

BUIKSLOTERHAM

Design & Development:
Metabolic

Year:
2006 - 2034

Location:
Amsterdam, The Netherlands

More info:
www.metabolic.nl/projects/circular-buiksloterham/

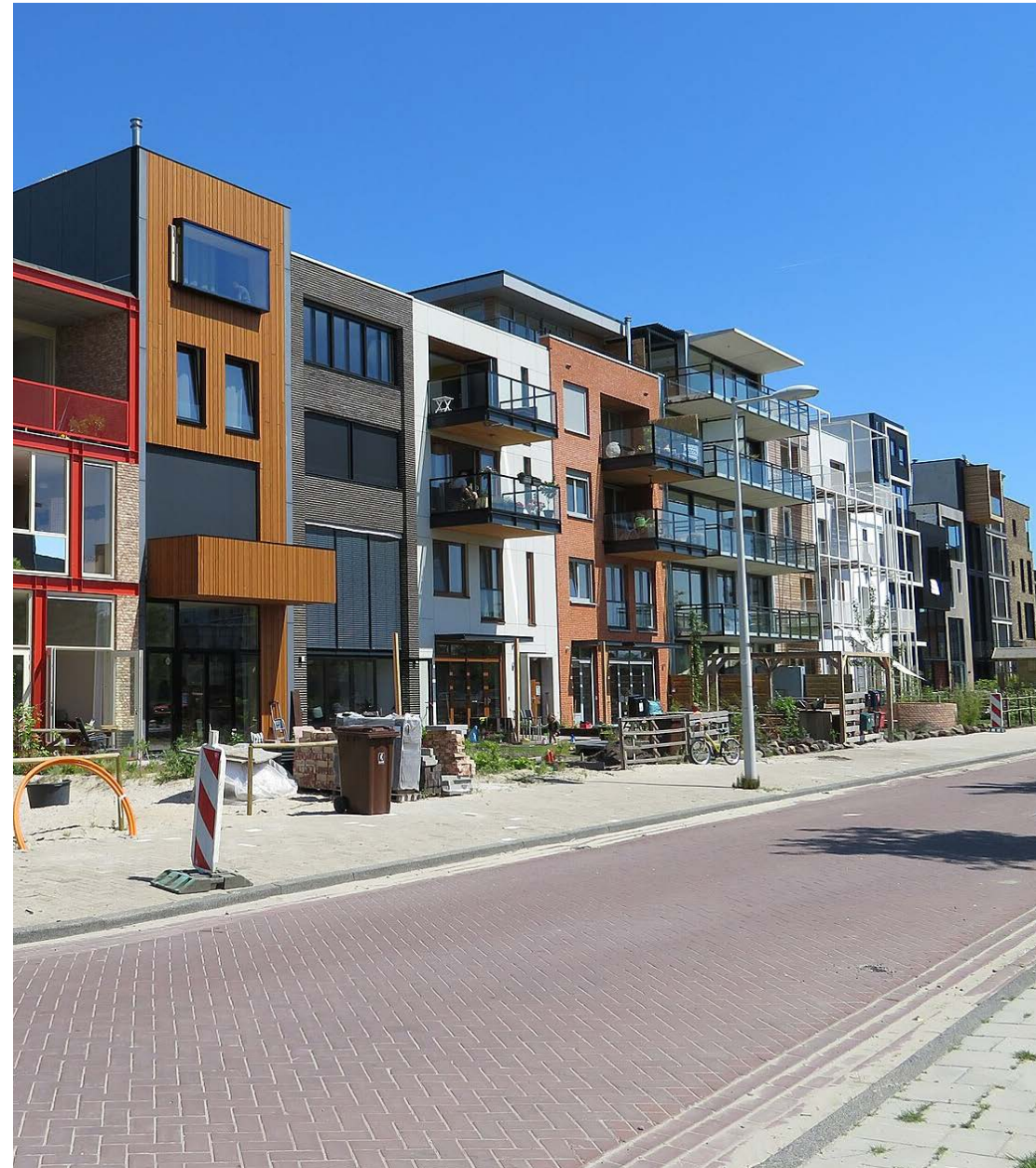
Scales:
Neighbourhood

Resources:
Water, Energy, Reclaimed
Materials, Biological Materials,
Technical Materials

