excellent energy infrastructure in place for the bulk consumers. Under the Port of Roermond banner, a collaboration between entrepreneurs and the government, work is currently being done to create port facilities like quays, mooring posts, and high-water markings. This clear infographic gives all the information: https://www.parkmanagementmiddenlimburg.nl/wp-content/uploads/sites/2/2019/05/WA-Roermond-A3-MAP-05-2021.pdf

Maastricht's Beatrixhaven is a large industrial estate (268 hectares, category 5) dealing with large flows, including for the metal industry (steel coils) and circular logistics, and with the storage/transshipment of building materials. It is home to many (construction) industries with access to water and to a limited chemical industry. The park and municipal authorities are exploring whether - and if so, how - circular goals can be achieved and how entrepreneurs can become involved. Companies are on the lookout for storage and transhipment space on the site.

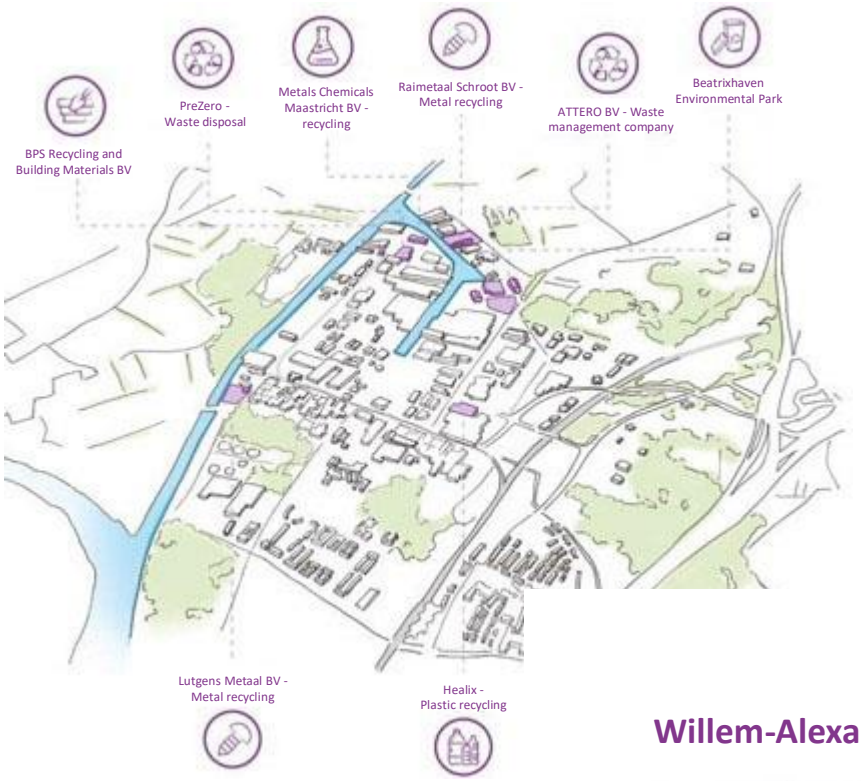
The following opportunities have been mentioned for these sites: due to their sand, gravel, and concrete businesses, these business parks along the Meuse are important for the construction sector; they are located in a cross-border business ecosystem; and are situated very strategically within the national Southeast corridor.

Striking spatial building blocks: Multi waste terminal, Barge terminal, Collective parking facility

'The storage process within the circular economy means having to cater for very different types of materials. We base our calculations on storage cycles of 3 days, 3 weeks, and sometimes 3 months.'

'The presence of quays and mooring facilities, as well as a small facility for container transport, is a real plus in terms of circular logistics.'

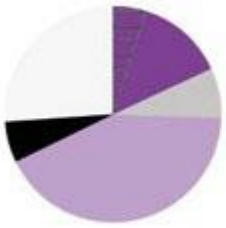
Beatrixhaven



Willem-Alexander

Quickscan

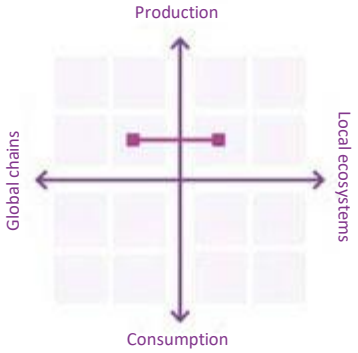
Distribution of companies by main sector



Total: 249

- Industry
- Construction
- Wholesale and retail trade, automotive repair
- Consultancy, research, specialised business services
- Other
- Percentage of circular companies

Site categorisation



Which CE strategy

Lifetime extension
Reduction
High-quality processing

In-depth coverage for those who want to know more

National strategies and spatial building blocks

The shift to a more circular economy is far from always a visible phenomenon on business parks. For example, changes can be effected within company buildings and production processes, or in the way a company is organised or realises it procurement and/or sales. Yet the circular transition also involves a spatial change - as room is required for storage and the processing of return flows, for example. How can business parks make room for the changing economy in time? We have in this guide made this clear using 'spatial building blocks'.

In the context of this guide, a spatial building block is the physical space required for a given circular economic activity or for enabling such activity as a precondition.

We opted to cluster the building blocks according to the NPCE strategies. This is a widely used, four-way division that fits well with national policy. Moreover, practice shows that each strategy introduces its own spatial challenges.

> *"Which of these national strategies to become more circular is a fit for your company/ business park?"*

Within each strategy, spatial building blocks have been defined that, in themselves, can help achieving circular ambitions and maximising spatial quality. In the below, we provide a brief description of each building block, stating the indicative figures used in this study.
Combining building blocks creates coherence and synergy. This allows for examining, for each location and task, which building blocks are needed to arrive at a comprehensive business park plan. How to realise this in practical terms is explained in Chapter 5.
This guide serves as inspiration for this process and does not provide guiding frameworks that circular business parks must comply with.

Chapter 5

It is important to note that the transition to the CE cannot in practice be separated from other changes and space claims. Scarcity of space renders it necessary to look for smart combinations of providing space for the circular economy and for, for example, the energy supply, digitalisation, climate adaptation, or mobility.

The development of the building blocks was fed by the three study areas, tested, and fed back again to the participants during the working meetings in the study areas.

1. **Reducing the use of raw materials**
   Reducing the Dutch raw materials footprint, both from a production and consumption perspective (R1 and R2).

2. **Substitution of raw materials**
   Replacing primary raw materials with secondary raw materials and sustainable high-quality bio-based raw materials as much as possible. Or the use of other available raw materials that are less of a burden on the environment (R1 and R2).

3. **Lifetime extension**
   Maximising the lifespan of products and components, including through reuse, refurbishment, and repair (R3, R4, R5, R6, R7).

4. **High-quality processing**
   Improving clean, well-sorted collection streams and material recovery to recycle materials to an equivalent level as the original material (R8 and R9).

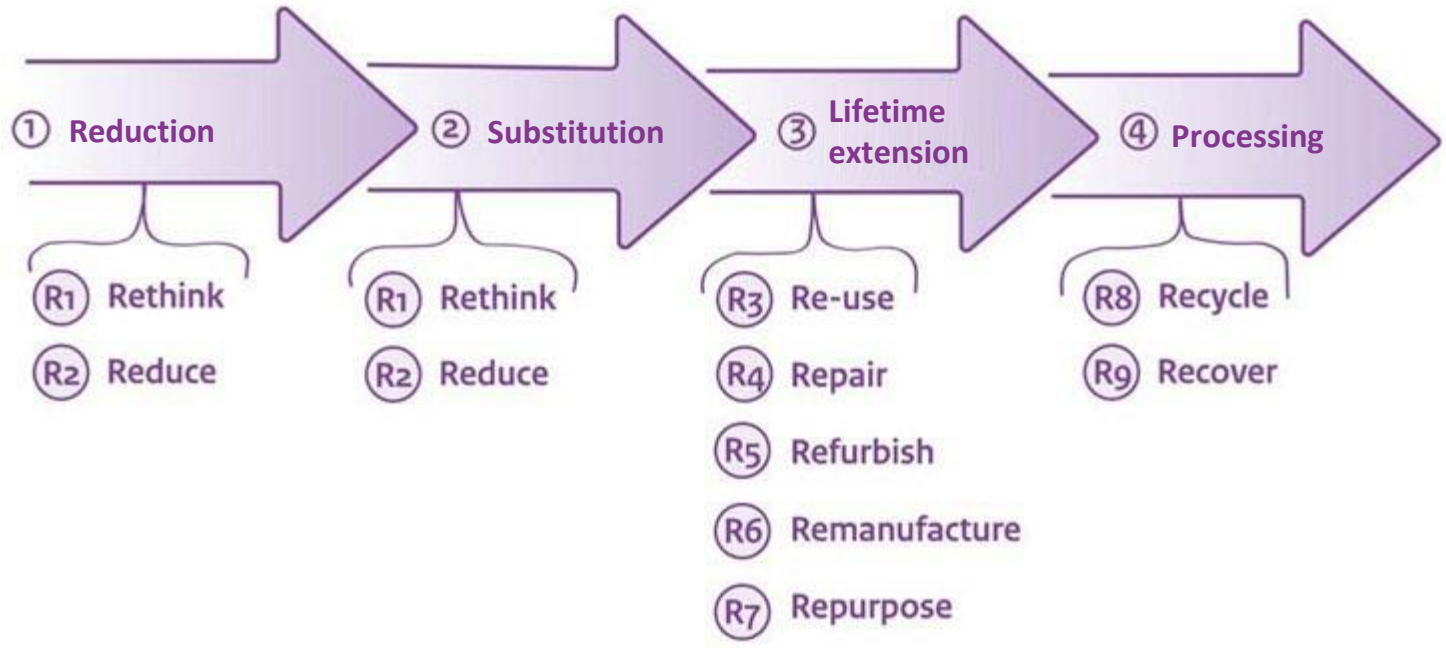


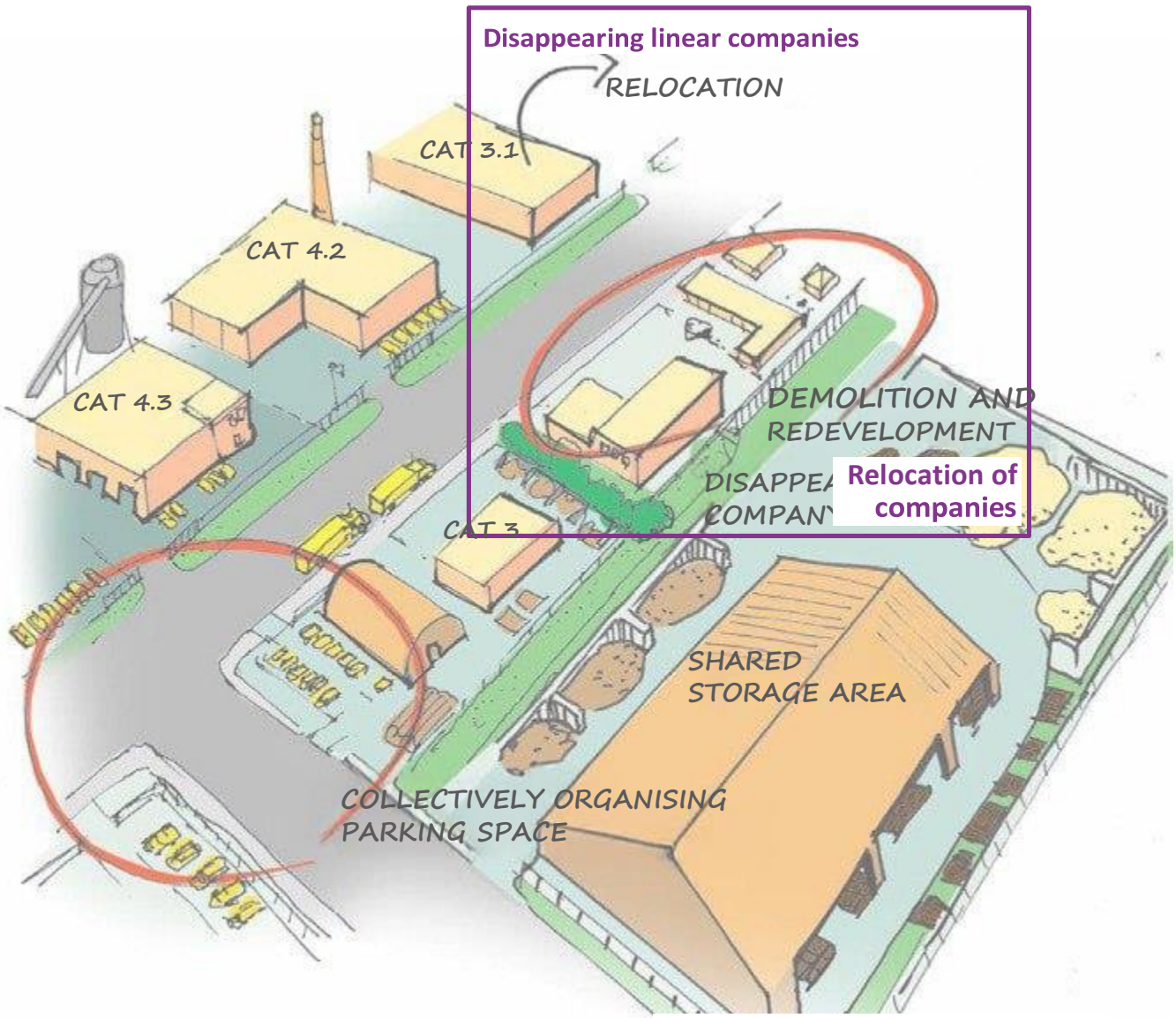
Figure 2: The four circular strategies

Back Chapter 3

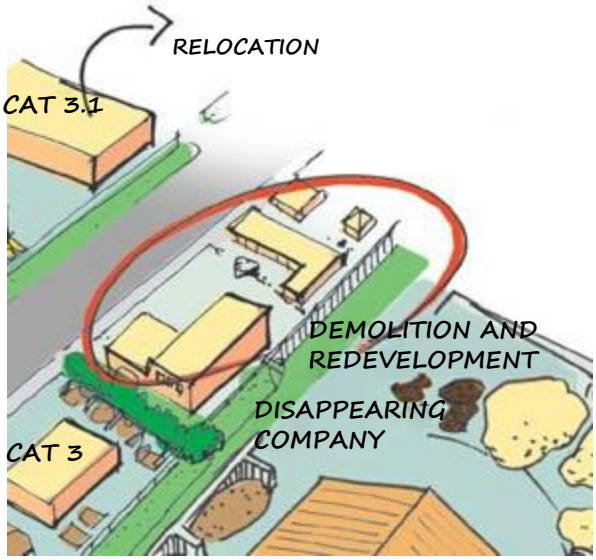
MAKING ROOM for the circular economy on business parks

Both right and in the years to come, there is a shortage of space available for companies, both on existing sites and in new business parks. This means space must be found or created. This can for example be done by making better use of space, such as by sharing or rearranging space. Of course, this depends on what is possible and on what the entrepreneurs themselves want. On top of this, circular activities may (temporarily) require additional space, so as to allow new, more circular activities to be set up while old (linear) activities are still being phased out. We therefore start with building blocks that create space. The below building blocks are not directly linked to the NPCE strategies, but do form part of the spatial preconditions.

The establishment of social functions relating to the circular economy should not result in companies being displaced. Business park space is scarce and economically very valuable. Because space will have to be made available for circularity, realising this primarily requires smart function combinations and, for example, physical stacking, smart use of space over time, and solid IT support, so that storage space can be limited. Ultimately, it may also be necessary to create additional space for companies and business parks, by way of compensation.



Building blocks

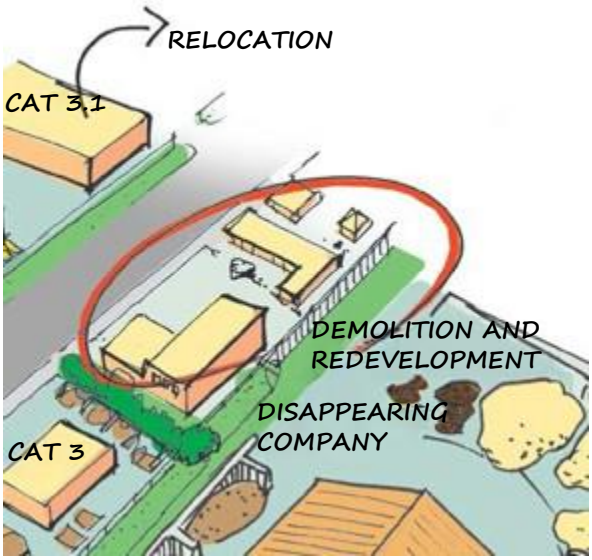


Disappearing linear companies

Certain expected trends will lead to the discontinuation of linear companies.
The premises used by these discontinued companies can be reused or demolished in a circular way to make room for the circular economy. This method of finding space is therefore about identifying companies the business model of which is expected to disappear in a circular economy. This may be the case, for example, when demand for the product or service offered ceases, or when more efficient processes mean that significantly fewer companies are needed for certain activities. Example: the rise of the electric car means that less maintenance is needed, leading to a decrease in demand for local garages; in addition, maintenance is more often concentrated in central locations.

Spatial preconditions:

Proactive planning may be able to support the intended transformation, particularly through zoning changes. However, changes in usage structure often also depend on private ownership, which is difficult to influence.



Relocation of companies

Some companies present on business parks have functions that do not have a (high) environmental category or do not fit well with a circular profile. Relocating these types of companies to an alternative site in or near the city in consultation with entrepreneurs can provide space for circular activities.

Spatial preconditions:

- Site with appropriate environmental space available elsewhere

This building block can only to a limited extent be manipulated. Such interventions often depend on the redevelopment of private property. A company's future plans, the availability of a good alternative location (in or near the city), and the required investments/funding are all prerequisites. In general, relocation takes a long time.

