Climate Action 2020

Expert Knowledge, Innovative Thinking

Urban Insight

Going circular

- A vision for urban transition



Picture: Tovatt/Mandaworks

SWECO

Urban Insight

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- A vision for urban transition

Contents

Introduction	4
Why go circular?	6
Circular action	9
- The built environment	9
- Landscape	13
Circular considerations	16
About the Authors	22
References	23

How can we go from awareness to action in circular design?





Introduction

The way we look at nature has always shaped our actions, not least in how we relate to our surroundings. Thanks to increased economic opportunity and ease of access to goods that were previously difficult to obtain or manufacture, we live in a linear "take, make, use, dispose" culture. This prevails in all sectors including the construction industry. Across the industry, common practices include clearing sites of wildlife or previous developments or planning new sites rather than adapting projects to the site's premises. Tear down and build new has become the norm. This linear approach to construction harms the environment in the broadest sense.

We see the footprints of these new construction projects replicated the world over. The resulting climate cost is high, unsustainable and often results in monotonous urban environments. The construction industry is responsible for a higher level of carbon emissions (9% globally through material production) than both international air and sea transport combined.

This report describes circular actions that can be taken to mitigate and manage the consequences of climate change. It also describes the aesthetic effects of such actions – how circular design helps to create unique urban environments for all citizens. The report aims to put circular actions in a broader context and outlines circularity conceptually as a holistic strategy that follows the principles of nature. The focus is on physical structures and their surroundings and on the impact of circularity on the physical environment – and vice-versa.

The need for climate action is urgent as we are witnessing an unpreceded loss of biodiverse ecosystems. Our climate is becoming more extreme as we see heat waves of increased intensity and duration as well as increased flooding. By adapting our cities and towns and by adopting a circular strategy we can bend the biodiversity curve, improve our climate and provide more appealing urban spaces.

Achieving this demands a change of mindset based on a respect for nature. This report provides a vision for urban transition.

3 global sustainable development goals are in focus in this report:



Why go circular?

THE URGENT NEED FOR CLIMATE ACTION

Although the problem of global warming has been known for more than 30 years, it has not been challenged to any significant effect.[1] In fact, worldwide carbon emissions caused by human activities have increased constantly, resulting in a continuing rise in carbon concentration levels in the atmosphere.[2] Only in 2020, as a result of the pandemic, did emissions decline considerably (8.8% in the first half of 2020). The longer term effects of the pandemic, however, remain uncertain.[3]

As a result of global warming, we are already witnessing rising average and extreme temperatures, glacier ice melting, rising sea levels and ocean acidification, lower groundwater tables, and changes in plant and animal habitats. Our biodiverse ecosystems are under threat, and we see that the effects of climate change are also having a significant impact on human society. The population in urban areas will grow by nearly 2.5 billion people in the next decade.[4] Decisions made about cities and urban infrastructure in the next decade will put countries on a path to prosperity and resilience – or decline and vulnerability. As the United Nations has stated, we need to reduce emissions by 7.6% every year between 2020 and 2030 to limit global warming to 1.5°C.[5]

Given the challenge of meeting the Paris Climate Agreement goals, the construction industry must also look for possible reductions since it accounts for a large proportion of carbon emissions.

CIRCULARITY AS CLIMATE ACTION

Circularity means that resources should remain in an economic and functional cycle as long as possible. The concept of waste is not part of such a practice, as all materials are considered a resource.

Implementing a circular approach is crucial to reducing carbon emissions in the construction sector. In 2020, the EU published a Circular Economy Action Plan. This plan provides a future-oriented agenda for achieving a cleaner and more competitive Europe in co-creation with economic actors, consumers, citizens and civil society organisations.[7]

Circular measures provide us with solutions to mitigate climate change by reducing carbon. Circular measures also enable us to manage the consequences of climate change, such as making a city robust and prepared for heavy rainfall. These measures provide solutions without necessarily reducing people's standard of living. In fact, it turns out that such solutions actually add value.