Design Approaches:
Regenerative design

R-Strategies:
Reuse, Repair, Refurbish,
Remanufacture

Aspects:
Resource Flows, Stakeholders



BUIKSLOTERHAM is a circular neighbourhood project in development located in Amsterdam North, which was initiated in 2006. It is currently under implementation (2015-2034). Buiksloterham was a typical post-industrial district. Like many industrial areas, it was occupied by heavy industries and shaped by a vast system of harbours. With the docks' relocation in the 2nd half of the 20th century, the site was left with polluted soil and relics of the former industrial and logistic activities. Today, the site has been completely

redeveloped into a neighbourhood for living and working. The redevelopment allowed the city to create Amsterdam's first circular urban development. It's one of the first circular projects on this scale with a bottom-up approach, where no concrete system is implemented from above. It is kept open for the creativity and innovations of the inhabitants. Because of its pioneering role, it's also called Circular Living Lab because it serves as a test field for circular systems.

The Municipality of Amsterdam aims to

transform the 100-hectare former industrial area into a nearly completely zero-waste living and working neighbourhood by 2034.

1. Conceptualization of Circularity

What is the circular idea, theory and approach behind this project? What is the aim and purpose of it?

The *Buiksloterham* project relies on the circular city concept. Since its origin in 2014, it was conceived as a pilot case to test and implement the possibilities and limits of this concept.

In dialogue with the city of Amsterdam, housing corporations, utility companies, and residents, *Metabolic* was hired to explore how circular economy principles could be translated into the physical space of *Buiksloterham*. The area's resource flows were analysed and consequently a vision for holistic circularity was developed. The timeframe of the vision was 20 years.

The first results of this exploration were guidelines and an action plan, for where certain flow types should optimally be closed within the physical boundaries of *Buiksloterham*. At the core of the transformation of Buiksloterham from a post-industrial area into a residential and office neighbourhood are key circular concepts: regenerating and reusing materials and space and closing resource loops.

With this ambition, the project follows the general order of action priorities for managing local resources:

- Reducing the volume of local flows (demand-side management)
- Finding local supply synergies (heat cascades, material cascades)
- Supplying local flows in a renewable way

Based on this approach, priorities for *Buiksloterham* on managing physical flows have been to focus on the energy, water, and nutrient cycles (in that order of importance).

The result was a design of circular neighbourhoods (e.g. *De Ceuve! & Schoonschip*) in which residential, office

and service spaces are combined. A zero-waste strategy is applied, and the (re)use of local water and energy and the production of organic food is encouraged. Although Buiksloterham combines several circular principles, the benefits and limitations are still under evaluation and monitoring. Therefore, it should still be considered an experimental area for circularity.

With local stakeholders, *Metabolic* developed a set of interventions for improving the current situation through waste minimization, high levels of source separation, and improved recycling techniques. These interventions were then translated into a roadmap and action plan. In 2015, the *Circular Buiksloterham Manifesto* was signed by more than 25 committed stakeholders, anchoring public support for follow-up studies and pilot projects, and influencing urban development within Amsterdam as a whole.

2. The Sectoral Dimension

On which economic areas is the circularity focusing? What kind of system, supply chain, and flows is the project addressing?

Since 2006, the main aim of Amsterdam's municipality in the transition toward sustainability and circularity has been to apply a holistic approach to each project related to circularity in the built environment. Considering this approach and the circularity concept adapted by *Metabolic*, the *Buiksloterham* project was designed to focus on three key sectors:

- **The water and energy flow.** Water will play a more prominent role in the urban landscape of *Buiksloterham* in the future, both as a recreational and mobility feature. The aim is to make the neighbourhood storm-water-sewer-free through natural rainwater management, and to recover nutrients and resources from wastewater.