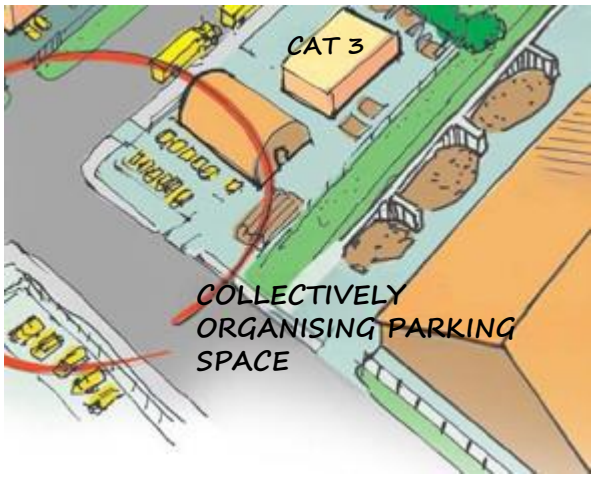
Best practice: A good example of how to achieve relocation is formed by the Spaanse Polder business park in Rotterdam.[3]

3) https://stadszaken.nl/artikel/6660/rotterdam-trekt-miljoenen-uit-voor-verduurzaming-spaanse-polder

MAKING ROOM for Reducing the use of raw materials

This NPCE strategy is mainly about contributing to the reduction of raw materials, materials, energy, and water. This can be done, for example, through savings within a company's own business processes, improved system efficiency, sharing of facilities and goods or, for example, machine rental. When considering business parks, such endeavours could include rainwater reuse (reduces the use of drinking water), insulation and renewable energy (reduces energy consumption), and smarter and more economical logistics functions and innovations (reduces fuel consumption). Spatially, this becomes visible in green-blue structures and water storage buffers, space for solar panels, batteries, or hydrogen supply, smart logistics routing for freight traffic, and the presence of commodity hubs.

Building blocks



Creating space through shared parking facilities

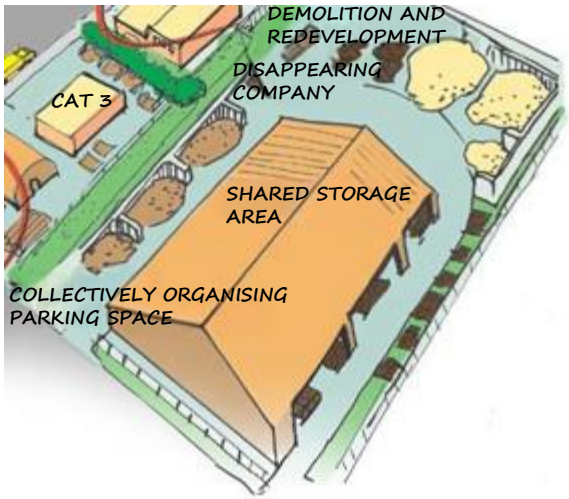
Collectively arranging parking facilities, for example, can free up space on sites and in public spaces for circular functions. The aim is to restructure existing parking facilities and create shared parking spaces to optimise sharing between parties and smartly distribute maximum capacity need. The principle of sharing space can also be applied to truck facilities, energy, etc. However, this is contingent on the entrepreneurs supporting such sharing and on the matter being explored with them from the start.

Spatial preconditions:

- Good pedestrian and bicycle connections (first and last mile)

Best practice: A good example of this can be found in the urban development plan for the Strijkviertel business park in Utrecht.[4]

4) https://stadszaken.nl/artikel/5715/strijkviertel-utrecht-vliegwiel-voor-transitie-naar-circulaire-stad



Creating space through shared materials storage

Collective storage spaces can be arranged more efficiently. Existing storage space can be optimised by identifying the needs of the various parties and by having one party's redundant space be made available for other parties. In addition, new storage space can be created, which in turn frees up space on the lots of multiple parties for other activities.

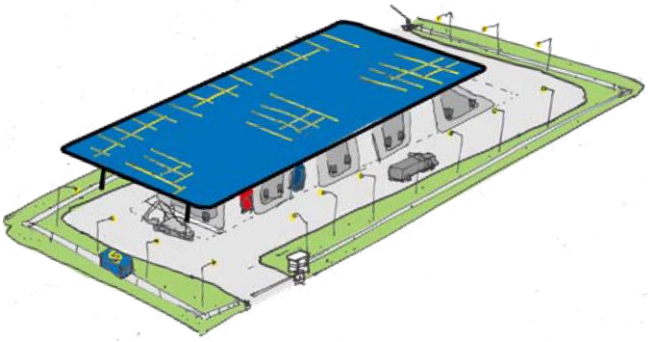
Spatial preconditions:

- Easily accessible to freight traffic and, if possible, by waterway and rail
- Availability of indoor and outdoor storage
- Site security possible / fencing

Such facilities do not really exist in the Netherlands so far. There is therefore a need to explore opportunities and conditions in pilot projects.

Best practice: A good example of this, organised on a regional scale, is WaterWood in Utrecht.[5] Abroad: ShipIt in Brussels.

5) http://www.waterwood.nl/



Source: Volvo trucks

Sustainable shared charging site for trucks

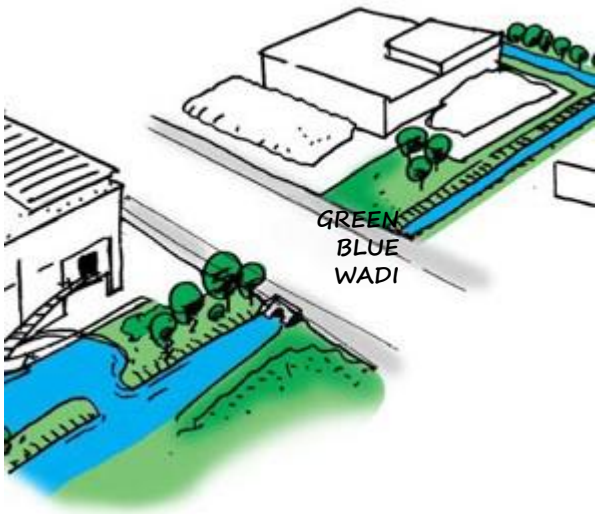
A site for charging electric trucks. There are currently some 800 electric trucks on the Dutch roads. By 2030, with the advent of zero-emission zones, there should be at least 16,000. Charging sites should connect to the existing infrastructure. Ideally, they should be organised around central hotspots (multiple projects, longer timeframes). To get the occupancy rate up, it is advisable to make the sites public. Preconditions: additional energy capacity is needed on the sites. Legally, however, this will eventually be necessary in connection with the introduction zero-emission zones.

Spatial preconditions:

- Near local generation
- Secure and socially safe

Best practice: The Directorate-General for Public Works and Water Management is working on a 'Heavy Duty Charging Sites Living Lab' at six locations.[6]

6)
https://www.rijkswaterstaat.nl/leefomgeving/duurzame-projecten/living-lab-heavy-duty-laadpleinen



Green-blue space

Water is an important means of production. Material processing companies such as concrete recycling plants use a lot of water, including for washing and rinsing, or for dust avoidance by spraying. Improving the capture of (rain) water on business parks and reusing it where possible will help reduce drinking water consumption. Water collection can be easily combined with greenery on business parks. While greenery is not directly needed for the circular economy, it is important for improving the climate resilience of business parks. This building block is all about the principle of "green before grey". There should be less paving and more greenery to retain water, for example by constructing a wadi, equipped with a water treatment facility by way of a helophyte filter or soil passage.

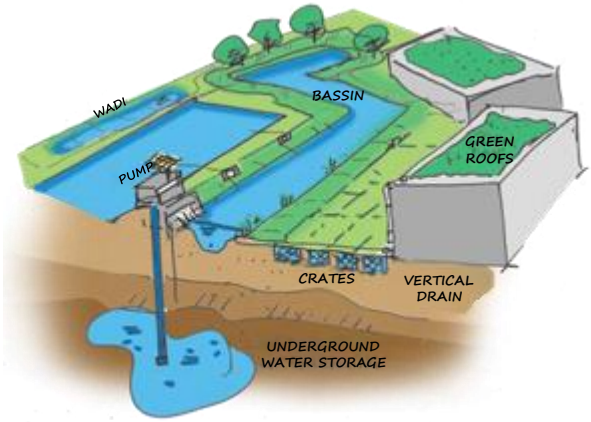
Spatial preconditions:

- Sufficient size and scale (no little patches of greenery)
- Connected to other green structures
- Native plants

The use of public space is often possible. However, this can also be in conflict with endeavours to intensify the use of sites.

Best practice: Greenport Venlo, a climate-adaptive and nature-inclusive working landscape.[7]

7)
https://klimaatadaptatienederland.nl/@296072/greenport-venlo-biedt-klimaatadaptief-biodivers/



Source: Distripark Dordrecht

Water storage/treatment

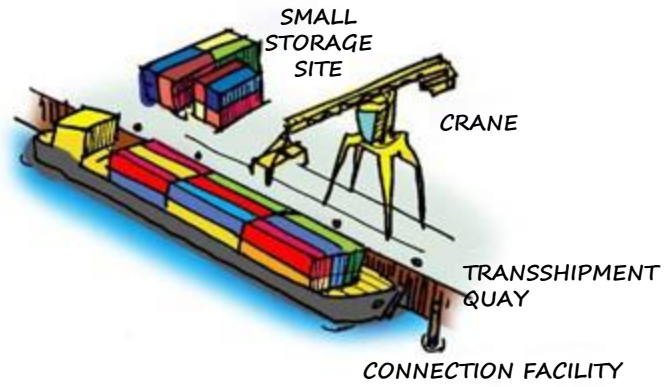
One example is that of a small water treatment plant recovering raw materials from water and allowing for the water to be reused. Process water is a scarce resource and we want to reduce the use of drinking water. There are three types for industrial use for water: raw water (unpurified), process water (slightly purified, for example used as cooling water), and demineralised water (demineralised, for example used for steam production and high-performance cooling processes). Depending on the type of water, it can be stored in underground and above-ground tanks, or even in wadis and in the soil.

Spatial preconditions:

- Only for process water (grey water)
- Storage underground within the soil: aquifer available

Best practice: A good example is innofase.[8] It features a water treatment plant that recovers raw materials.

8) https://www.innofase.com/nl/bedrijf/waterschap-rijn-en-ijssel/

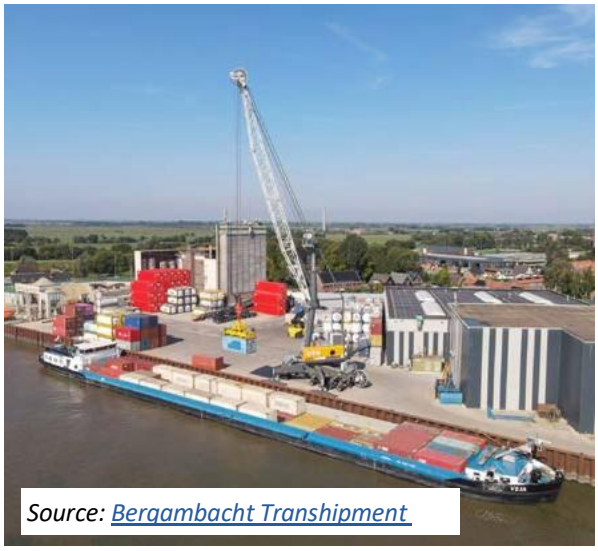


Barge terminal

This is a logistics facility for the transhipment of containers and bulk goods to small vessels (inland waterways). Such a quay adds flexibility to the business park by providing an additional mode of transport.

Spatial preconditions:

- Quay and crane and storage area (in total about 0.5 to 2 hectares)
- Sufficient draught for class five b vessels and facilities for boaters, including shore power, quayside facilities, and mooring posts

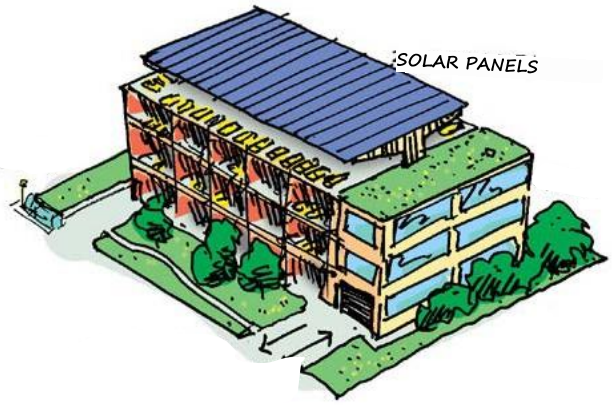


Source: Bergambacht Transhipment

Should the use of trucks also be required (e.g., in connection with a demolition project), inland shipping becomes too expensive.

Best practice: Alpherium is a sound current example of a park making the shift to barge transport, though it is not a specifically circular one.[9] The Bergambacht Transhipment Terminal provides a picture of a smaller barge terminal.

9) https://www.verkeerskunde.nl/artikel/containerterminal-alpherium-vermindert-wegverkeer



Renewable energy generation location/systems

Examples include solar panel roofs or wind turbines. Business parks being linked up to the electricity grid is no longer a foregone conclusion. Planning which parties are able to get power when and where is a complex matter and there is a great deal of competition with other functions within the limited space. Money, skilled personnel, and space are scarce. The huge construction task, considered jointly with issues like accessibility, green space, climate adaptation, environmental quality and, more recently, energy transition and congestion all touch on each other.

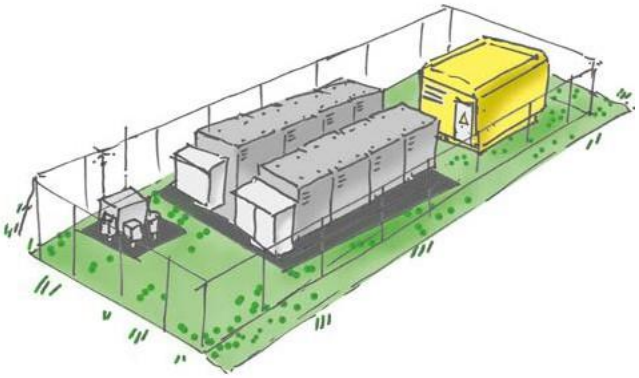
However, often, more is possible than one would think: energy hubs, cable pooling (sharing the cable of a major consumer) and also, within the legal frameworks, batteries with green generators, are all valid options.
Examples include https://ecofactorij.nl/, the energy hub at JC Arena, and Schiphol SADC https://www.sadc.nl. Use the neighbourhood analysis tool and power grid check to obtain more local energy information.

Spatial preconditions:

- Fencing
- Cable and connection to medium voltage
- Sound spatial integration possible

Roofs are suitable for solar, including by way of light PV panels. Solar panels facing east and/or west will link up better to the morning and evening peaks. Wind turbines fitting into the regional energy strategy, Geothermal in cooperation with EBN, digesters in cooperation with the environmental services, and wastewater treatment plants in cooperation with the water boards.

Best practice: The Joulz Energy Hub at Schiphol Trade Park.[10]



Renewable energy storage

Battery placed next to the transformer, to act as a buffer and distribution system. By storing the energy in a buffer, boiler, or storage, heat, cold, and electricity can be stored within the business premises or business park. Peak shaving and peak shifting, to change the time of the morning and evening peaks. Or sharing energy locally.

Spatial preconditions:

- Safety zone
- Accessible by car

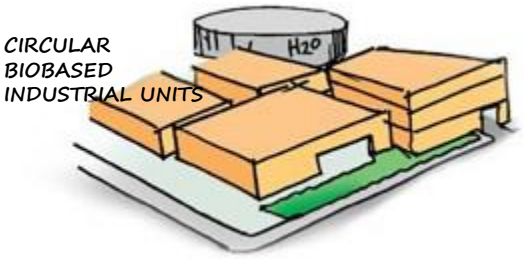
The placement depends on whether the solution is installed within the business premises or on public land (in compliance with the zoning plan and energy regulations). The fire safety of batteries forms a major risk. Most initiatives are currently in the planning stage. One example is the support provided by the province of Noord-Brabant to energy hubs on business parks.[11]

11) https://www.brabant.nl/actueel/nieuws/brabant-investeert-5-miljoen-energyhubs-bedrijventerreinen/

GIVING ROOM to the Substitution of raw

By substitution of raw materials, the NPCE refers to replacing finite resources, energy, and water with replaceable alternatives. Companies could, for example, change their procurement methods, or use more reusable or bio-based products. Spatially, this is visible in business parks through the use of circular materials in public spaces and commercial buildings, in pilot sites of innovative circular companies and initiatives, and by way of the presence of, for example, sustainable fibre and wood processing, food cultivation, or biochemistry industries.

Building blocks



Biobased factory

A biobased factory is one that uses natural materials and, for example, harvested fibre crops, plant residues, wood, or agricultural waste, and makes new products out of them. Instead of using petroleum or other fossil raw materials, the plant converts biological (residual) flows into, for example, building materials, bioplastics, paint, or fuels.

Spatial preconditions:

- High environmental category
- Water and energy infrastructure
- Storage space
- Safety

Example: Peel Pioneers in Den Bosch

Best practice: Fibre hemp factory for insulation materials in Drachten.[12]

12) https://greeninclusive.nl/nieuws/start-realisatie-vezelhennepfabriek-in-drachten/

Vertical farm

The circular economy also has implications for agriculture. While politically, this falls outside the scope of the National Circular Economy Programme, industrial forms of circular agriculture are conceivable on business parks. This is why we include building block, as a link in an efficient and sustainable food system. A vertical farm is a stacked cultivation system in which crops are grown indoors, in multiple layers on top of each other. This often takes place in a controlled environment and features the use of technologies such as LED lighting, climate control, and hydroponics or aquaponics.

Spatial preconditions:

- Water (reuse) and energy
- Stacking and combining functions

Best practice: Vertical farm growing and selling herbs, lettuce, and microgreens.[13]

13) https://www.growy.nl/

Circular area design

Circular area design is a strategy for the sustainable design, development, and management of public spaces, infrastructure, and real estate on a business park, implemented to enable the shift to the circular transition. Replacing linear products and raw materials with recycled materials and, for example, wood and fibre products plays a major role in this context. A close relationship exists with storage facilities where materials are collected and used or reused for other projects.

Spatial preconditions:

- Repurposing instead of demolishing
- Applying reusable and reused materials
- Modular and detachable construction
- Energy and water-saving
- Green and nature-inclusive

Low investment, often linked to municipal budgets or commitments from local private parties.

Possibly implemented by way of local initiatives for small, occasional projects such as benches or signage; municipal or regional circular building initiatives.

Best practice: A good example in practice is included in the phase 2 plan for the Amsterdam Osdorp Business Park.[14]

14) https://www.vastgoedmarkt.nl/198537/business-park-amsterdam-osdorp-fase-2-nieuwe-standaard-op-het-gebied-van-circulariteit

Circular innovation area

Testing ground for starting circular companies affiliated with polytechnics and universities. Substitution in particular is a strategy requiring innovations.