In 2018 total carbon emissions were 55.3 $GtCO_2e$. 21% of these emissions were related to material production, and 9% were caused by material production in the construction sector.[6]

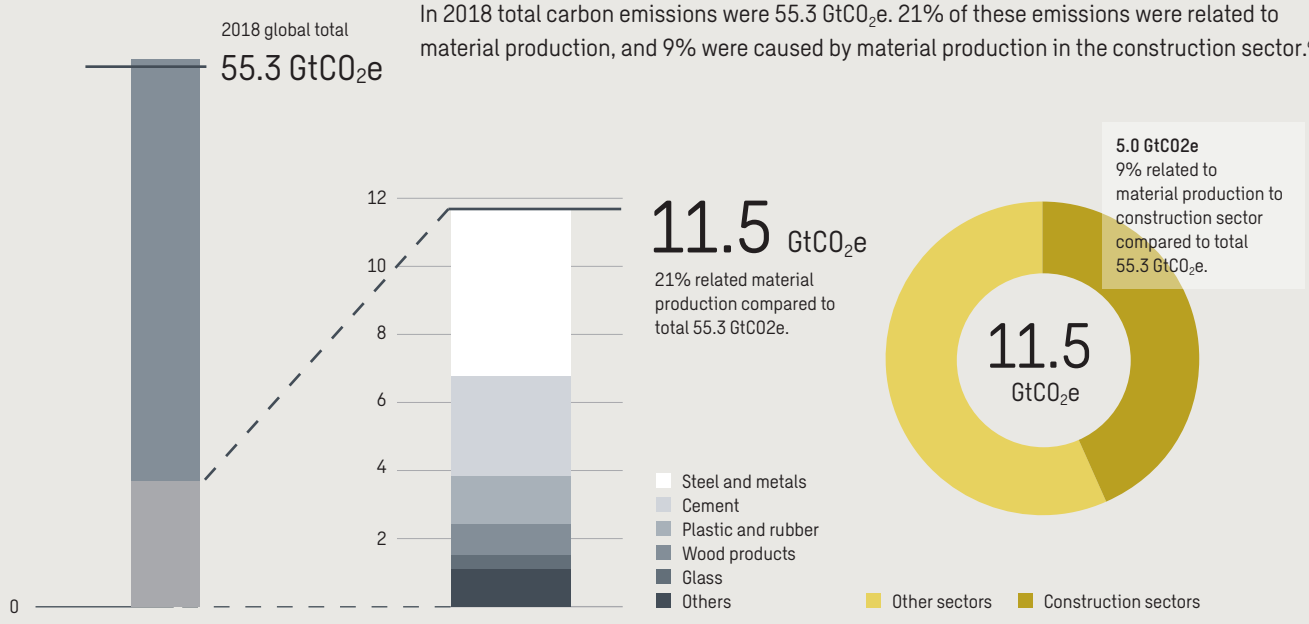




Illustration: Sweco

THE AESTHETICS OF CIRCULARITY

The European Landscape Convention highlights landscape planning as "strong forward-looking action to enhance, restore or create landscapes". This means that there is great potential to promote the desired landscapes at an early planning stage. But the right decisions must be taken.

Circularity offers a narrative about how a cycle of life unfolds in a broad sense, embracing everyone and everything. Every generation is a part of the cycle of life, a cycle formed by a continuity of human traditions and heritage. This narrative helps citizens to understand the implications of climate change. And approaching nature with humility might be a reason for implementing circular measures that can mitigate climate crises.

The influential landscape planner Ian McHarg articulated "design with nature"[8] as a version of circular planning. Circular strategy is an applied mindset that follows the principles of nature. In this regard, circularity means adapting any human construction to the site-specific processes of nature. This aesthetic framework provides scope to prioritise beauty and the creation of places we strive to take care of in the future.

CIRCULAR URBAN DESIGN

The circular design of our cities involves managing the physical environment within the site-specific processes of nature. But how does this relate to how we design our cities? And what's in it for the citizens?

From a circular perspective, it is important to see the urban structure as a whole – which requires more visionary, holistic planning. But today's laws and regulations on the reuse of building materials are demanding. As a result, building materials end up in containers even though they are fully usable. However, there is a call for a green change and a new rulebook in the construction industry among architects and contractors.