Regarding the energy flow, the total energy demand is approximately estimated at around 992 million MJ (or 992 Terajoules) per year, mainly resulting from the area's heat demand (32%), followed by energy for mobility (21%), and operational energy for remaining industrial activities (13%). Since 2020, the smart energy grid has been projected to supply 12-14% renewable energy to *Buiksloterham*, while the

remaining energy requested is produced locally. *Buiksloterham's* smart energy and heating capabilities include more than 1 MWp of solar plants, smart heat pumps, (underground) heat storage, smart electric vehicle charging hubs, and both (30+) decentralized home batteries, as well as a (>1MWh) centralized community battery system. *Spectral* will implement its *Local Energy Market* platform within *Buiksloterham*, allowing residents and local businesses to trade renewable energy across the district. A nearby business can access that available green energy if a block of flats generates more than it needs during working hours.

- **Food and organic waste streams.**

- **Circular buildings and infrastructures.** Houses are primarily passive structures, self-built with recycled material. The project also strives to create a more efficient form of transportation. Aside from having an efficient and CO₂-neutral public transportation system, the project consists of a network of shared facilities such as (electric) cars and bikes. It is planned to create at least one bike parking per 25m² of housing. To support soft mobility, the municipality aims to facilitate the switching of different modes of transport (from public transport to individual sustainable transport like bikes, e-bikes and electric vehicles). In particular, an extensive grid of main and side streets was designed with the idea of increasing accessibility and dispersing traffic. However, by widening the public roads, more bicycle space is created, heightening the demand for bike storage spaces.

3. Sustainability Framework & Transition Concepts

What is the context of the project? What is the socio-economic, legal, and political structure established to develop the project?

Buiksloterham serves as both a living test bed and catalyst for Amsterdam's broader transition to becoming a circular, smart, and biobased city. Since 2006, the Municipality of Amsterdam started to see potential in a new development of the former industrial area due to its proximity to the city centre and loss of its original use. The initial idea aims to create the first holistic circular neighbourhood in the Netherlands, which could be used as a blueprint. Such a vision

initially focuses on largely renewable energy. Resources and materials are recovered for reuse, repair, and further recycling, and the adjustment of new developments according to the availability of materials. The transition towards circularity of the neighbourhood also pays careful attention to liveability, by investing in biodiversity and an appealing aesthetic of streets and buildings.

Additionally, the development attempts to achieve a social and diverse working-living climate where culture is regarded as an integral part of circular development. Establishing new business models and residents' involvement are crucial. As reuse will be optimal when the exact needs of local residents are met. Meet-ups between residents and businesses are facilitated to offer opportunities to present their projects and build networks.

In a practical sense, the *Buiksloterham* sustainability framework sets out the following ambitions:

- to be self-sufficient in energy and based on renewable energy;
- to be a 'zero waste' neighbourhood with a closed material flow as much as possible;
- to be rainproof and extract nutrients from wastewater;
- encouraging soft mobility in the neighbourhood;
- stimulating local and circular businesses.

4. The Social Dimension

Is this project bottom-up or top-down in its approach, and what role do local inhabitants, stakeholders, and circular innovators play? Does it have a flagship / pioneering character for others? Does this project view people as consumers, users, or pro-sumers in the context of a circular economy? Does it have a pioneering role, with impact beyond its region?

In *Buiksloterham*, the citizen-driven dimension is a crucial aspect and considered a possible development model. Unlike traditional development initiated by cities, this project is characterised by a bottom-up approach. Moreover, it is based on simple urban plans where individuals and groups could build houses

or apartment buildings. Many developers own one or more plots in the *Buiksloterham* neighbourhoods. This property fragmentation allows for experimentation with various ideas, some with a more participatory character; in contrast, others are distinguished by a more top-down structure. However, both initiatives are developed under Amsterdam's municipal policy and ambition of being circular and sustainable. Thus, the *Buiksloterham* project is considered a living lab with a diverse community, where ideas and innovations can be tested and supported because of fewer communal restrictions in the neighbourhoods than would usually be the case.