Spatial preconditions:

- Knowledge and educational institutions present
- Space for tests and trials
- Components with high environmental category
- Laboratories and experimental space
- Public space focused on meetings

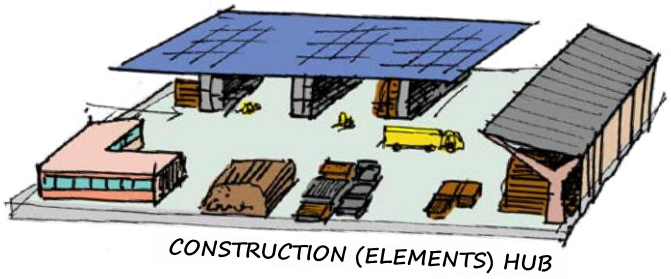
Best practice: One example is PlanOne in Delft, a pilot plant company specialising in sustainable production processes.[15]

15) https://www.biotechcampusdelft.com/nl/organisaties/pod/

GIVING ROOM to Lifetime extension

In the context of the NPCE, lifetime extension relates to designing, maintaining, and repairing products in such a way that they last longer and are reusable. On business parks, this for instance means that storage is available for returned products and that craft facilities are present: from workshops with office spaces and factory halls (possibly with robots), to re-manufacturing and manufacturing services. These are functions that are often located close to the city. Spatially, they therefore require good accessibility and a pleasant working environment for employees and visitors.

Building blocks



CONSTRUCTION (ELEMENTS) HUB

Circular hub

A circular hub is a central location where reusable materials, and especially components, are collected, stored, sorted, and made available for reuse, for example in construction and renovation projects (example: Waterwood, see https://waterwood.nl/). They can also be temporary hubs, for instance as part of ongoing construction or demolition projects.

Spatial preconditions:

- Central location
- Flexible and open space, can be temporary
- Multimodal access (heavy traffic)
- Availability of indoor and outdoor storage
- Stacking if possible
- Site security possible / fencing
- View (orderly, uncluttered)

Construction companies in the Netherlands are already working with such hubs in numerous locations.

Best practice: A good example is the Dura Vermeer Urban Miner in the Rotterdam region.[16]

16) https://www.duravermeer.nl/dura-vermeer-urban-miner

Circular Craft Centre

This is a facility, set up as a single centre or in separate locations, where crafts and circular principles are joined to repair, reuse, and transform materials and products. It is therefore a combination of processing functions (collection, storage, processing), with a focus on craft activities, i.e., on manual and experimental processing rather than on standardised and automated processes (as in a recycling plant). It focuses on extending the life of products by way of repairs, refurbishment, and upcycling, such with the aim of reducing waste and reducing ecological impact. Circular craft centres meet five criteria (https://circulairambachtscentrum.nl/): they must be connected to a recycling centre, have a thrift shop, have a workplace for reparations, possess an educational function, and have a social function.

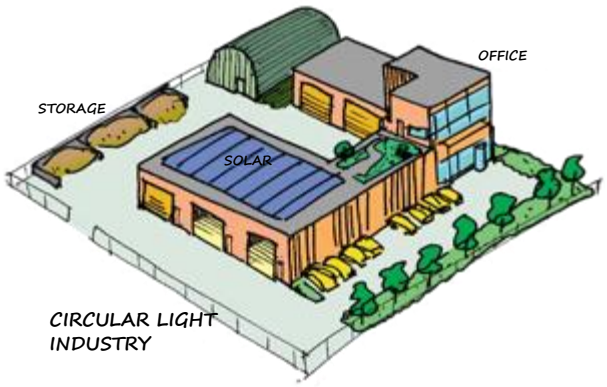
Spatial preconditions:

- Accessible on foot, by bicycle, and by public transport
- In/near urban area
- Space for repairs, thrift shop, education, storage, and sorting
- Meeting space

Limited space requirement (can also be located in small buildings, no advanced infrastructure required) - small-scale collection facility for separated waste streams with a size of up to about 0.5 hectares.

Best practice: One example is Upcycle Centre Almere.[17]

17) *https://www.stadennatuur.nl/projecten/upcyclecentrum.html*



Circular light industry

Companies active in the circular light industry focus on producing goods using circular principles. This means that companies in this sector use raw materials efficiently, minimise waste, make products detachable, and dismantleable for reuse, and that they apply sustainable production methods. Light industry refers to the clustering of manufacturing companies in efficient spatial accommodation.

Spatial preconditions:

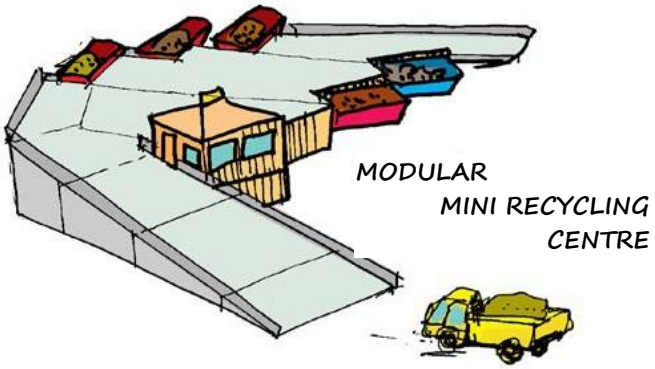
- Accessible by car, slow traffic, and public transport
- Room for industrial units, limited storage
- Stacking and combining functions to the extent possible
- Energy and process water

Best practice: One example is Heskon in Tilburg. This company repairs batteries.[18]

18) https://www.heskon.nl/

GIVING ROOM to High-quality processing

This involves processing materials to create high-quality raw materials and materials. High-value processing focuses on sorting materials as well as possible, ensuring that good products are not unnecessarily recycled at a low value - let alone that they are incinerated. Material and product flows are important, as is linking supply and demand (the marketplace function). Spatially, this becomes visible on business parks by the establishment of more storage space for (secondary) materials and the collection of residual flows, large-scale storage and transhipment facilities like quays and cranes, the presence of companies performing processing functions like sorting, washing, modifying (mechanically, automated, or using robots), good accessibility for ships and freight transport, the presence of water collection systems, and dust and noise protection constructions to reduce nuisance.



Mini recycling centre

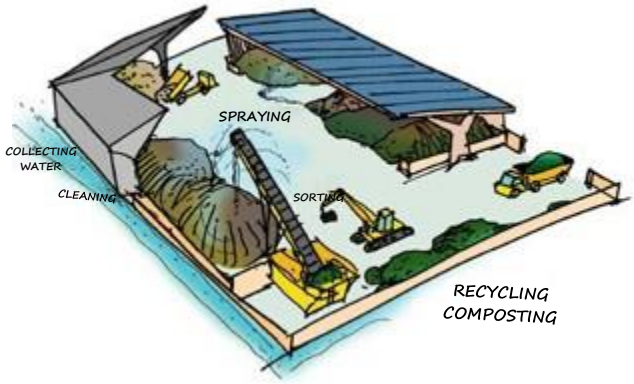
Facility for waste sorting. In general, this is used for small quantities and/or irregular types of waste the processing of which users do not have regular processes in place for. This allows a business park to process its own collective waste. "Mini" indicates that these centres may be small units intended solely for the local collection of waste from established companies. Many companies have entered into a specific agreement for having its waste collected. An alternative is entering into a collective contract for an efficient waste service.

Spatial preconditions:

- Entrance building/barrier
- Warehouse/container site
- Containers for waste separation present at business premises
- Logistical space of supply, dumping, and disposal

Best practice: A good example is formed by Modulo's circular, modular, prefabricated recycling centres.[19]

19) https://modulo-milieustraten.nl/modulo-discipline-x/



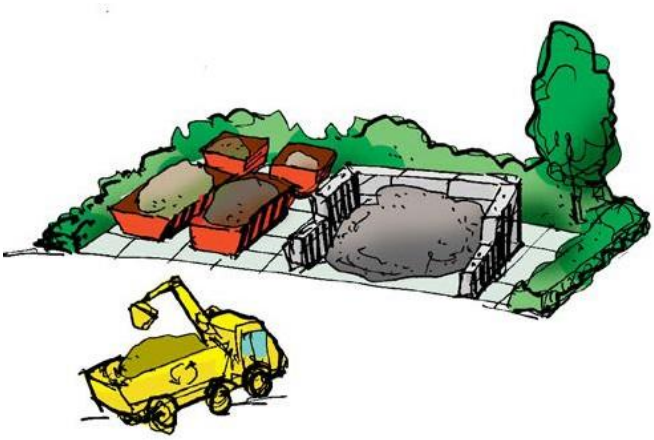
Recycling plant

A recycling plant is an industrial facility where collected waste is sorted, treated, and processed into reusable raw materials or new products. This is closely linked to manufacturing activities. It processes waste streams (e.g. metals and plastics) and turning them into reusable material.

Spatial preconditions:

- Plenty of space for indoor and outdoor storage and processing (large quantities)
- High environmental category (dust, odour, and noise)
- Screens/fencing, mitigation measures against nuisance
- Water collection, purification, and storage
- Multimodal

Best practice: Examples of plastics recyclers are Obbotec (Rotterdam), Uppact (Delfzijl), and Pryme (Rotterdam); metal recyclers include Purified Metal Company (Delfzijl/Farmsum) and Jansen Recycling Group (Dordrecht); and an example of concrete recycling is formed by Urban mine (Zaandam) (see photo).



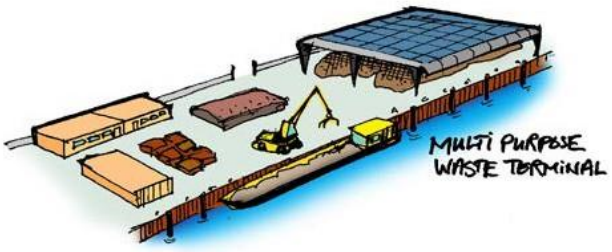
Raw materials hub

Central, logistics storage location for (construction) materials. A link to a digital marketplace is advisable; the physical location will in that case only be used for materials that are released in one project but cannot immediately be used in another project. Reusable materials and waste streams from the region are collected, sorted, temporarily stored and/or modified for further processing, recycling or reuse at the hub. This involves large flows of materials. The raw materials hub building block focuses on a wider range of raw materials than the circular hub building block, which focuses on a specific product in the chain (e.g., wood construction elements) and on components and return products.

Spatial preconditions:

- Central location
- Plenty of space for indoor and outdoor storage and processing (large quantities)
- Fencing (security)
- Multimodal and with access to water
- High environmental category (dust and noise)
- Mitigation measures against nuisance

Temporary storage sites are also an option (e.g., demolition projects, on-site storage).



Multi purpose waste terminal (residual streams)

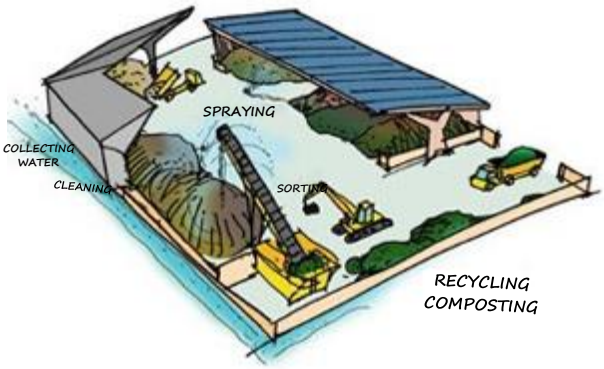
A multi purpose waste terminal is a comprehensive waste processing facility where various types of waste - including household residual waste, bulky waste, construction and demolition waste, industrial waste, and recyclable materials - are collected, temporarily stored, sorted and/or prepared for further processing or transport at a single location. It is similar to a resource hub, but operates on a larger scale, deals with a wide variety of types of waste and residual streams, and always has access to waterways. This makes it a multimodal facility for storing and transporting larger flows of, for example, metals and plastics. A multi purpose waste terminal thereby provides a link between a business park and the surrounding region.

Spatial preconditions:

- Plenty of space for indoor and outdoor storage and processing (large quantities)
- Fencing (security)
- Mitigation measures against nuisance
- Multimodal and with access to water
- High environmental category (dust and noise)

Size: 2.5 hectares for processing various residual flows with loading and unloading facilities.

Example: Amsterdam City Dock



Composting plant

A composting plant is a specialised processing facility where organic waste, such as vegetable, fruit and garden (VFG) waste, is biodegraded and converted into compost in a controlled manner. Composting plants exist at different levels: some only serve a collection and composting functions, others also offer fermentation and, thus, the processing of waste into, e.g., biogas for CHP. Higher-quality processing of biomaterials can also be offered via the Recycling plant building block.

Spatial preconditions:

- Plenty of space for indoor and outdoor storage and processing (large quantities)
- High environmental category (odour and noise)
- Screens/fencing, mitigation measures against nuisance
- Multimodal

Size: about 2.0 hectares for the processing of green waste streams and organic waste.

4 Changing business parks: example scenarios

This chapter looks at how business parks can change. We will use the spatial building blocks introduced in Chapter 3 for this purpose. There are multiple paths leading to a circular future. The development path depends on the size, location, wishes of, and opportunities available at the business park and the infrastructures already in place. The transition to more circular business parks will provide long-term value to both entrepreneurs and society. Three example scenarios show how this holds for different types of business parks. This chapter begins with lessons learned by park managers, entrepreneurs, and municipal authorities.

Lessons from practice

About 50 entrepreneurs, owners, park managers, authorities, and relevant organisations were interviewed for this guide. When asked what should be considered when making space for the circular economy in business parks, they presented the following general items to be addressed.

- Jointly create a (spatial) vision and arrange for the following matters in it: money, cooperation, volume, time, space.
- Focus. Start with 1 or 2 building blocks, not with 10 at a time. Let the first project be a stepping stone to further ones.
- Get to work on pilot projects: organise circular value chains at the regional level and provide space for them, offering sites of 0.5 or 1 hectare for innovative tests.
- The transition will only succeed if framework conditions are in place and the business case is solid; make sure it pays off.
- The intrinsic motivation held by entrepreneurs is found to be of great importance. Don't impose but facilitate (Limburg, Utrecht).
- Many entrepreneurs currently feel no sense of urgency to make the circular transition. The government should actively focus on making space available (quantitatively and qualitatively) (Environmental Strategy): drive the transition and share knowledge. Share best practices.
- Create appropriate tools/regulations for operating a business in the circular economy. These are currently too strongly based on the linear economy. Circular commerce works differently and requires greater flexibility.
- Urban and regional business parks should complement each other instead of compete. For example, multiple business parks could jointly explore additional space can be organised or jointly develop a shared storage site.
- Exploit rail and waterway opportunities and ensure that locations are easily accessible (this is also relevant in terms of capacity). If you have it, use it.
- The energy situation is leading for actually achieving success = preconditions. For example, organise energy hubs, set up a joint energy cooperative for each site.

Conclusion from the working meetings

- Before the circular economy can be scaled up and thrive economically, all preconditions - both spatial and non-spatial - must be in place. In spatial, these concern the availability of storage space and good connections (road, water, rail) and sufficient HMC space.

Cry from the heart

What matters according to entrepreneurs, park managers and the municipal authorities:

- "Speak the language of the entrepreneurs: they are the ones who have to start practising it."

In-depth coverage for those who want to know more

The circular economy and broad value development on business parks

What if the spatial development towards 'greater circularity' were to be driven from a value perspective? In this guide, we have adopted a regional economic perspective on circularity. That is, viable local/regional opportunities for joint ventures and the creation of synergies within regional value chains are key, not the total size of the circular challenge in terms of raw material units. Nor should we as yet be talking about "100%" circular companies. The primary current task is to identify local spatial opportunities for a more circular economic 'ecosystem'.

A broad approach to welfare

A (more) circular economy contributes to tackling several societal challenges: combating climate change, biodiversity loss, and environmental pollution, while at the same time improving the (long-term) security of supplies and competitiveness (see inter alia the PBL and the European Commission).

As such, the circular economy fits perfectly within the broad welfare concept, that is, considers welfare from a broad perspective. This concept takes consideration of the economy, the planet, and mankind, but also considers the distribution of benefits and burdens among different groups of people - now and in the future, over here and elsewhere. The Sustainable Development Goals also refer to 'responsible consumption and production' (SDG 12). For this reason, the building blocks in this guide have been assessed globally and on the basis of the personal practice-inspired estimation of the research consortium for this guide, such in accordance with their impact on **subjective well-being, health, consumption, education and training, economic capital, natural capital, and social capital**. This provides an overview of the potential for broad value development. The annexed table summarises the different aspects for each building block.

Increasing competitiveness

In a circular economy, it is very important not to equate assumed value with a (financial) business case, the land value, or the 'added value' of companies and business activities. For these metrics take no or limited account of other important values that might be degraded or improved (e.g., environmental pollution, climate change, working conditions, etc.).

At present, such other 'added values' can often not - or only to a limited extent - be cashed in by companies (higher product prices or increased product sales). As a result, under the current system, being circular often even leads to a competitive disadvantage in the market (higher cost prices). However, once governments and companies will, over the years to come, increasingly start basing their commercial activities on a clear long-term framework, vision, and mission with respect to the circular economy, circular companies will actually start experiencing competitive advantages, as they offer products that better meet the need for responsible (circular) consumption, allowing circular companies to strengthen their future competitiveness. However, more circular business operations are not technically or legally feasible or profitable for all companies given the current market. The 'The future of European competitiveness' report (Draghi) recognises the current stubborn reality in which we are moving towards a sustainable (carbon-free and circular) economy, but which makes it very difficult for economies and companies to actually make this switch. The

report points to structural barriers, such as high transition investments, regulations hindering circular innovations, and market dynamics that are still primarily focused on a linear model. This was recently confirmed in the 2025 Comprehensive Circular Economy Report. So it is also important to recognise the current reality. This guide therefore also focuses on the preconditions and the restrictions companies are faced with.

The spatial building blocks identified for this guide are divided into three bundled CE strategies, complemented by a section on creating space for a circular economy. This relates to spatial interventions to be taken at the level of a business process, a building, a plot, or even an entire area. The realisation of the building blocks requires investment from companies, property or plot owners, or governments and a timeframe within which such realisation is feasible.

The annexed table summarises the different aspects for each building block.

Annexes

Three example scenarios

In most cases, business parks will not exclusively follow one national strategy. Instead, they will primarily base their endeavours on the existing situation and the local challenges and opportunities that arise. In most cases, this involves the redevelopment of existing work sites. The starting situation is of core import in this context, with path dependence featuring prominently. Making room for the circular transition is therefore always a customised process.

Business parks will develop incrementally. The location of the park in relation to the city, it having access to waterways or not, its size, and whether HMC environmental space is available, all matter in this context. Of course, there are also many other factors that determine the circular development of a park, such as its location near infrastructure, the companies or specialisations present, and numerous economic value-case considerations about where logistics, operations, and processing can best take place relative to supply and demand.