Circular actions are the results of choices made at a policy level, by individuals and at different stages in between. According to the EU Commission's Circular Economy Action Plan, the circular economy will provide citizens with high-quality, functional and safe products that are efficient and affordable, last longer and are designed for reuse, repair and high-quality recycling. A whole new range of sustainable services, product-as-service models and digital solutions will bring about a better quality of life, innovative jobs and upgraded knowledge and skills.[9]

When we consider models of circularity, we have to adapt and understand them in the context of urban design.

Property developers are responsible for the physical structures people live in. It is important to see the urban structure as a whole – which requires more visionary, holistic planning. The role of the developer seems to be shifting towards being part of a long-term arrangement. And a circular approach to development is central.



Circularity involves reducing, reusing, recycling, sharing and more. However, this report focuses on physical structures and their surroundings. Other key issues, like social and economic considerations, mobility and energy production, are integral though not addressed specifically here.

A good urban environment is much more than a collection of environmentally friendly buildings.

Kenneth Dahlgren, Head of Urban Development and Society, Aspelin Ramm estate developer

KEY DEFINITIONS

CARBON	Shorthand for all greenhouse gases, quantified in tonnes of carbon dioxide equivalent (tCO_2e)
DOWNCYCLING	When materials are recycled into another material of lower quality.
RECYCLING	When materials are processed into products or materials used for their original or other purposes.
UPCYCLING	Recycling materials into new products or materials of better quality.
AESTHETICS	Visual and sensory qualities and the citizen's reflections upon such qualities.

Circular action

The built environment

Buildings are an essential part of our living environment and provide space to work, socialise, sleep, or simply enjoy life. Building structures, walls, roofs and floors are resources that enable these operational environments. However, as time goes by, cities and districts evolve. Buildings need maintenance, people move in and out and grow older, and new generations present different needs.

Changing demands therefore require our buildings to transform from time to time. But producing new building products and materials causes carbon emissions, which again increases climate change. As a result of creating materials for use in construction, emissions are in many cases at least as large as for energy use throughout the building's life cycle.[10] **The EU stipulates that starting in 2020, 70% of all construction waste must be recycled.**[11] It is crucial that we constrain all actions that escalate climate change. We must realise that each brick, wall, door and windowpane has a value.

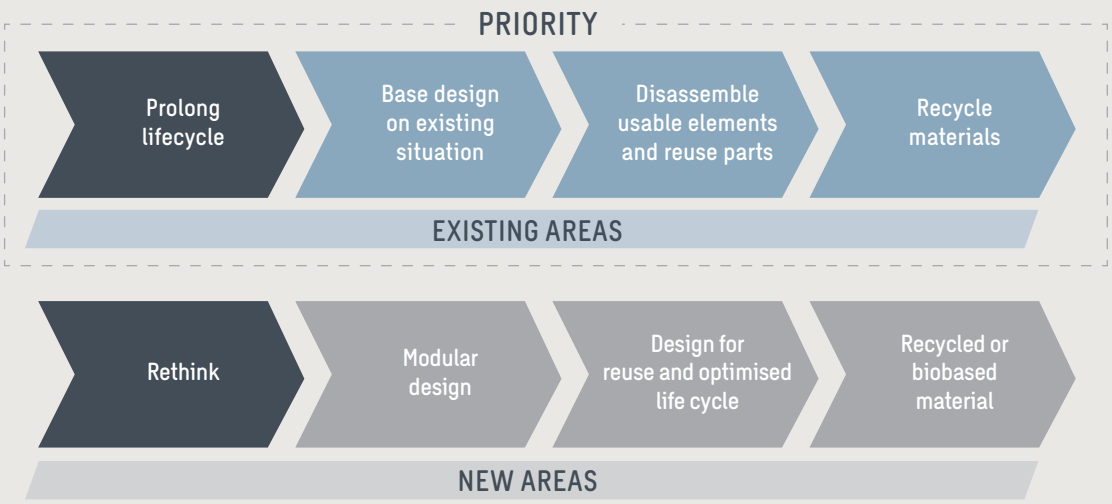
REUSING EXISTING BUILDINGS

Preserving and extending the lifetime of existing buildings normally results in less carbon emissions than demolishing and building new ones. To reduce emissions created during the production of building materials, existing buildings should be reused where possible and space efficiency maximised to avoid building more.