From a design perspective, the developed neighbourhood is much more diverse than those created through a top-down approach due to the direct involvement of the diverse range of residents. For instance, the floor plans (especially those of the 'building groups') are more flexible as people understand life changes. The communities have organised themselves around circular principles by reusing local resources. Greater involvement of the people who will live in these buildings is, unsurprisingly, resulting in more loved neighbourhoods.

5. The Territorial & Spatial Dimension

What is the scale of the project? Are urban planning policies design strategies cross scale? If yes, how and which flows are involved? What is the role of space and territory in this circular project?

Buiksloterham was designed and developed by thinking that circularity has everything to do with time and space. Modifications to the metabolism of the circular city are seen as a continuous process. A circular city is a city that continuously reinvents and improves itself. In *Buiksloterham*, a transition towards circularity consists of applying the right technical innovations at the right time and place, i.e., optimal integration between systemic and spatial design.

Within Amsterdam, *Buiksloterham* is a rare case: though it has been treated as a functionally peripheral district because of its industrial past, it is located just five minutes from the old centre of Amsterdam across the IJ river. *Buiksloterham* is like a blank

slate with many empty plots and almost no monumental buildings compared to most other centrally-located neighbourhoods. This status creates space and flexibility for new development through the systemic design of different flows and supply chains. As the number of exchanges between systems and flows taking place grows, so does the complexity and resilience of the circular city within the project. The circular city is indeed reminiscent of an ecosystem in which developments find their own niche, fertile soil for new applications, wherein the most successful float to the surface and find broader applications. The site is connected to the municipality's more extensive networks for heating, electricity and sewage. Networks whose users not only take from them but also networks with which exchanges take place. Therefore, as the small circular exchange of flows is born and even though the project focuses on the neighbourhood scale, its results, benefits and knowledge spread across Amsterdam's entire city. The site was designed to profit from the present (solar or wind) energy and the force of gravity. The design of the underground space was crucial for the project development and its circular ambition: soil life, water buffering, massive tangles of infrastructure, the remains of past constructions, piles, soil reclamation, etc. These infrastructures are often invisible but play a role in the location determination of circular interventions and the general structuring of the neighbourhood. The current structure and existing building typologies allow an open and flexible approach to creating a new type of urbanism based on circular concepts. That might support the design and implementation of circularity in other newly projected districts overlooked.

6. Assessment & Monitoring

How are strategies and policies monitored and evaluated? How is the qualitative and quantitative success of a project evaluated?

Due to the current implementation status of the project, it is difficult to quantitatively monitor the success or the failure of this circular initiative and development. However qualitatively it is assessed to provide interested stakeholders with some basic information necessary to develop a new circular and sustainable neighbourhood by:

- verifying and promoting the (re)use of

(waste-)water

- waste management
- energy / heat use and production

Next to more technical information, it is crucial to highlight that since 2016, the number of residents has increased from approximately 30 residents to 715 in 2022, with an ascending trend in 2023. According to the original urban project, 6.500 residents will live, and 8.000 people will work in *Buiksloterham* by the end of 2034. collection.

Colophon

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References & further reading:

Metabolic. (n.d.). *Circular Buiksloterham*. <https://www.metabolic.nl/projects/circular-buiksloterham/>

Pulido Barrera, P. (2014). *Circular Buiksloterham: Assessing Circular Urban Development in Amsterdam North*. 10.13140/RG.2.1.2926.5120. https://www.researchgate.net/publication/281373680_Circular_Buiksloterham_Assessing_Circular_Urban_Development_in_Amsterdam_North