This guide also builds on the 'Circular Economy Qualitative Inventory' study conducted by Erasmus UPT and Rienstra Policy Research (Merten Nefs and Gerlof Rienstra, December 2024, see List of sources). The study provided a more detailed overview of what companies themselves consider to be necessary for the circular transition. The (limited) selection of companies in this study sometimes results in surprisingly different emphases. These include the ideal location being much more traditional (central, easily accessible by public transport) than expected, there being less appreciation for multimodality and more appreciation for a healthy working environment on the business park. Moreover, the availability of sufficient qualified staff is an essential prerequisite.

List of sources

The circular economy in the Netherlands is also a knowledge economy. Soft values like the liveability and accessibility of sites are not necessarily circular, but are considered very important to entrepreneurs.

In this chapter, we show how the building blocks from this guide can be combined and applied. We do so by presenting three possible scenarios as part of the design study. These are hypothetical exercises to gain a picture of how business parks could transform into (more) circular business parks. For inspirational purposes, the spatial building blocks are combined in phases and applied to three different common types of business parks:

A. Small-scale mixed-use business park

B. Medium-sized mixed-use, production-oriented business park

C. Large-scale business park for international chains

We have opted to in each case apply a three-stage scenario, focusing:

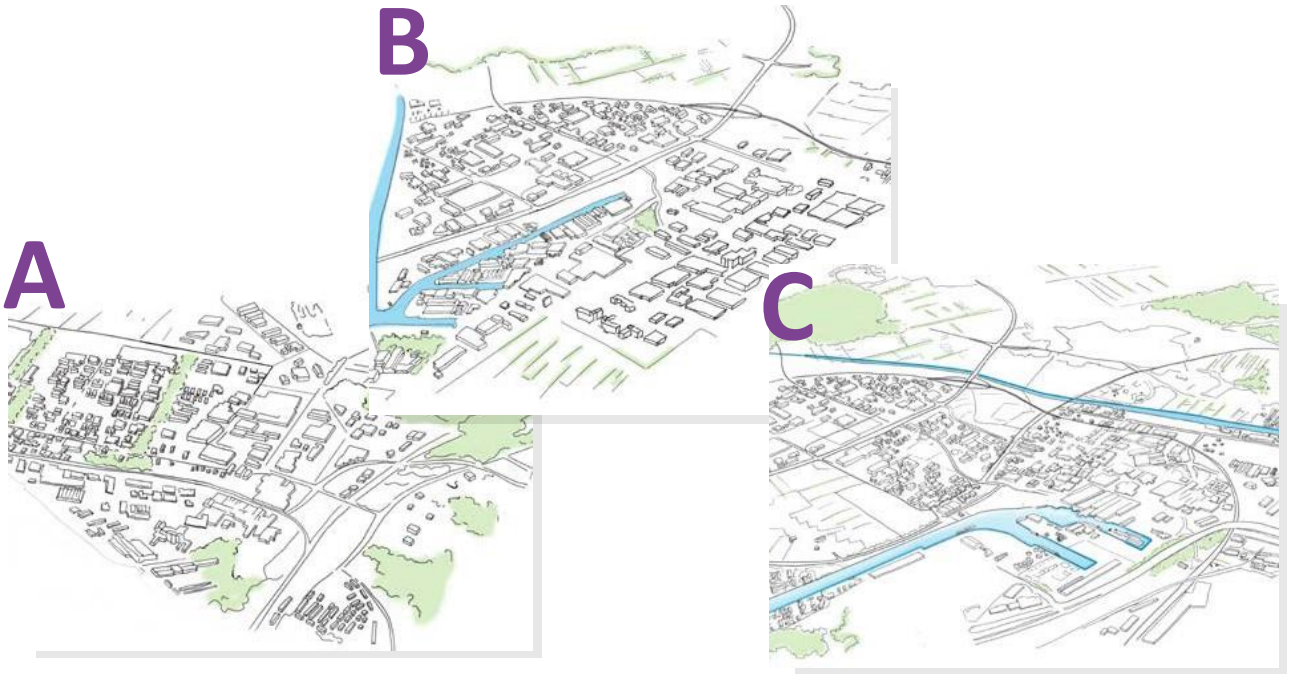
1. first, on the better use of existing space

2. second, on improving infrastructure conditions

3. finally, on specialisation and comprehensive circular area development.

This produces an S curve: start small, accelerate and scale up, and then perpetuate a new equilibrium. The scenarios aim at the total transformation into a circular business park in about 10 years.

> *“What type of business park do you have dealings with? Find out more on how to make more room for circular economy in the below.”*

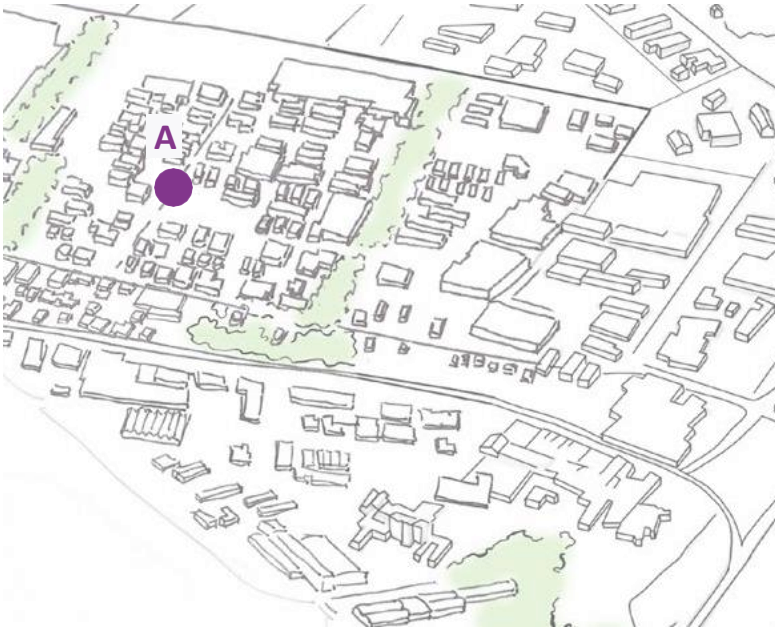


Example scenario A)

Small-scale mixed-use business park (no port) in and near the city

Supposition

This site is a medium-sized SME site (smaller than 50 hectares) in and near the city and has no port. Its environmental category is usually 3.2 or lower. The available functions include a recycling centre, urban distribution, commercial housing, etc. Such a site often also includes many functions that do not necessarily need to be located in a business park but found affordable space, such as gyms, offices, storage boxes, and a climbing hall. Because of its location in or near the urban environment, the site offers opportunities for labour-intensive activity, social initiatives, and a spatial link with the city.

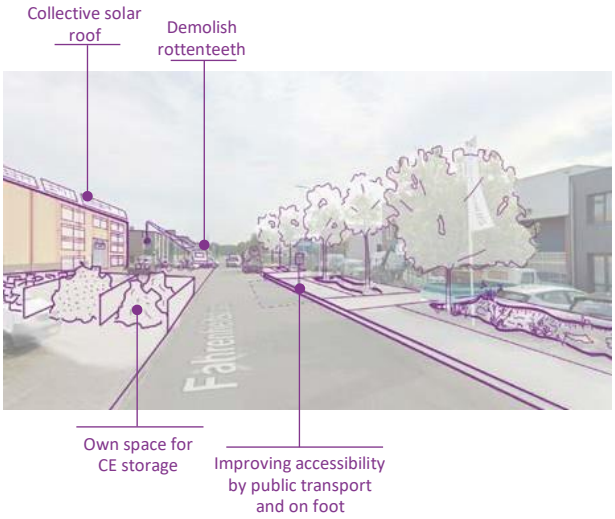


Outline of the fictional context

This site is home to an active group of entrepreneurs working towards sustainability. The municipal authorities are working with the stakeholders to revitalise and make the site more sustainable. Greening, rooftop solar panels, and responding to climate change are key, as are safe cycling and walking routes that connect to the city and a clustering of social initiatives. The municipality considers the site to be of assistance to the city.

What stands out?

> The location near the city is an opportunity for labour-intensive work and social employment
> There are opportunities to develop an urban working area focused on education, urban distribution, a craft centre, direct energy exchange between surrounding residential areas and this business park, which has large roof areas
> Included in the urban agenda for a green-blue city, public transport, and cycling



Stage 1:

seizing opportunities and taking small steps, 'easy pickings'

A number of companies want to process residual and return products and are using part of their own plot for small-scale circular storage (they rearrange their own site)

Modular construction of a mini recycling centre by the business association - operated by a CE service provider: a 'Sustainability Plaza' created by the companies themselves

Establishment of a Circular Craft Centre linked to the existing municipal waste station

The municipality improves accessibility by public transport and on foot

Construction of a transformer/battery grid

Stage 2:

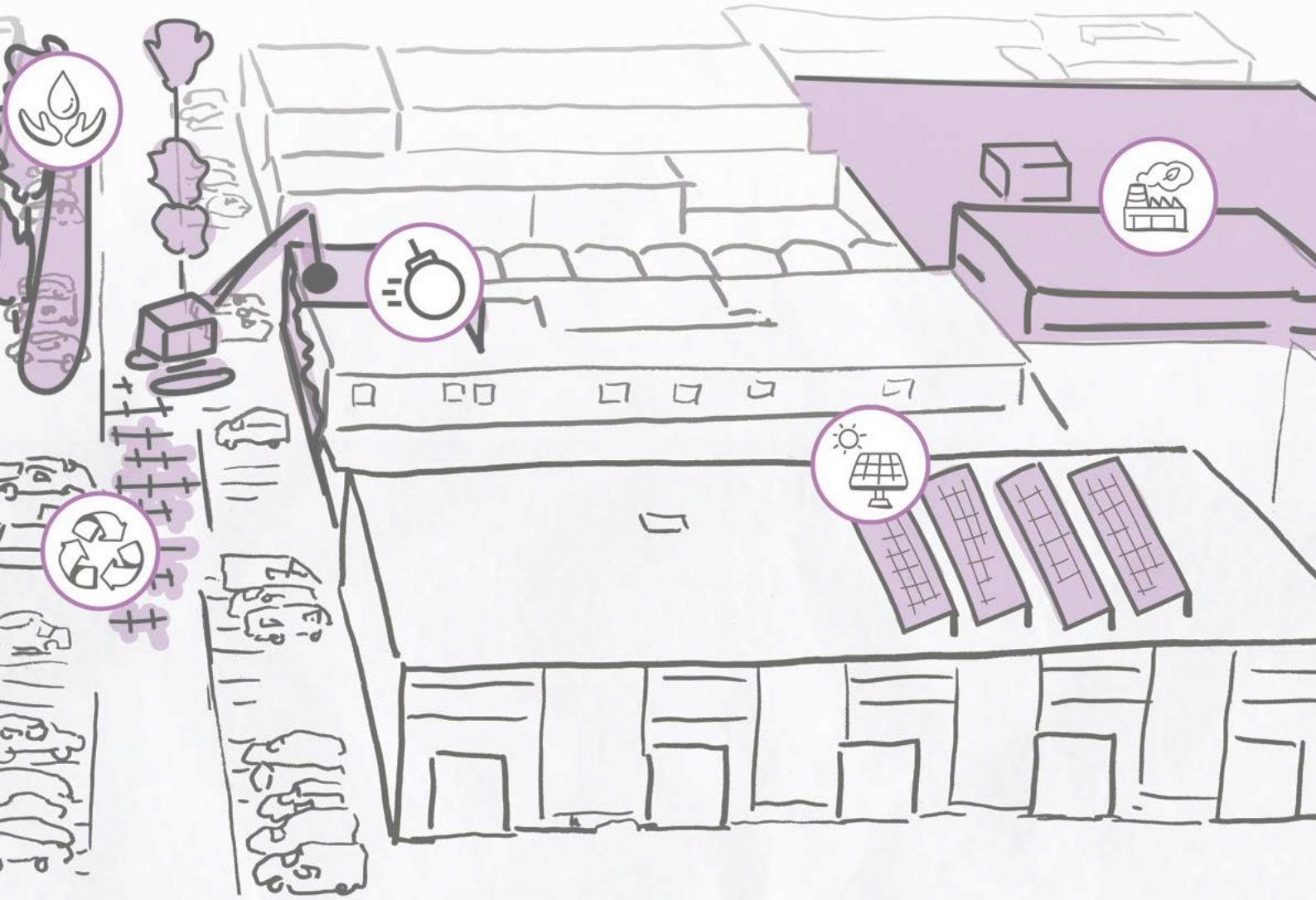
Freeing up space and transforming the public space, this requires preparation time and investment

- Making space by demolishing severely outdated parts and relocating some functions to more suitable locations within the city. The municipality has found space for this
- CE landscaping of the public space (reused and reusable materials, circular design principles)
- Creation of a green-blue wadi structure for water storage and pre-treatment for reuse in circular work processes: 1 water tank

Stage 3:

Use opportunities to restructure and further develop the site with collective functions and space for knowledge and labour-intensive circular manufacturing (light industry). This can only be done once the stage 2 preconditions are in place.

- Construction and opening the light industry section (category 3)
- Collective solar roof




KidZ

Example scenario B)

Mixed-use, medium-sized production-oriented business park with/without access to waterways, near the city

Supposition

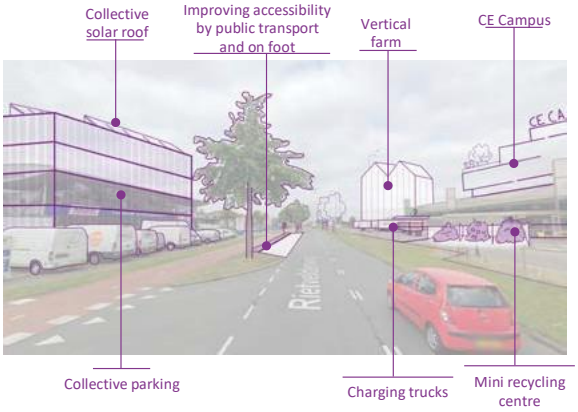
This site is currently a medium-sized SME site (around 100 hectares) near a city and sometimes features an (old) port or a location along a canal. The site has a small section with a higher environmental category (over 4). Businesses to be found here include a concrete plant, a waste incineration plant, public transport charging stations, etc. Part of the site is outdated and category 1 and 2 businesses are present.

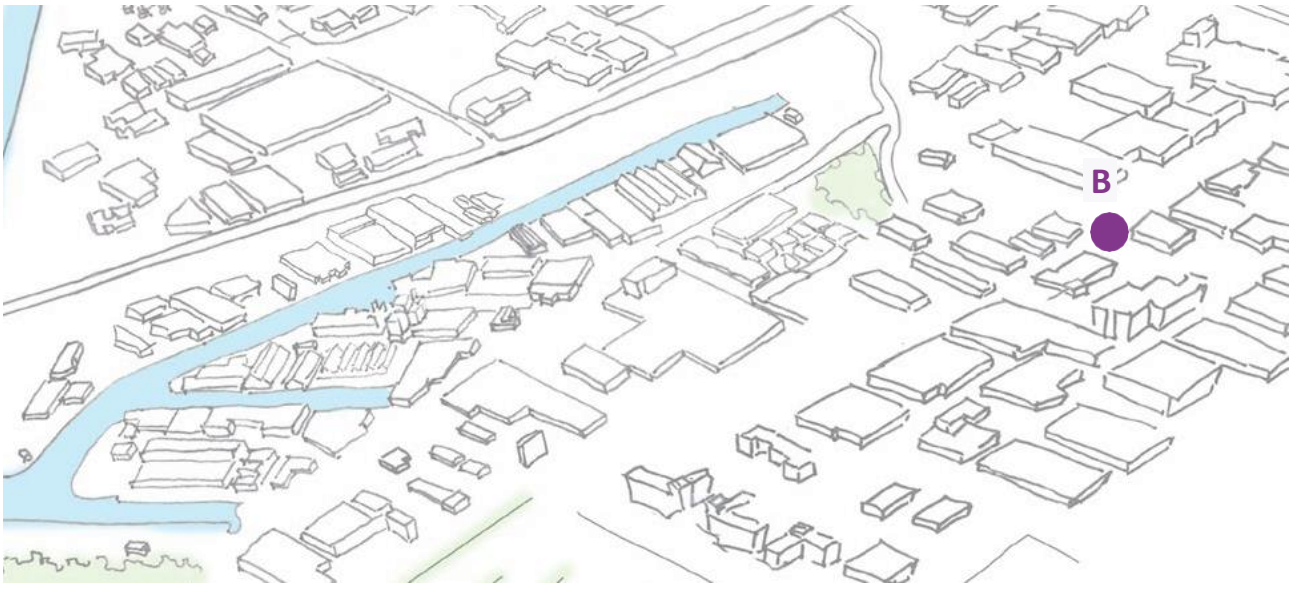
Outline of the fictional context

The parties making use of this business park, which is important for the region, are investigating whether the site can be made more sustainable. A Business Investment Zone (BIZ) has been set up. The entrepreneurs place highest priority in the energy structure. A section close to the city features an old listed industrial building. A collective of entrepreneurs, a secondary vocational education institution, and social organisations have joined up with a developer to come up with a plan for this building: turning it into a campus. Letters have gone out to the animal shelter and fitness centres to consult with the municipal authorities on finding better locations for their businesses. The municipality has found space for this.

What stands out?

- Larger area, includes more companies, which can be more difficult but also means greater clout once they are organised as a BIZ, and park management.
- The multimodal accessibility and infrastructure preconditions are the key challenges. If these can be met, it is possible to develop a broad economy, especially at this type of regionally important business parks.
- Industrial functions demand HMC, which are scarce: this requires a (temporary) shifting-use operation to make optimum use of them. The relocation of companies in consultation with entrepreneurs does require space elsewhere and money.