CIRCULAR ACTIONS FOR CONSTRUCTIONS IN EXISTING AND NEW AREAS

In general, for existing areas it is better to prolong the lifecycle of and reuse complete buildings or elements rather than recycle mass from demolished buildings. Recycling is better than downcycling, specifically in regard to the energy needed in the transformation process.

When planning development of new areas one should think of what kind of design concept is best in each case. Developing new areas provides the opportunity to design with the end of the lifecycle in mind.





In the Økern area development in Oslo, an 18-storey building from 1970 is planned to be reused in the future. Calculations made with the software One Click LCA show that if the building is demolished, and a new one rebuilt, the materials will account for approximately 4,000 tonnes of carbon. By contrast, preservation and rehabilitation, which retain most of the heavy structures, will emit about 1,900 tonnes of carbon. This contributes to a reduction in emissions of approximately 55%.

Another example of the same approach is found in Finland. The City of Helsinki aims to achieve carbon neutrality by 2035. This target is ambitious and requires implementation of a wide range of actions. In an area where most of the buildings were constructed during the 1960s and 1970s and are now in need of heavy refurbishment, Sweco has performed construction calculations indicating that it is possible to achieve even up to 59% lower embodied carbon while providing preserving refurbishment. Maintaining the existing bearing constructions in steel and concrete in particular had a huge impact on lowering the carbon footprint. Moreover, the construction cost analysis indicated that a preserving renovation would be more affordable than the construction of new buildings.[12]

REUSING BUILDING ELEMENTS

When the entire structure cannot be adequately reused, r eusing existing building elements makes a good alternative. A positive example of the potential extensive reuse of building materials and elements is Construction City, an alliance of construction businesses in Ulven, Oslo.



Global cement production is responsible for approximately 5% of total carbon emissions.[13] This is more than the global emissions from air travel. So there is no question that there is huge potential to reduce the carbon footprint of the project when it comes to concrete. Therefore, the main focus has been on concrete. The project has an opportunity to reuse, or recycle, 70–90%. They have the potential to reuse 3,400 tonnes of concrete by reusing and reconfiguring elements, and as a result reduce overall carbon emissions by 952 tonnes. This is the equivalent of about 350 round-trip flights from London to New York. The client further requires a minimum 100-year lifespan for the structure. And to maximise end-of-life reuse, the concrete contractor has to create a plan showing how they will disassemble the elements.

RECYCLED AND BIOBASED MATERIALS

To reach carbon neutrality targets, we need to find ways to produce buildings with minimal carbon emissions and to maximise operational energy efficiency during the use phase. In addition to the reuse of existing materials, the construction of buildings using renewable materials offers a decent solution in this regard. Building in wood has gained much attention recently. Each cubic metre of wood binds a ton of the greenhouse gas CO2. The more wood we store (e.g. in buildings), the less CO2 the atmosphere needs to deal with.[14] Wood is renewable, can provide large separate components to build with and is relatively light. This allows for a rapid construction process and less need for large cranes. If reuse is not possible, the next step is recycling.



Generally, up to 50% carbon is saved by building in wood compared to conventional construction. Photo: Sweco.



Mjøstårnet, construction design by Sweco Norway. The tallest wooden building in the world! Photo: Sweco.

DESIGNING FOR REUSE

The reuse of existing buildings is another method that prefers reuse over new builds. Entire buildings can be moved from one site to another.

Norway has a long tradition of moving its houses. In fact, the dismantling and rebuilding of log cabins in new locations is part of Norwegian building history. In the future, when designing new buildings or structures of various kinds, the same principles should be taken into consideration.

Today, solutions already exist to make movable buildings. Parts of buildings can be detached without destroying the main structures. Elements of lightweight wooden structures are quick to assemble on site and can then be moved somewhere else or even implemented as a part of another building. A good example of this modular design is by a Finnish building supplier that provides prefabricated learning spaces that can be dissembled and moved to another site when needed. Schools, preschools, gyms and cantinas are made like this. With this approach, it is possible to maintain entire or parts of buildings and relocate them somewhere else. There is no need to demolish in the usual sense of the word.



Ströms in Gothenburg. Value-driven visualisation of the Ströms building in Gothenburg based on its whole-life carbon footprint.

In general, value-driven visualisations in BIM (Building Information Modeling) are a necessary precondition for an effective communication of various sustainability aspects of the design such as cost, carbon footprint or various circularity aspects of the design.

On the image is a value-driven visualisation of the Ströms building in Gothenburg based on its carbon footprint from its whole life. Visualisation tools can be crucial to point out circularity aspects such as the reuse, recycle, and upcycle potential. Using tools already during the design phase can pinpoint noncircular components and materials and prevent their use. In addition, keeping track of materials used over time, is an essential tool for circular development.

VALUE-DRIVEN VISUALISATIONS IN BIM TO IDENTIFY VARIOUS SUSTAINABILITY ASPECTS.

Using value-driven visualisations in BIM, a project can get insights about crucial sustainability aspects, such as global warming potential (net carbon emissions), costs and the potential for reuse, recycle and upcycle. Visualisations can be made specifically for:

- material (steel, wood, insulation, glass, aluminium etc.)
- component types (roofs, ceilings, walls, stairs, sanitary systems etc.)
- technical discipline (architecture, structure, MEP etc.)
- life cycle stage (production, usage, end of life)

Once implemented in BIM, further analysis is possible. The user can get niched insights on demand, such as the specific carbon footprint of all walls during the production stage. Also relationships between sustainability aspects can be visualized such as the climate intensity per invested euro of the given component, material or discipline.

The landscape

DESIGN FOR LOCAL DRAINAGE AND THE ESTABLISHMENT OF FLOODWAYS

One consequence of climate change is increased and heavier rainfall. In areas where much of the land is covered by pavement and buildings, water runs off as much as 10 times faster than on unpaved land.[13] Creating rain gardens that manage the water locally is one way of meeting the challenges. Additionally, when the rain is extremely heavy, and the amount of water exceeds the dimensions of the retaining and storage system, safe flood routes are essential to handle the rainfall.

In order to let water follow the cycle of nature, it should be drained locally. This means designing for storage and delay on site, preferably in an open system to handle heavy rain and achieve a more robust system than leading the water into pipes.

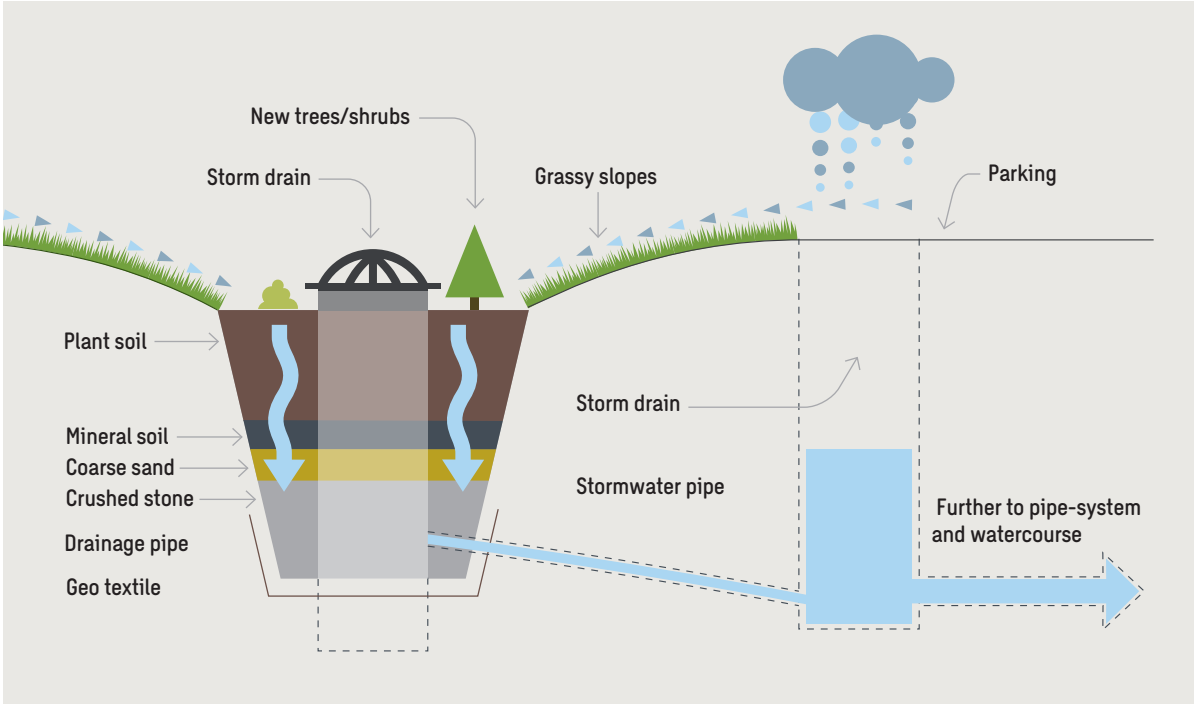
Sweden's largest rain garden ever has been created in Kviberg, Gothenburg. Sweco designed and made the necessary assessments to handle rainwater from a 15,000-square-metre area. To manage the rainwater that flows from the parking area, about five percent of the total area has been used for rain beds, which both purify and delay stormwater.