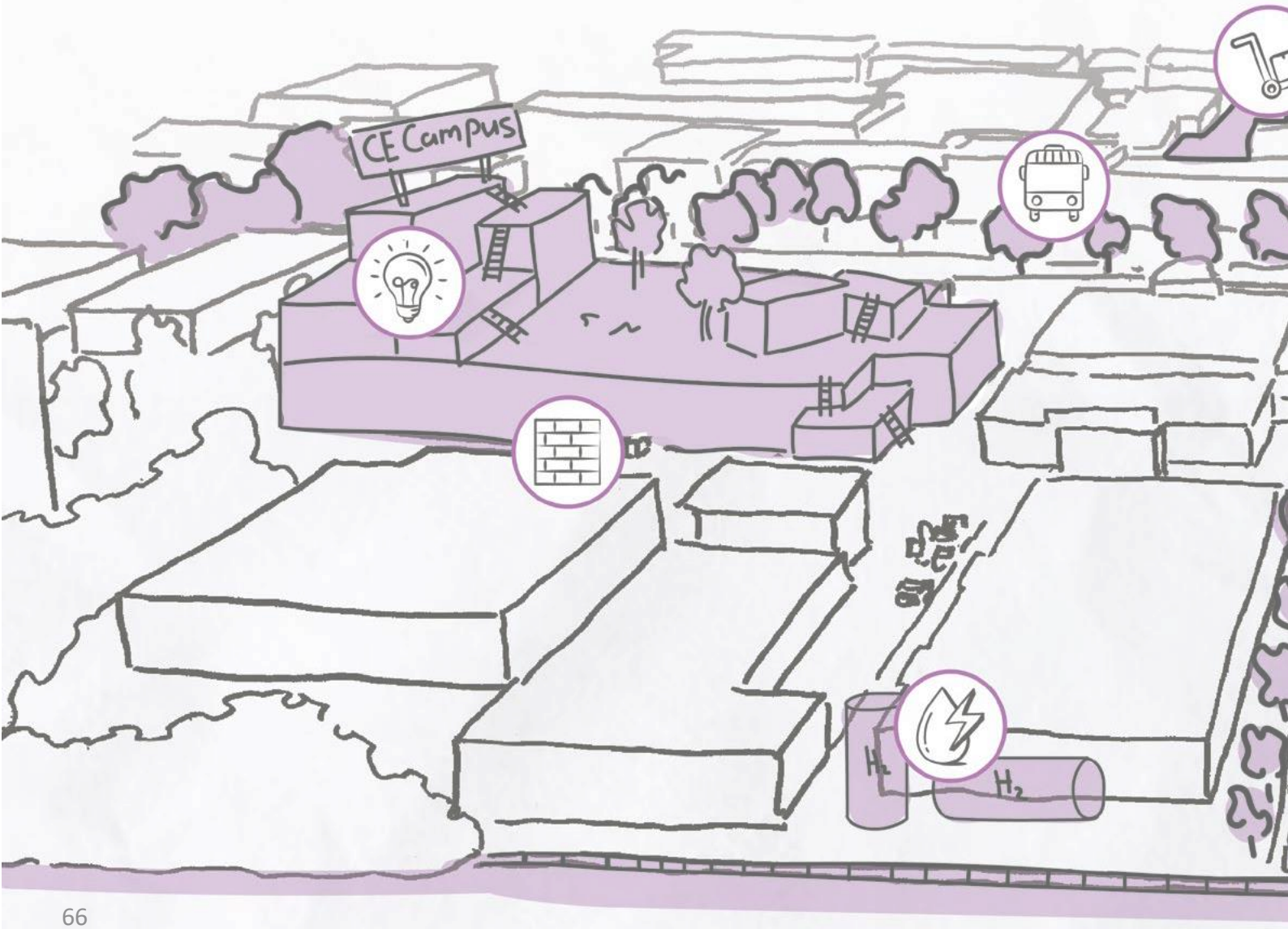




Stage 1:

Because a BIZ, park management, and a municipal agenda are present, momentum can be built. From the outset, the focus is on developing circular initiatives: creating a construction hub, starting a small campus, improving public transport, and setting up collective (storage) facilities (possibly elsewhere on a neighbouring site)

- Setting up a construction hub by the municipality / 'materials exchange station' association
- Construction of a transformer / battery grid
- Redevelopment of the factory into a CE start-up campus
- The municipality improves accessibility by public transport and on foot
- Using shared storage / plots on another site (0.5 hectares)
- Modular construction of a mini recycling centre by the association - operated by a CE service provider



Stage 2:

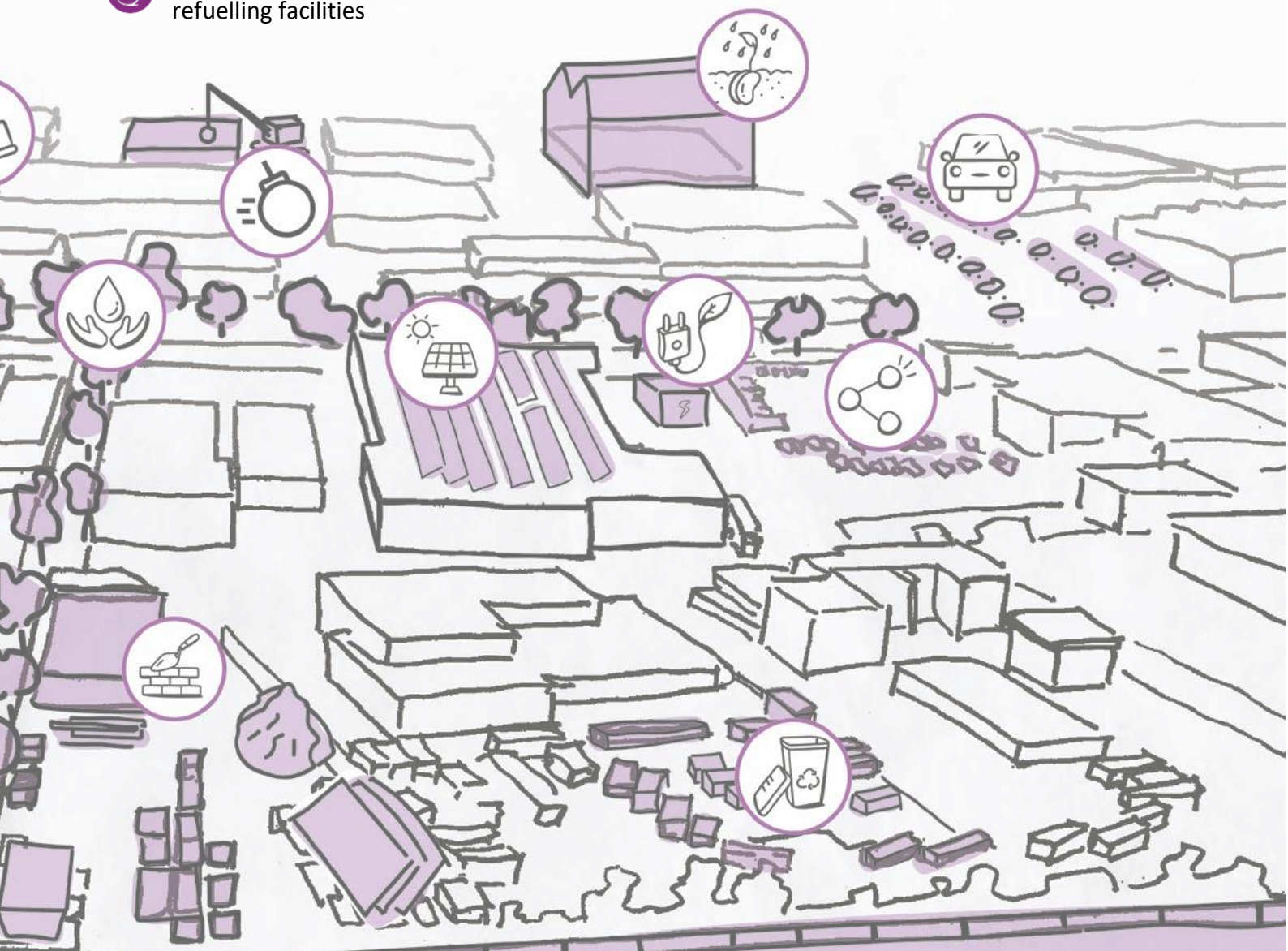
The highest priority for ensuring sound further development is to thoroughly strengthen the Infrastructure: green-blue, energy and quays, arrange for collective parking

- Making space by demolishing severely outdated parts and relocating some functions to more suitable locations within the city
- Create green-blue wadi structure for water storage and pre-treatment
- Construction of collective parking facility by municipal authorities and association
- Charging stations for trucks
- Improving quay facilities and hydrogen refuelling facilities

Stage 3:

Once the phase 2, composed as it is of meeting the preconditions, is completed, specialisation into, e.g., circular building and food chains, further development with circular companies, and collective functions will follow

- Establishment of construction logistics company / Prefab construction industry
- Construction and opening the light industry section (category 3)
- Collective solar roof
- Establishment of a vertical farm / insect farm in the circular food chain



Example scenario C)

Large-scale business park for global chains (always with a port)

Supposition

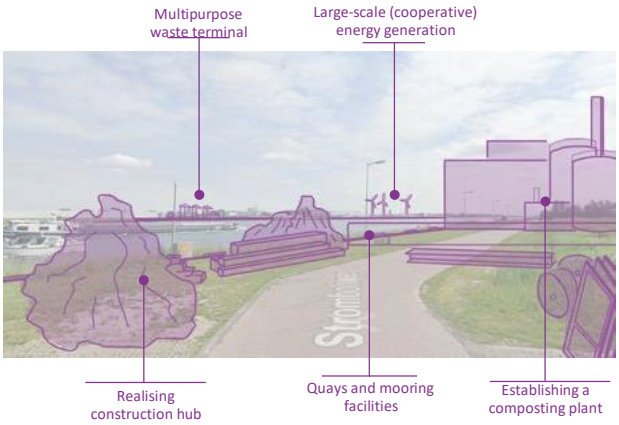
This is a business park with industrial activities located on the edge of or outside the city, featuring a port and a quay. A large part of this site is home to companies with a high environmental category (4+). Many large companies are located here and the site has industrial functions. A small part of the buildings is outdated.

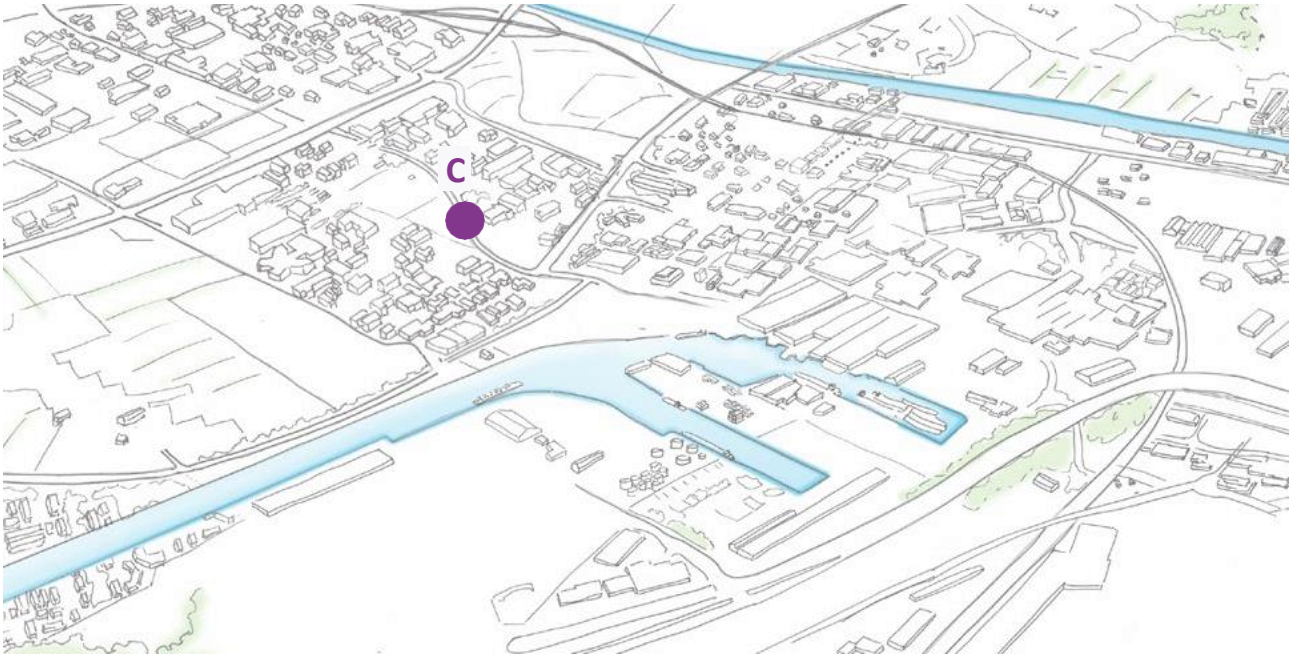
Outline of the fictional context

This site is developing within the provincial business ecosystem. The provincial spatial-circular strategy has identified it as a promising site for hubs because of its multimodal and strategic location. Interest groups are urging that attention be provided to safety (bicycle-truck) and nature. The municipality wants to link the tackling of climate and nature challenges of the neighbouring city and the adjacent rural area to the development of this site, for example by fitting green roofs and creating ecological value in the periphery.

What stands out?

- So large a site is rare, meaning that optimum utilisation is crucial.
- A number of companies are financially strong, for example because they are part of a multinational. The circular economy is their core business. It would seem obvious that these parties take the initiative themselves.
- Infrastructural conditions are key: energy, access roads, quays, but also process water. Rainwater storage and optimal water reuse require space but are important assets. It also forms a key for realising green-blue (nature).





Stage 1:

If this area is to fulfil its strategic role as a hub, getting the infrastructure in order is the main priority: energy, storage and transhipment, waste management, road and area planning (public transportation)

- Modify the infrastructure and create 2 public transport hubs
- Realising construction hub
- Quays and mooring facilities
- Transhipment quay with small container terminal; 0.5 hectares, 1,000 TEU
- Large-scale (cooperative) energy generation
- Establish a mini recycling centre
- Circular area design (new buildings with reusable materials, lay and maintain roads with reusable materials)
- Construction of buffers and an energy storage and exchange system, charging stations

Stage 2:

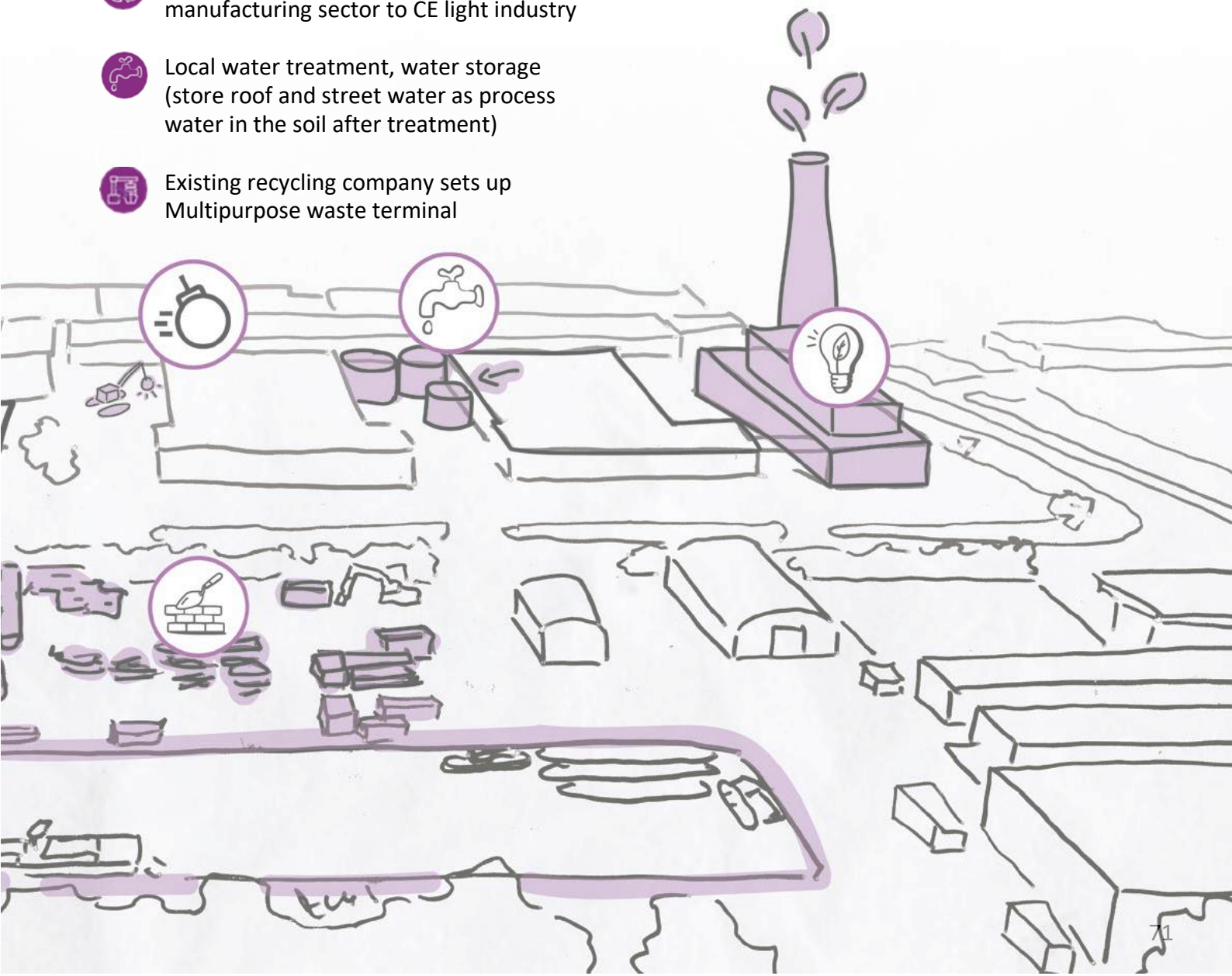
A shifting-use operation is necessary to maximise the use of all HMC parts. This will require cooperation on the regional scale and will take several years - which is why this constitutes stage 2 (already prepared from the outset of stage 1). This process involves relocating businesses that do not need the high environmental category and for which the municipality has found alternative sites, as well as redevelopment into light industrial and large-scale storage facilities.

- Relocate and demolish, make room for the following:
- Create collective parking facility for employees; companies can use the vacant space for storage, among other things
- Upgrade part of the SMEs in the manufacturing sector to CE light industry
- Local water treatment, water storage (store roof and street water as process water in the soil after treatment)
- Existing recycling company sets up Multipurpose waste terminal

Stage 3:

Now that all the conditions - space, energy, water, and access - are in place, it is time for the establishment of some new large companies dealing with large flows and for the further development of the site with circular industry functions. The municipal authorities pursues an active acquisition policy based on a vision and profile.

- Establishment plastic recycler / Biobased chemistry
- Establishing a composting plant



What can we learn from these example scenarios?

- **An incremental spatial development strategy is realistic.** When dealing with an existing business park, start with small initiatives, brought in by both the entrepreneurs and the municipal authorities. Afterwards, acceleration is possible to a stage in which preconditions are put in order (space, collective solutions, systems). This is followed by a stage of adjusting the area design to allow for CE and, where possible, of collective further development.