LANDSCAPE APPROACH

- Use existing structure as a basis
- Re-use elements on site (water, soil e.g.)
- Restore lost landscape

Along a hiking trail in Skytterdalen in Bærum, west of Oslo, Sweco has redesigned a stream, that was previously underground, as surface water (also called daylighting). This to manage clean surface water and separate it from wastewater. The solution involved forming a stream course built up of moraine masses, with thresholds and larger stones. The stream course is designed to handle a 25-year flood, and in some areas where key infrastructure intersects the flow it is built to withstand a 200-year flood.

STORMWATER MANAGEMENT



The principles of a rain garden according to Gøteborg Municipality, Sweden.



At Kadettangen west of Oslo, Bærum Municipality developed a popular recreational area on top of new terrain built with about 21 million cubic metres of masses, mostly rocks, transported from a large infrastructure project close to the site. Photo: Siri Bjørnbakken.

REUSING WATER ON SITE

In areas where water is a preciously limited resource, cleaning and reusing water is crucial for ensuring adequate supplies.

Biozone Ootmarsum in the Netherlands is a constructed wetland whose main purpose is to convert the effluent from the wastewater treatment plant of several towns into clean water that can be used in the natural environment. The project, designed by Sweco, is a part of the European Union Interreg IIIB project Urban Water Cycle.

The biozone adds oxygen to the water and reduces ammonium and suspended matter. The biozone has varying water depths containing both aquatic plants and marsh plants capable of growing. This forms the basis of an aquatic ecosystem that is home to several vital ecological links. The design has a natural appearance and is integrated ecologically and visually in the landscape.

LAND USE PLANNING

Wise land use planning shows great potential to reduce negative impacts on biodiversity, animal habitats, soil structures and other qualities of nature. Good development is defined by the area we do not use, and by how we promote landscape qualities. For example, this involves emphasising the character of a place, which the European Landscape Convention advocates for in landscape planning as “strong forward-looking action to enhance, restore or create landscapes”.[15]

Designing good landscape plans at an early stage makes it possible to avoid unnecessary blasting, digging and transport. For every 5 to 10 cubic metres of rock blasted, one truck is needed to transport it. Nevertheless, when a significant change of terrain is needed, the masses should be used for landscaping on or near the site. This is a bold and large-scale act; still, it mirrors a circular mindset in reusing the resources locally in a positive way.

REDEVELOPING THE LANDSCAPE

Long ago, a river passed through Økern that is today transported in pipes. In the planned development of the urban area around a high-rise building, parts of the water flow will be taken to the land surface. In this way, landscape that has been lost for decades can be recreated.