- **Space for CE is linked to many other (pre)conditions** that enable economic development, such as energy, (road) infrastructure, data availability, green and (process) water, and accessibility, for instance. The 'multimodal' and 'infrastructures (including energy)' preconditions appear to be of special importance. If these are put in order, a broad-based economy can develop.

- **Scarce space with a high environmental category for industrial functions is needed.** We have found that circular activities regularly require environmental space, because they cause nuisance or pose risks to their immediate surroundings (noise, odour, etc.). The required environmental space is at odds with the fact that few people want to put up with nuisance in their residential environment, while urban expansion is underway. As a result, local governments must be prepared to make difficult spatial trade-offs. Moreover, the existing HMC space in the Netherlands is far from being optimally utilised. It would seem sensible to embark on a shifting-use operation in time to make the best use of the existing HMC space. Preconditions for such shifting-use operations are funding, municipal regulations giving direction, throughput time (they take a lot of time and money), and the availability of suitable alternative (temporary) space. These are all required in order to maintain economic earning power.

- **Given the current market development of the circular economy, many circular activities still require a relatively low land price**. In all areas studied, we found that circular economic activities are currently virtually always linked to low land prices. Large plots with a lot of storage and parking space are always cheaper per square metre than small plots and properties - possibly with several floors - because the added value of storage of 'reusable raw materials', too, is relatively low. An increase of the value of premises and land is therefore possible by way of densification and intensification. Better utilisation of business parks through intensification and densification has a positive effect on the values on and of a business park and can also provide needed space for the development of a circular economy on a business park. However, in doing so, relatively low land prices remain necessary in order to set up a profitable circular activity, such as transport or storage, or a startup. In short, intensifying and densifying existing business parks increases land prices, but this is at odds with many circular functions. To encourage circular activities, it therefore makes sense for municipal authorities to consider making use of differentiated land allocation and pricing on business parks.

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5 Getting started: a roadmap

This chapter provides a concrete and optimistic roadmap. It ensures that the existing business park is transformed into a circular business park. This can be done by applying the building blocks and lessons from the earlier chapters. It is not a blueprint, but meant to make the process conceivable and thereby to serve as inspiration for your own roadmap.

Lessons from practice: implementation success factors

The success factors listed in the below were named during the working meetings held while drafting this guide. These are issues that require constant attention, but are also important conditions for a successful circular business park.

- Administrative ambition and mandate
- Strong park management and mandatory membership structures
- A positive business case
- Flexible zoning allowing mixed circular functions
- Protection of high environmental category zones
- Optimisation of (process) water Sufficient energy infrastructure capacity
- Good accessibility and soft settlement conditions for the labour market
- Regional coordination between business parks
- Active entrepreneurs who want to take matters into their own hands

The starting point

Cooperation is a must

Making a business park circular is not easy. But doing nothing is not an option either. If an innovation cannot be implemented within four years, it is often already obsolete by the time it does get introduced. Active collaboration ensures that you can create and seize opportunities together with your neighbours in the business park - to make plans and execute them.

Who should actually initiate the spatial change towards circular business parks? It would be logical for the municipal authorities and business park representatives to take the first step, with help from the province from a regional approach. The other parties are key to success, however. Companies should not wait: they, too, are expected to take the initiative.

An energetic approach will break through the potential obstacles that currently exist.

For while you can go fast alone, you go further together. This does mean that you need to be organised from the start, which requires time, money, and effort from all parties beforehand. There are hurdles to overcome, such as a lack of interest, a lack of (financial) resources, and a lack of de-burdening. Overcoming these obstacles requires something from all parties involved, in a collaborative effort. It is therefore essential that, in the context of area development or collective facilities, all involved with a business park first organise themselves in a BIZ or some other fashion, and then start a working group for circular chains, just like they have done for the energy challenge.

Subsidies can always help you get started and get organised together. For an example, refer to the Dutch Green Business Club: Homepage - Green Business Club - Nationwide and www.businessopen.nl so you can also organise the chains in conjunction with your neighbours who are not yet present in your business park.

Three general starting points

Before physical space is created for the circular economy, it is important that some of the entrepreneurs in the business park are already familiar with and want to work on circularity. Issues to consider include:

- Is more knowledge needed?
- Are there opportunities already present or are changes in your operations already possible on your own plot?
- Is a chain approach needed?

For this reason, there are three starting points to consider when starting work.

1

Starting point 1. Circular awareness and focus on opportunities among entrepreneurs

- As companies, we are committed to reducing the use of raw materials.
- We are committed to the high-quality processing of waste streams.
- We are committed to replacing raw materials with sustainable, recycled, or reusable materials.
- We are committed to extending the life of our assets and we also take back our products from customers after their useful life, and reuse or refurbish parts of them.
- As companies, we know how much and what types of raw materials and products come in and go out, which helps to make a good business case.

2

Starting point 2. Governmental circular policy as support

- The various governments (municipality/ province/state) have put the circular economy in business parks on the agenda by way of their environmental strategies and have formulated achievable targets.
- Any national or European change in policy can create opportunities or generate new business models. However, this does require you to have a joint overview.
- The Beautiful Netherlands Large-scale Business Establishments Guide provides a broad overview of spatial instruments to be used www.MooiNederland.nl
- For circular (spatial) regulations, see: https://www.circulaw.nl/

3

Starting point 3. The chain approach is the start of a new reality

Different raw material and product flows are relevant for each product group. A company is a link in the value chain, with its own suppliers and customers. Mapping them also provides an overview of the available opportunities.

The chain approach looks at the whole production process, including the use, reuse, and disposal of end-of-life materials and products.

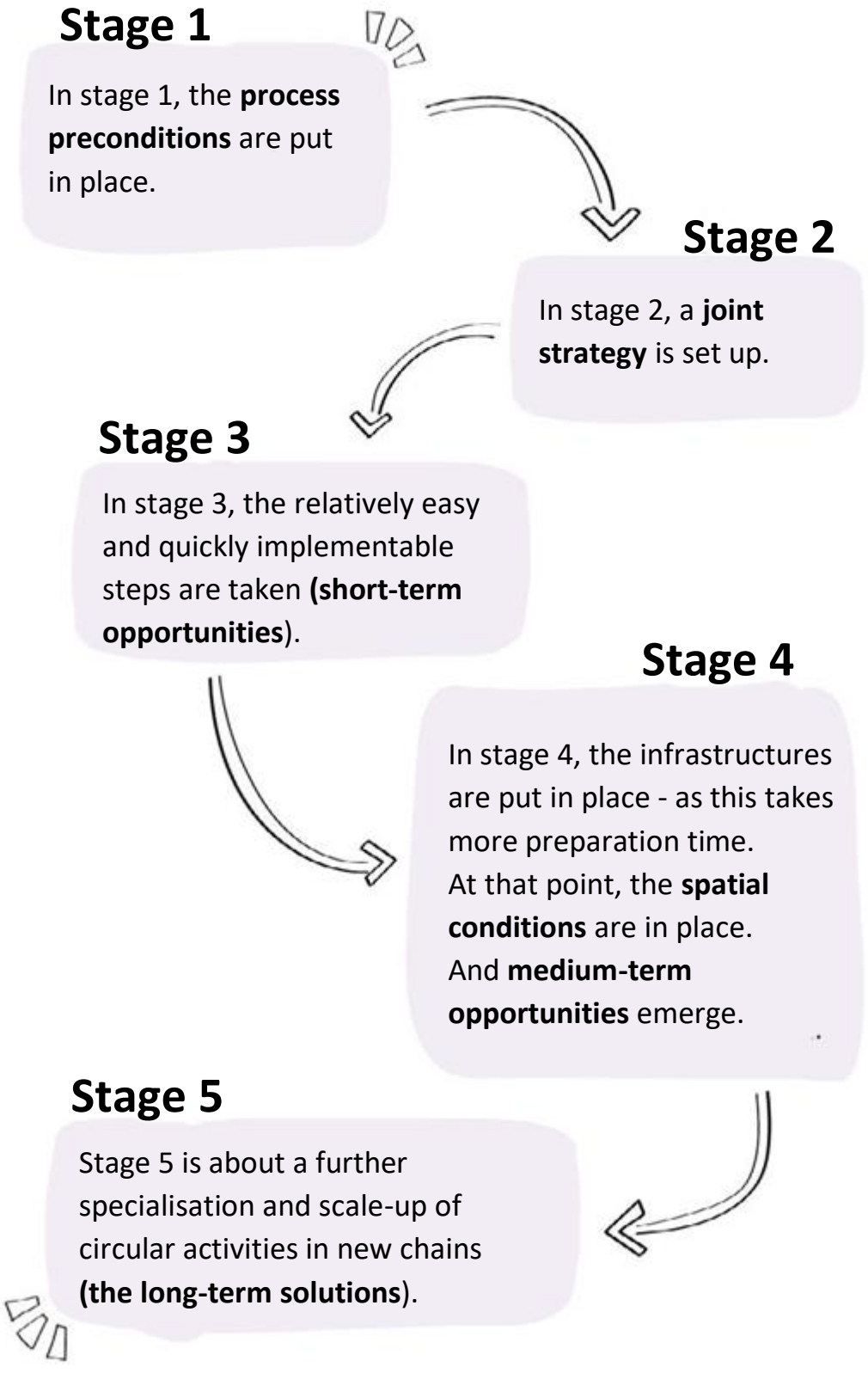
- This includes the links of raw material extraction, production, distribution, use, reuse, and disposal.
- By seeing the chain as a single entity, partners can work together on innovations that lead to less waste and resource consumption and to reduced CO2 emissions.
- This can mean that the waste from one chain is used as a raw material in another.
- The chain approach also helps to identify bottlenecks and opportunities for circularity throughout the chain.

Challenges and opportunities:

- One challenge is that the chain is often divided between different companies and organisations, which requires cooperation.
- However, there are also many opportunities for innovation and improvement and new business models within the chain.

Getting started

The attached simplified flowchart proposes five main stages in the approach towards a circular business park, with the estimated minimum timeframe - within an optimistic and ambitious term of 7 years. The steps follow a logical working process based on the design study. Some activities, such as stakeholder cooperation and monitoring, should continue throughout the process.



Roadmap

STAGE 1 - Preconditions (Year 1, Month 1-6) - overall optimisation

Activities

Initiative The municipal representation or the intermediary of the entrepreneurs (via the BIZ, for example) and the provincial authorities (jointly) take the initiative to become more circular as a business park: working group.

Start baseline measurement (types and quantities of material flows, infrastructure in place), for to measure is to know.

Organisation of a group of stakeholders, the so-called leading group, or coalition of the willing: interest, knowledge sharing, starting an initiative, but also training on space for the circular economy.

Do research and get the basics right:

- Mapping municipal and provincial environmental strategies and agendas. What are the prevailing (spatial) strategies for the circular economy?
- What kind of business park are we (local, regional, global), what chains are we connected to/want to be connected to? Are there any quick wins to obtain?
- How much physical space is potentially needed on the business plots for storage of raw materials / residuals / waste and return products?
- Determine the promising position of this business park within regional development and explore what businesses themselves already need / are up against: seek cooperation on a regional scale

Designers create Conversation Maps: map the current situation of initiatives, opportunities and barriers.

Results

- Conversation Maps (through design studies, interviews, and graduate theses)
- Governance structure (who initiates, who facilitates, and what frameworks need be set?)
- Quick wins identified and a leading group of entrepreneurs (a minimum of 3) formed

STAGE 2 - Strategy development (Year 1, Month 7-12) - chain optimisation

Activities

Inform and inspire. Discuss the map: which building blocks and design concepts from this guide are appealing and promising? Create a dot on the horizon together. Involve spatial designers, economists, and circular experts relevant to the companies.

Conduct a detailed material flow analysis for each product group (what do the different companies use, what could remain, and what could be improved)?

Policy alignment and putting the necessary municipal and provincial policies, like the Environmental Strategy and the Environmental Plan, in place.

Assisted by designers, create a Development Image, a plan with a spatial zoning of the business park into environmental use areas, types of circular activities, and the spatial layout for (collective) storage and transhipment, processing, and required knowledge functions. The Development Image contains spatial measures that can be taken in the short term (easy pickings - stage 3), an infrastructure plan (stage 4), and a plan for restructuring, relocating, or seeking space elsewhere and scaling up activities (stage 5)

Results

- Material flow analysis
- Circular Economy development overview (10-30 years): what do we want to achieve and how will we achieve this?
- Policy framework in place, including municipal Environmental Strategy and Environmental Plan
- Business cases and phasing with the first (sub)chains to start quickly (<1 year)

STAGE 3 - Easy Pickings (Year 2) - Small spatial redevelopments

Activities

Realise circular initiatives within companies

Smartly make space on your own plot: examples include a stacked scalable storage facility, making space for temporary storage of own residual streams, **extend the life of or reuse existing buildings.**

In case of a positive cost-benefit analysis, implement collective projects, like collective waste processing (mini recycling centre), set up a crafts centre

Develop good spots on the business park: people-friendly, good spatial quality

Optimise the sustainable energy supply and accessibility by bicycle and public transport

Make the process visible (shop window) and seek cooperation with training and knowledge institutions

Assisted by designers, create an Action Map and design layout plans for frontrunner projects

Results

- Action map, with quick wins in public spaces and plots (and redevelopments)
- Quickly visible improvements identified and possibly LOI for new collaborations
- Commitment by companies increased through joint knowledge sessions

STAGE 4 - Infrastructure development (Years 3-4) - Medium-sized spatial redevelopments

Activities

Develop collective facilities:
- A smart parking strategy to gain physical space on the parks. Share parking space;
- Collective storage for raw materials and residues;
- Using each other's waste streams in collaboration with other business parks;
- Collective energy systems;

Link option: Install green-blue infrastructure

Optimise logistics; improve the infrastructure for the supply of substances and materials for recycling (separating and bundling large flows) including through collective facilities

Assisted by designers, create a **draft layout plan** for the conditional infrastructure of (semi) public spaces and shared spaces

Results

- Physical **transformation of the business park** where already possible for the purpose of the transition to the circular economy
- **Green-blue structure** for cables and pipes, water storage
- **Improved energy and mobility** for the long-term perspective

STAGE 5 - Specialisation & Scale-up (Years 5-7) - major spatial redevelopments

Activities

Expand the circular economy functions and scale them up within the site, such in the context of a regional business ecosystem. Depending on the given initial situation, specialise or diversify into a mixed-use park.

Relocate functions that do not actually belong on the site on the basis of their environmental category

See if there is willingness among companies to link up with each other more and cluster circular functions on the site where this helps create a clear and accessible structure of heavier and lighter activities

Create conditions for innovation, such as a campus-like environment

Optimise water transport. This requires sufficient draught for class five b vessels and facilities for boaters, including shore power, quayside facilities, and mooring posts

Realise the municipal and regional hub strategy, with a role for the business park (possibly housing a circular hub)

Assisted by designers, get to work on **area-specific park designs**: connect to urban and landscape features, soil and water steering

Develop area design and site development based on circular principles such as stacking functions, business premises with base (circular concrete) and topped by a superstructure (wood / bio-based, timber frame construction), consider bio-based insulation, strive for indoor functions such as storage, provide manufacturing companies with noise protection measures, build modular and flexible and prefabricated

Results

- Scaling up circular production (in the chains with neighbours and other parks)
- New employment (through new economic chains)
- Regional knowledge position strengthened (by sharing knowledge locally)

Continuous Activities by the business park working group (Years 1-7)

Circular enterprise
Collaboration & organisation - Monthly: Putting spatial instruments and preconditions in order - policy objectives, laws and regulations, manpower, money, (shifting-use) space
Monitoring & measuring circular site performance - Quarterly **Knowledge sharing** - Half-yearly

Key stakeholders & roles

Stakeholder	*Primary roles*	*Core responsibilities*
Municipality	Facilitator, Regulator	Policy coordination, licensing, infrastructure, spatial planning
Park management	Coördinator, Catalyst	Dai-to-day coordination, informing, organising, acting as an ambassador, involving companies, project alignment
Companies	Implementers, Investors	Adapting business models, investing in circular solutions
Real estate owners	Space providers	Adapting buildings, long-term investments
Knowledge institutions	Innovation partners	Research, knowledge transfer, training and development of personnel
National/ Regional government	Strategic Enabler	Regional alignment, funding, national and regional circular policy framework and environment policy, knowledge sharing

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6 Glossary, websites and useful documents

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Useful websites, tips, and more information

- Instruments and rules for the development of business parks: Beautiful Netherlands Large-scale Business Establishments Guide: www.MooiNederland.nl
- Circular regulations: https://www.circulaw.co.uk/
- Circular business parks, knowledge, and inspiration https://skbn.nu/circulair
- Circular craft centre subsidies: https://circulairambachtscentrum.nl/slag/welke-financieringsbronnen-jouw-circulaire/?utm_source=nieuwsbrief&utm_medium=e-mail&utm_term=20230720&utm_content=link_ID0EDGAI&utm_campaign=Nieuwsflits%20Circulaire%20ambachtscentra%20mei%202025
- Subsidies for CE projects https://www.rvo.nl/onderwerpen/circulaire-economie/financiele-steun-bij-circulaire-projecten
- Inspiration on space for the circular economy: TU Delft's digital circular design atlas: https://www.tudelft.nl/bk/circular-design-atlas
- Sample infographic on sustainability and circularity by Willem Alexander Roermond: https://www.parkmanagementmiddenlimburg.nl/wp-content/uploads/sites/2/2019/05/WA-Roermond-A3-MAP-05-2021.pdf

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- Noord-Holland Circular Work Locations Exploration

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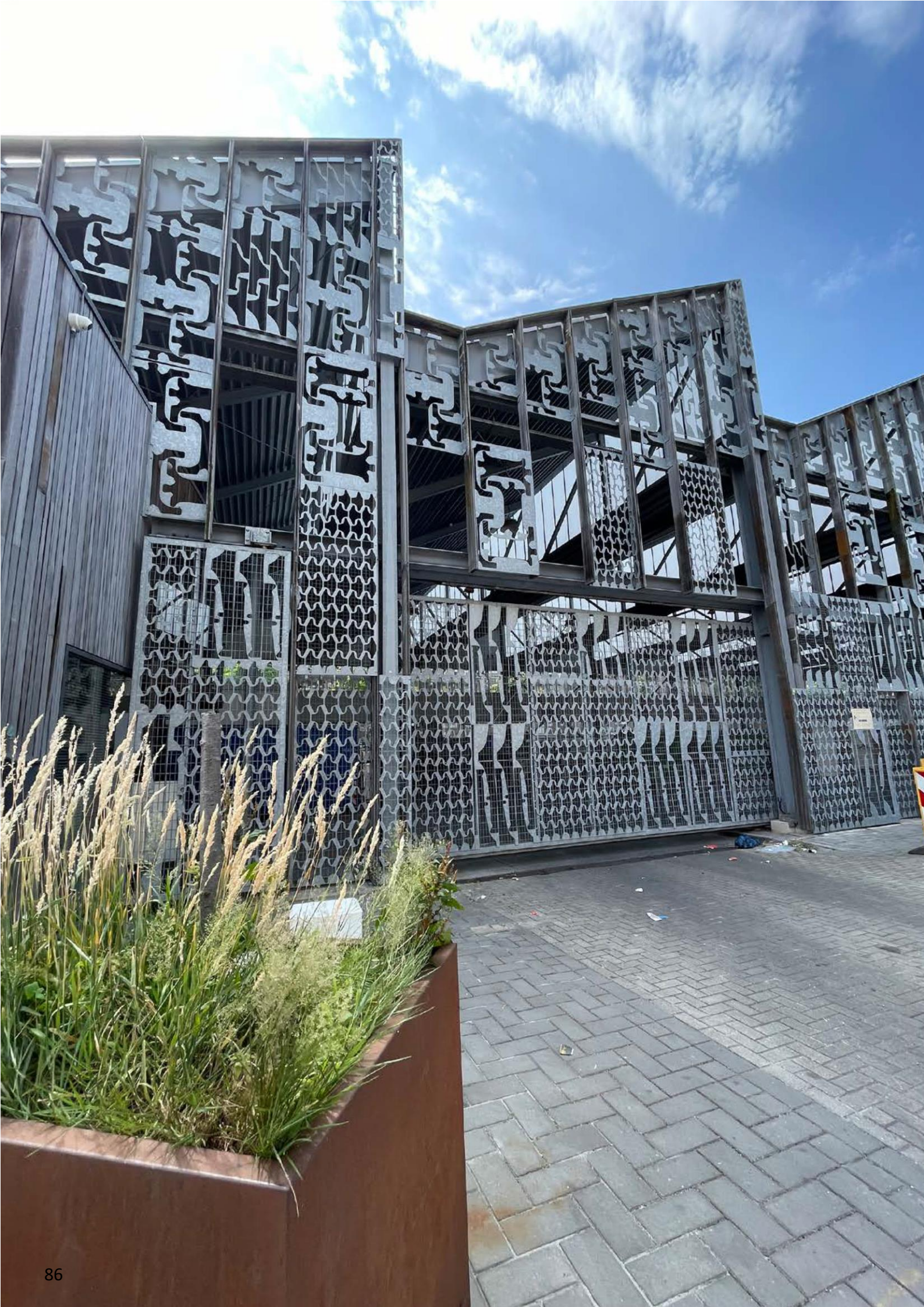


7 Annexes

Spatial quality

This guide uses the generally accepted definition of spatial quality, based on Vitruvian concepts: Spatial quality is the right balance between use value, future value, and experience value. When considering these concepts in the context of circularity at business parks, they relate to the following:

- **Use value** refers to effective and efficient space for circular economy 'systems' such as residual flows, water cycle, or transport. Are they functionally in order, with efficient space utilisation and the right function/business in the right place?
- **Future value** refers to designing the space in such a way that it contributes to sustainability, being low-emission and detachable, so that the space and its components can be reused later. The space also contributes to climate mitigation and adaptation and to biodiversity.
- **Experience value** and social value refer to a well-designed, pleasant space that is area-specific from the point of view of identity (of city and country) and is inviting and logical for employees and visitors in terms of quality of stay and routing.

On the one hand, a circular economy has a small-scale physical aspect that is easy to fit into the daily living environment of living and working (e.g. waste containers, more efficient machinery, or reuse of buildings). But on the other hand, it also has a large-scale aspect, featuring industrial activities, large logistics flows and production areas, and areas that stink, make noise, and are dangerous. It is therefore important that appropriate locations for functions, area design, and living environment quality (clean, whole, and safe) are sought with an eye to spatial quality.

This guide in this connection uses the generally accepted definition of spatial quality, which is based on the concepts of the Roman architect Vitruvius: spatial quality is the right balance between use value, future value, experience value. This is the lens we look through when working on design principles for business parks that facilitate the circular transition, resulting in high-quality space.

Use value: taking functional space into consideration

Circularity will turn some places into 'spatial links' that are essential for circular value chains. Key in this connection is the functionality of the spatial link. The spatial manifestations of circular activities on business parks are diverse and are presented as spatial building blocks in a subsequent chapter. In general, the circular economy manifests itself in:

- Production and processing space: room for reprocessing, bundling, sorting;
- Logistics space: storage and transport of circular materials and goods;
- Use space: commercial buildings for circular activities and circularly designed public space.

Experience value: taking soft values into consideration

Good design takes into account the uniqueness of the business park. Doing justice to individuality puts area characteristics centre stage, protects and utilises what is already there, and supplements what ties in with the value and nature of the area and its economic function. This approach produces business parks that are suitable for their function and respond to 'soft values' that matter to people (read: employees) and that are considered important by companies with a view to staffing and business activities. Companies also tell us how important the working environment is.

Future value: redeveloping space

The urgency of a circular economy does justice to future generations: it prevents passing on the burden. Building the circular economy does require space, however. Space is scarce in our country. It is therefore important to smartly combine functions as much as possible and, above all, to make the best use of the existing economic space for the transition to a circular economy. Doing justice to scarcity requires that space be used for multiple purposes. This practical guide therefore focuses primarily on the optimal layout for the circular transition of existing business parks.

What activities are considered 'circular activities'?

Activities aimed at reducing material use (narrow the loop), extending lifetimes (slow the loop), reusing and recovering materials (close the loop), or replacing non-renewable materials with sustainable or renewable alternatives (substitution).

In the Netherlands, every business is given an SBI code. This is a code that tells something about the type of economic activity the company conducts. Some of these activities are considered (potentially) circular activities. An overview is included in the annexe.
For the sake of convenience, the (global) environmental category is listed with the activities. While the concept of “environmental category” is no longer used in Environmental Policy, it is still widely used in practice. Business activities are divided into six categories, each with subclasses. The high environmental categories (HMC) are numbered levels 4, 5, and 6. The category is an indication of the degree of potential nuisance and danger and the distance to be kept from residential areas. Many business parks in and around the city are zoned by environmental category in the relevant Environmental Plans.

A few examples of existing economic activities that occur in a circular economy:

- Manufacture of paper pulp, paper, and paperboard (SBI 171): 3.2
- Reparations and maintenance of general-purpose machinery (SBI 33121): 4.1
- Preparing sorted material for recycling (SBI 3832): 4.2
- Sale and repair of passenger and commercial vehicles (SBI 45112): 3.2
- Inland navigation (freight, tankers, and towage) (SBI 504): 5
- Warehousing and services for transport (SBI 52): 3.1

Becoming more circular can take many guises; in the below list, this is shown from the level of one particular plot to the level of collaborating with other business parks

1. **The circular transformation of internal business processes on a company's own plot** (extending product life cycles, applying and processing sustainable renewable bio-resources and renewable energy, reusing secondary (residual) streams from existing production processes, reducing negative impact on the environment). This is by no means always spatially visible;

2. **Organising, valorising or up-cycling (this is a form of recycling where the product is of the same or of even higher quality after processing) and spatially incorporating waste and residual flows** (collective waste collection, collective facilities for processing residual flows, providing opportunities for repair);

3. **Circular area or real estate layout:** the physical layout and design of buildings and the outdoor spaces of business parks according to circular principles and with an eye for soft settlement conditions, such as spatial quality and social inclusion;

4. **Organising and spatially incorporating circular value chains** (this can (in part) be done within the park, up to the level of industrial symbiosis, but more often takes place across park boundaries). We consider the logistics of residues or circular products as a component with a spatial component, e.g. a hub;

The variety of applications produces possibilities and opportunities for entrepreneurs in business parks. Circularity as a business model is as yet not technically feasible or (in the current market) profitable for all (types of) companies. Major differences in circular market opportunities (regional, (inter)national) and initiatives between sectors and types of companies still exist.

Major construction companies, for example, are already engaged in circular business activities to varying degrees. For other sectors, market opportunities are not yet opportune, for instance due to the lack of a positive business case or technical applications, or to obstructive laws and regulations. The impact of the circular economy on business parks is therefore (partly) dependent on the current structure, characteristics, and companies present at business parks.

What do we mean by a circular economy?

The Netherlands Environmental Assessment Agency (PBL) defines a circular economy as follows: "The circular economy is about using significantly fewer raw materials significantly and using them more efficiently in order to reduce negative environmental impacts and supply risks. (ICER report PBL p. 24)." A more circular economy thus contributes to a number of important issues, such as combating climate change, biodiversity loss, and environmental pollution and improving the Netherlands' security of supply and competitiveness (see also Figure 2.1). The European Commission adds ensuring competitiveness (in the long term) to this mix (A New Circular Economy Action Plan, European Commission 11-3-2020).

The National Circular Economy Programme sets out what is needed to achieve a circular Netherlands by 2050. This programme is based on four strategies, all of which are required: raw material use reduction; substitution of raw materials and materials; lifetime extension; high-value processing. These are based on six steps of the so-called R ladder: 1) Refuse/Rethink; 2) Reduse; 3) Reuse; 4) Repair/Refurbish/Remanufacture/Repurpose ; 5) Recycle; 6) Recover. The higher up the ladder from rung 6 to rung 1, the better.

Positioning of the circular economy in relation to societal challenges and other policy themes

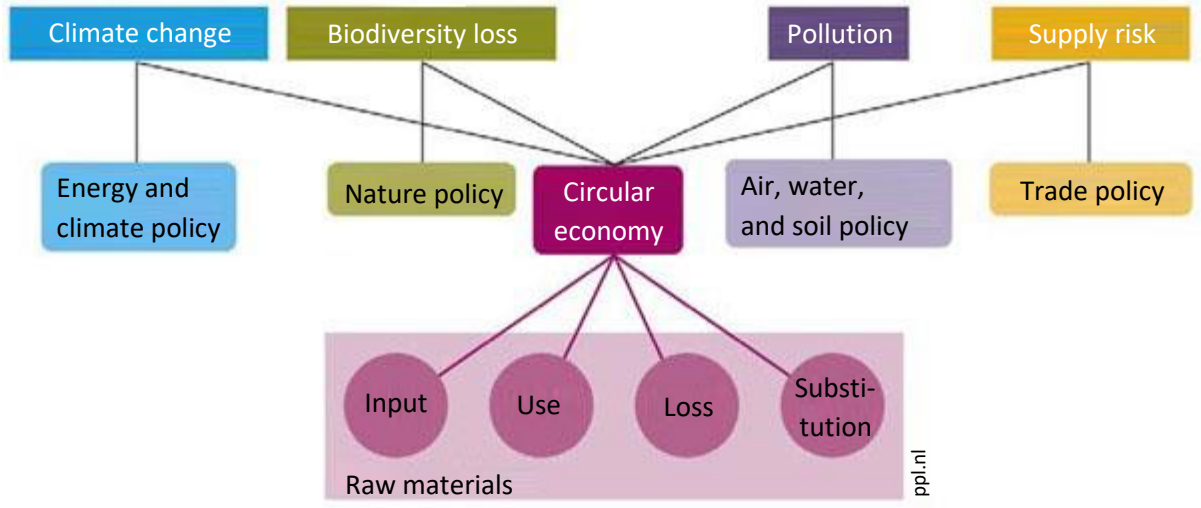


Figure 3: Objectives of the circular economy (Source: PBL)

Explanation of the strategy for the circular economy in and around the city guide project

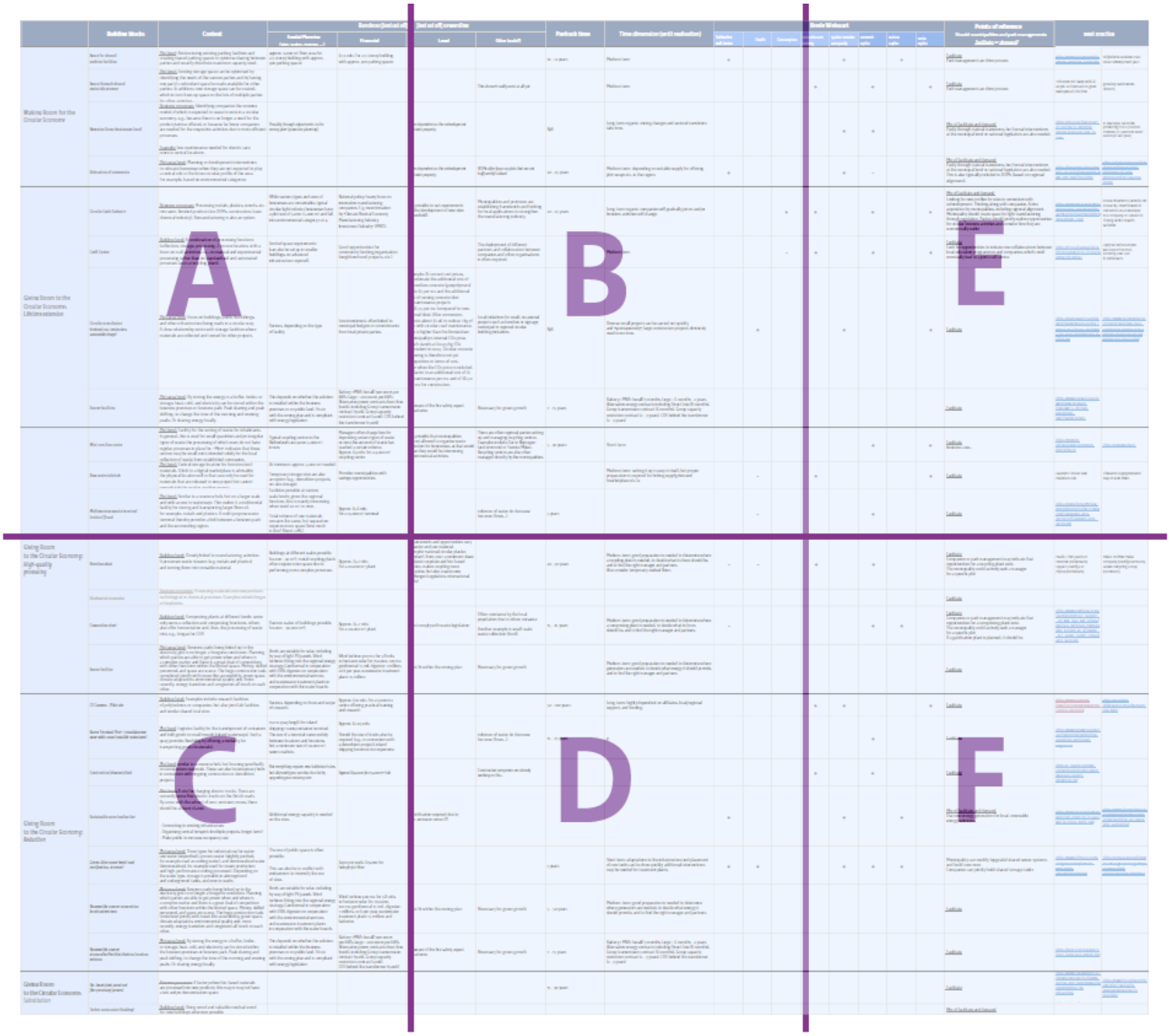
To create this guide, we first studied 25 business parks in the Netherlands by way of a QuickScan. The parks concerned were selected as national location data and a business survey[13] showed that circular activities take place on them, that they are located in and adjacent to the city, and that they have access to waterways. The 25 parks are spread across the Netherlands and are as diverse as possible, making them representative. The comparisons made between the 25 included their location, accessibility, economic profile, and spatial layout. Subsequently, we asked the park managers of these sites and the authorities of the municipalities which they are located in to provide outlines of circular characteristics and respond to the observations. The QuickScan approach, observations, and conclusions are laid down in a separate external annex.

20) Nefs, Merten and Gerlof Rienstra, Location characteristics for circular activity in and around the city (December 2024)

Based on the QuickScan, three study areas spread across the Netherlands were selected and visited for further analysis. During (preliminary) interviews, working meetings, and field visits, we consulted with the representatives of these sites (park managers, companies, and business associations), the authorities of the relevant municipalities and provinces, knowledge institutes, and civil society organisations about the circular economy and the space needed for it. During the working sessions, the space and preconditions needed were explored on site, following a set approach. The reports with observations, conclusions, and recommendations are available as separate external annexes. Based on this, spatial building blocks, tools, and practical principles were formulated, supported by design research and economic reflections by the CE Team consortium (BVR consultants, Buck Consultants International, Rienstra policy research & policy advice, RRR advice).

B

Circular economy positioning table



The above table provides detailed background information on the different building blocks.
The emphasis is predominantly on spatial-economic preconditions: what is needed in financial, planning, or legal terms to realise a building block? What are the standard payback and realisation periods? How do the building blocks score on the various Broad Prosperity indicators (Source: expert opinion and practical insights from the survey and the researchers)? What concrete handles are available to the various parties involved? What are good practices that have already been realised? Some of this information is included in the main report. The table therefore mainly serves as a reference guide. Some fields are blank, either because additional research is needed, or because insufficient information is currently available.

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Back Chapter 2

Back In-depth 4

	Building blocks	Context	Randvoo [*text cut off*]	
			Spatial Planning (size, water, energy, ...)	**Financial**
Making Room for the Circular Economy	***Space for shared parking facilities***	Plot level: Restructuring existing parking facilities and creating shared parking spaces to optimise sharing between parties and smartly distribute maximum capacity need.	approx. 3,000 m² floor area for a 3-storey building with approx. 400 parking spaces	€7.9 mln. For a 3-storey building with approx. 400 parking spaces
	Space through shared materials storage	Plot level: Existing storage space can be optimised by identifying the needs of the various parties and by having one party's redundant space be made available for other parties. In addition, new storage space can be created, which in turn frees up space on the lots of multiple parties for other activities.		
	Stopping linear businesses (cars)	Business processes: Identifying companies the revenue model of which is expected to cease to exist in a circular economy, e.g., because there is no longer a need for the product/service offered, or because far fewer companies are needed for the respective activities due to more efficient processes. Example: less maintenance needed for electric cars; more in central locations.	*Possibly through adjustments to the zoning plan (proactive planning).*	
	Relocation of companies	Plot/area level: Planning or development interventions to relocate businesses when they are not expected to play a central role in the future circular profile of the area. For example, based on environmental categories		
Giving Room to the Circular Economy: *Lifetime extension*	***Circular Light Industry***	Business processes: Processing metals, plastics, woods, etc. into semi-finished products (no OEMs, construction, basic chemical industry). Remanufacturing is also an option.	While various types and sizes of businesses are conceivable, typical circular light industry businesses have a plot size of 5,000-15,000 m² and fall into environmental category 3 or 4.	National policy: heavy focus on innovative manufacturing companies. E.g. incentivisation by "Climate Neutral Economy Manufacturing Industry Investment Subsidy" (IMKE).
	Craft Centre	Building level: A combination of processing functions (collection, storage, processing...) on one location, with a focus on craft activities, i.e., on manual and experimental processing rather than on standardised and automated processes (as in a recycling plant).	Limited space requirements (can also be set up in smaller buildings, no advanced infrastructure required).	Good opportunities for community funding/organisation (neighbourhood projects, etc.)
	Circular area design *(material use, construction, sustainable design)*	Plot/area level: Focus on buildings, public furnishings, and other infrastructure being made in a circular way. A close relationship exists with storage facilities where materials are collected and reused for other projects.	Various, depending on the type of facility	Low investment, often linked to municipal budgets or commitments from local private parties.
	Energy facilities	Plot/area level: By storing the energy in a buffer, boiler, or storage, heat, cold, and electricity can be stored within the business premises or business park. Peak shaving and peak shifting, to change the time of the morning and evening peaks. Or sharing energy locally.	This depends on whether the solution is installed within the business premises or on public land. Fits in with the zoning plan and is compliant with energy legislation	Battery 1MWh (small) 300 euros per kWh, large = 200 euros per kWh. Alternative power contracts direct line (300k), including Group transmission contract (350k), Group capacity restriction contract (500k). CDS behind the transformer (1500k)
	Mini recycling centre	Plot level: Facility for the sorting of waste for inhabitants. In general, this is used for small quantities and/or irregular types of waste the processing of which users do not have regular processes in place for. "Mini" indicates that these centres may be small units intended solely for the local collection of waste from established companies.	Typical recycling centres in the Netherlands are 3,000-5,000 m² in size.	Managers often charge fees for depositing certain types of waste or once the amount of waste has reached a certain volume. Approx. €4 mln. for a 4,000 m² recycling centre
	Raw materials hub	Plot level: Central storage location for (construction) materials. A link to a digital marketplace is advisable; the physical location will in that case only be used for materials that are released in one project but cannot immediately be used in another project.	At minimum approx. 5,000 m² needed. Temporary storage sites are also an option (e.g., demolition projects, on-site storage).	Provides municipalities with savings opportunities.
	Multipurpose waste terminal (residual flows)	Plot level: Similar to a resource hub, but on a larger scale and with access to waterways. This makes it a multimodal facility for storing and transporting larger flows of, for example, metals and plastics. A multi purpose waste terminal thereby provides a link between a business park and the surrounding region.	Facilities possible at various scale levels; given the regional function, this is mainly interesting when sized 20 m² or over. Total volume of raw materials remains the same, but separation requires more space (how much is this? About 20%).	Approx. €5.6 mln. For a 25,000 m² terminal

[*text cut off*] orwarding		Payback time	Time dimension (until realisation)			
Legal	Other (scale?)			Subjective well-being	Health	Consumption
		10 - 12 years	Medium term	+		
	This doesn't really exist at all yet		Medium term			
Often dependent on the redevelopment of private property.		N/A	Long-term organic: zoning changes and sectoral transitions take time.			
Often dependent on the redevelopment of private property.	*ROMs often focus on plots that are not (sufficiently) utilised.*	20 - 25 years	Medium term: depending on suitable supply for offering plot swaps etc. in the region.	+		
It is possible to set requirements for the development of new sites (greenfield).	Municipalities and provinces are establishing frameworks and looking for local applications to strengthen the manufacturing industry.	20 - 25 years	Long-term organic: companies will gradually join in and/or business activities will change			+
	The deployment of different partners and collaboration between companies and other organisations is often required.		Medium term			-
Example: At current cost prices, we estimate the additional cost of cementless concrete (geopolymers) at €0.67 per m^2 and the additional cost of reusing concrete tiles in maintenance projects at €6.55 per m^2 (compared to new, normal tiles). After conversion, it costs about €1.06 to reduce 1 kg of CO2 with circular road maintenance. This is higher than the Amsterdam municipality's internal CO2 price, which stands at €0.43/ kg CO2 equivalent in 2024. Circular concrete repaving is therefore not yet competitive in terms of cost, even when the CO2 price is included. So factor in an additional cost of €1 in maintenance per m^2 and of €6.50 per m^2 for construction.	Local initiatives for small, occasional projects such as benches or signage; municipal or regional circular building initiatives.	N/A	Diverse: small projects can be carried out quickly and "spontaneously"; large construction projects obviously need more time.		+	
Be aware of the fire safety aspect of batteries	Necessary for green growth	7 - 15 years	Battery 1 MWh (small) 3 months, large = 6 months - 2 years. Alternative energy contracts including Direct Line (8 months), Group transmission contract (6 months). Group capacity restriction contract (2 - 3 years). CDS behind the transformer (2 - 3 years)			
It is possible that municipalities are not allowed to organise waste collection for businesses, as that would mean they would be intervening in commercial activities.	There are often regional parties setting up and managing recycling centres. Examples include Dar in Nijmegen (and environs) or Twente Milieu. Recycling centres are also often managed directly by the municipalities.	5 - 30 years	Short term			
			Medium term: setting it up is easy in itself, but proper preparation is required for linking supply/demand (marketplace etc.)		-	
	volumes of water do decrease (no even flows...)	5 years			-	

Giving Room to the Circular Economy: *High-quality processing*	***Multipurpose waste terminal*** *(residual flows)*	Plot level: Similar to a resource hub, but on a larger scale and with access to waterways. This makes it a multimodal facility for storing and transporting larger flows of, for example, metals and plastics. A multi purpose waste terminal thereby provides a link between a business park and the surrounding region.	Facilities possible at scale levels; given the regional function, this is mainly interesting when sized 20 m² or over. Total volume of raw materials remains the same, but separation requires more space (how much is this?	Approx. €5.6 mln. For a 25,000 m² terminal
	Recycling plant	Building level: Closely linked to manufacturing activities. It processes waste streams (e.g. metals and plastics) and turning them into reusable material.	Buildings at different scales possible (10,000 - 30,000 m²); metal recycling plants often require more space due to performing more complex processes.	Approx. €5.7 mln. For a 20,000 m² plant
	Biochemical processing	Business processes: Processing materials into new products via biological or chemical processes. Examples include biogas or bioplastics.		
	Composting plant	Building level: Composting plants at different levels: some only serve a collection and composting functions, others also offer fermentation and, thus, the processing of waste into, e.g., biogas for CHP.	Various scales of buildings possible (10,000 - 30,000 m²);	Approx. €5.7 mln. For a 20,000 m² plant
	Energy facilities	Plot/area level: Business parks being linked up to the electricity grid is no longer a foregone conclusion. Planning which parties are able to get power when and where is a complex matter and there is a great deal of competition with other functions within the limited space. Money, skilled personnel, and space are scarce. The huge construction task, considered jointly with issues like accessibility, green space, climate adaptation, environmental quality and, more recently, energy transition and congestion all touch on each other.	Roofs are suitable for solar, including by way of light PV panels. Wind turbines fitting into the regional energy strategy, Geothermal in cooperation with EBN, digesters in cooperation with the environmental services, and wastewater treatment plants in cooperation with the water boards.	Wind turbine 400 m² for 3.8 mln, 10 hectares solar for 750,000, 100 m² geothermal 15 mil. digester: 1 million, 20 k per year, wastewater treatment plant: 15 million
Giving Room to the Circular Economy: *Reduction*	***CE Campus - Pilot site***	Building level: Examples include research facilities of polytechnics or companies, but also joint lab facilities and similar shared trial sites	Various, depending on focus and scope of research.	Approx. €10 mln. For a 3,000 m² centre offering practical training and research
	Barge Terminal Port + transhipment quay with crane (possibly containers)	Plot level: Logistics facility for the transhipment of containers and bulk goods to small vessels (inland waterways). Such a quay provides flexibility by offering a modality for transporting goods (materials).	150 m quay length for inland shipping+crane/container terminal. The size of a terminal varies widely between locations and functions, but a minimum size of 20,000 m² seems realistic.	Approx. €1.125 mln. Should the use of trucks also be required (e.g., in connection with a demolition project), inland shipping becomes too expensive.
	Construction (elements) hub	Plot level: Similar to a resource hub, but focusing specifically on construction materials. These can also be temporary hubs in connection with ongoing construction or demolition projects.	*Not everything requires new (collection) sites, but ultimately you can also do a lot by upgrading your existing sites*	*Approx €650,000 for a 5,000 m² hub*
	Sustainable cargo loading bay	Plot level: A site for charging electric trucks. There are currently some 800 electric trucks on the Dutch roads. By 2030, with the advent of zero-emission zones, there should be at least 16,000. - Connecting to existing infrastructure - Organising central hotspots (multiple projects, longer term) - Make public to increase occupancy rate	Additional energy capacity is needed on the sites.	
	Green-blue space (wadi and purification, storage)	Plot/area level: Three types for industrial use for water: raw water (unpurified), process water (slightly purified, for example used as cooling water), and demineralised water (demineralised, for example used for steam production and high-performance cooling processes). Depending on the water type, storage is possible in aboveground and underground tanks, and even in wadis.	The use of public space is often possible. This can also be in conflict with endeavours to intensify the use of sites.	€400 per wadi, €13,000 for helophyte filter
	Renewable energy generation location/systems	Plot/area level: Business parks being linked up to the electricity grid is no longer a foregone conclusion. Planning which parties are able to get power when and where is a complex matter and there is a great deal of competition with other functions within the limited space. Money, skilled personnel, and space are scarce. The huge construction task, considered jointly with issues like accessibility, green space, climate adaptation, environmental quality and, more recently, energy transition and congestion all touch on each other.	Roofs are suitable for solar, including by way of light PV panels. Wind turbines fitting into the regional energy strategy, Geothermal in cooperation with EBN, digesters in cooperation with the environmental services, and wastewater treatment plants in cooperation with the water boards.	Wind turbine 400 m² for 3.8 mln, 10 hectares solar for 750,000, 100 m² geothermal 15 mil., digester: 1 million, 20 k per year, wastewater treatment plant: 15 million and batteries
	Renewable energy storage/buffer/distribution location systems	Plot/area level: By storing the energy in a buffer, boiler, or storage, heat, cold, and electricity can be stored within the business premises or business park. Peak shaving and peak shifting, to change the time of the morning and evening peaks. Or sharing energy locally.	This depends on whether the solution is installed within the business premises or on public land. Fits in with the zoning plan and is compliant with energy legislation	Battery 1MWh (small) 300 euros per kWh, large = 200 euros per kWh. Alternative power contracts direct line (300k), including Group transmission contract (350k), Group capacity restriction contract (500k). CDS behind the transformer (1500k)

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Requirements and opportunities vary by sector and raw material. Example: 'national circular plastics standard', from 2027 a minimum share of plastic recyclate and bio-based plastics, makes recycling more attractive, but also creates new challenges (regulation, international trade)		20 - 30 years	Medium-term: good preparation is needed to determine where a recycling plant is needed, to decide what its focus should be, and to find the right manager and partners. Also consider temporary residual flows	-	-	
Must comply with waste legislation	Often resistance by the local population due to odour nuisance Another example is small-scale waste collection (food).	15 - 25 years	Medium-term: good preparation is needed to determine where a composting plant is needed, to decide what its focus should be, and to find the right manager and partners.	-		
Must fit within the zoning plan	Necessary for green growth		Medium-term: good preparation is needed to determine where generators are needed, to decide what energy it should provide, and to find the right manager and partners.			
		50 - 100 years	Long-term: highly dependent on affiliates, local/regional support, and funding.			
	volumes of water do decrease (no even flows...)	15 - 25 years	p			
	Construction companies are already working on this...					
Electrification required due to zero-emission zones (?)				+		
		5 years	Short term: adaptations to the infrastructure and placement of new tanks can be done quickly; additional interventions may be needed for treatment plants.	+	+	
Must fit within the zoning plan	Necessary for green growth	5 - 50 years	Medium-term: good preparation is needed to determine where generators are needed, to decide what energy it should provide, and to find the right manager and partners.			
Be aware of the fire safety aspect of batteries	Necessary for green growth	7-15 years	Battery 1 MWh (small) 3 months, large = 6 months - 2 years. Alternative energy contracts including Direct Line (8 months), Group transmission contract (6 months), Group capacity restriction contract (2 - 3 years). CDS behind the transformer (2 - 3 years)			

Broad Prosperity					Points of reference	Best practice	
Education and training	Spatial cohesion and quality	Economic capital	Natural capital	Social capital	Should municipalities and park managements facilitate or demand?		
	+		+		Facilitate Park management can drive process	https://www.p1.nl/fileadmin/pdf/P1_dossier6_jan09.pdf	Strijkviertel Business Park urban development plan
+		+		+	Facilitate Park management can drive process	This does not really exist at all yet, so there are no good examples at this time	(possibly Waterwood, Utrecht)
	+	+			Mix of facilitate and demand Partly through natural transitions, but formal interventions at the municipal level or national legislation are also needed.	https://nos.nl/artikel/2564767-fabriek-in-helmond-loosde-jarenlang-pfas-in-riool	For example, factories producing PFAS (Custom Powders in Helmond went bankrupt last year)
	+	-			Mix of facilitate and demand Partly through natural transitions, but formal interventions at the municipal level or national legislation are also needed. This is also typically included in ROMs (based on regional alignment).	https://ijzeradvocaten.nl/ver_huis-en-inrichtingskosten-bij_een-290-bedrijfsruimte/	https://stadszaken.nl/artikel/6660/rotterdam-trekt-miljoenen-uit-voor-verduurzaming-spaanse-polder
+		+		+	Mix of facilitate and demand Looking for new profiles for sites in connection with redevelopment. Thinking along with companies. Active acquisition by municipalities, including regional alignment. Municipality should create space for light manufacturing through regulation. Parties should jointly explore opportunities for circular business activities and consider how they are economically viable	https://www.rvo.nl/files/file/2020/11/DEF_1025%20Leidraad%20Duurzaam%20gem.%20Vastgoed_7.pdf	Ambachtsezoom (Hendrik Ido Ambacht), PeelPioneers in Den Bosch as an example of a company, or Heskon in Tilburg, which repairs batteries
+		+		+	Facilitate Look for opportunities to initiate new collaborations between local education programmes and companies, which could eventually lead to a joint craft centre.	https://circulairambachtscentrum.nl/overzicht-circulaire ambachtscentra/	Upcycle centre Almere was one of the first, currently also HER in Rotterdam.
	+			+	Facilitate	https://openresearch.amsterdam/image/2024/5/22/the_impact_of_circular_strategies_for_road_maintenance_in_cities.pdf	https://www.vastgoedmarkt.nl/198537/business-park-amsterdam-osdorp-fase-2-nieuwe-standaard-op-het-gebied-van-circulariteit
					Facilitate	https://www.brabant.nl/actueel/nieuws/brabant-investeert-5-miljoen-energyhubs-bedrijventerreinen/	
		+		+	Facilitate business case...	https://modulo-milieustraten.nl/modulo-discipline-x/	https://openwaste.nl/
+				+	Facilitate	Haarlem Circular Raw Materials Hub	Friesland: supply/demand map of land flows
		+			Facilitate	https://repository.officiele-overheidspublicaties.nl/externebijlagen/exb-2019-24239/1/bijlage/exb-2019-24239.pdf	

	+		+			Facilitate Companies or park management may indicate that opportunities for a recycling plant exist. The municipality could actively seek a manager for a specific plot	Plastic: Pilot plants of Obbotec (Rotterdam), Uppact (Delfzijl), or Pryme (Rotterdam)	Metal: Purified Metal Company (Delfzijl/Farmsum), Jansen Recycling Group (Dordrecht)
						Facilitate		
			+	+		Facilitate Companies or park management may indicate that opportunities for a composting plant exist. The municipality could actively seek a manager for a specific plot If a gasification plant is planned, it should be	https://www.oregional.nl/bestanden/20191021_Rapport_Op_weg_naar_een_klimaatneutrale_regionale_voedselketen_Arnhem_en_Nijmegen_-_ACT_Groen_Traject_Consultancy_WUR.pdf	
						Facilitate		
	+	+			+	Facilitate	https://www.platform-investico.nl/onderzoeken/de-campus-economie	https://plantone-rotterdam.nl/locaties/plant-one-delft/
			+			Facilitate	https://www.verkeerskunde.nl/artikel/containerterminal-alpherium-vermindert-wegverkeer	
	+		+			Facilitate	https://c-creators.org/wp-content/uploads/2022/08/Download-rapport-Bouwhubs.pdf	
		+		+		Mix of facilitate and demand Use new energy generation for local, renewable energy solutions.	https://www.tln.nl/actueel/elektriciteit-breng-nu-in-kaart-wat-je-straks-nodig-hebt	https://www.rijkswaterstaat.nl/leefomgeving/duurzame-projecten/living-lab-heavy-duty-laadpleinen
		+	+	+		Municipality can modify (upgrade) shared sewer systems and build new ones Companies can jointly build shared storage tanks	https://www.stimular.nl/maatregelen/helofytenfilter-voor-eigen-afvalwaterzuivering/	https://klimaatadaptatienederland.nl/@296072/greenport-venlo-biedt-klimaatadaptief-biodivers/
						Facilitate		
						Facilitate	https://joulz.nl/nl/cases/schiphol-trade-park-energy-hub	
						Facilitate	https://www.nieuweoogst.nl/nieuws/2025/04/25/nieuwe-fabriek-voor-vezelverwerkingmammoetgrasen-miscanthus	https://greeninclusive.nl/nieuws/start-realisatie-vezelhennepfabriek-in-drachten/
						Mix of facilitate and demand		

Colophon

Beautiful Netherlands Guide to the Circular Economy on Business Parks in and around the City

Ministry of Housing and Spatial Planning,
The Hague, June 2025

This guide was commissioned by the Beautiful Netherlands programme of the Ministry of Housing and Spatial Planning, BVR spatial development consultants, Rienstra Beleidsonderzoek & Beleidsadvies BV, Buck Consultants International, RRR advice.

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Photos: BVR has traced and cited sources for the photographs used where possible.