The stream through Skytterdalen in Bærum, where such a floodway is established, was built after a study of older maps and terrain assessments. The banks and the rest of the park are planted with local vegetation. The result is an attractive recreational area, with a stream and hiking trail winding through the valley, over cliffs, alongside ponds and thresholds that retain water and maintain different water levels.

In both cases, the qualities remaining from the original landscape help to strengthen the character of the area.

Circular cities are about reusing buildings and materials, but also about closing the larger cycles for water and nutrients in e.g. food and sewage. And if we dare to think really big, then circularity is also about closing the carbon cycle through the use of biomass-based structures and carbon sequestration in the soil in regenerative landscapes.

Stein Stoknes, FutureBuilt



This high-rise building from 1970 has been reused. Elements of the landscape that have been lost for decades will be recreated by the development of Økern Centre in Oslo, Norway. Illustration: A-LAB and Økern Sentrum.

Circular considerations

THE AESTHETIC BENEFITS OF CIRCULAR ACTION

Circularity contributes to climate mitigation and adaption by both mitigating and managing the consequences of climate change. It also adds a pleasing aesthetic dimension to urban development. In most cases when the concept of circularity is realised, it results in a more interesting urban environment for citizens.

The reuse of the high-rise building at Økern is positive from the perspective of carbon emissions. But by letting the building remain it also adds both a historic dimension and symbolic value to the new area to be developed. There is a growing willingness to pay for properties in conservation areas, and in that respect saving historic buildings and the surrounding environment may also result in increased property values.[17] This proves that proximity to older buildings and physical environment are attractive qualities. Considering this, plus the fact that cost reduction and carbon reduction often go hand in hand, circular actions should be highly relevant for a lot of projects.

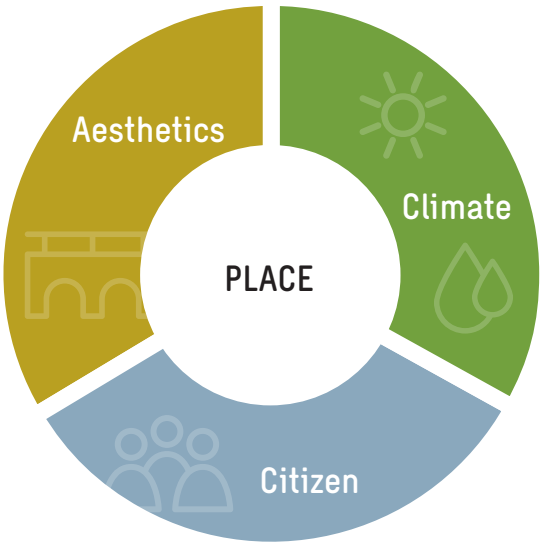
Redeveloping and exposing streams previously hidden in pipes, as planned at Økern, will reinvent the interpretation of the old river as a piece of nature and showcase it in the new urban context – a lost landscape will be retrieved. Together with letting the symbolic high-rise building remain, this will create a site-specific urban environment.

In creating the floodway in Skytterdalen, nature becomes a design model for the reinterpretation of a new landscape. The original features of the place gain prominence through the creation of space for stormwater and native vegetation. Reclaiming this place is an example of practicing the aesthetics of circularity using a long-term perspective. The physical environment becomes pleasant and attractive for citizens walking along the trail by the stream.

Nature serves as a motive for the processes taking place by mimicking natural methods when recycling or reusing buildings, water or terrain, as in the constructed wetland in Ootmarsum, which cleans water and accomplishes much more. The design has a natural appearance and is integrated ecologically, and the enhanced site is made accessible by a footpath and a a hill with a view. Also, at the more prosaic site containing the parking lot in Kviberg, Gothenburg, the cycle of nature is revealed by the functional and beautiful rain garden, which manages the rainwater locally.

A circular point of departure results in site-specific solutions, and often the preservation of historic elements of the site concerned. Taking circular action is made visible to different degrees in the physical environment. Sometimes it is easy to see, such as when an old brick building is placed in a modern context. But circular actions are sometimes more difficult to perceive visually, for instance when a modular building has been erected, or elements of the terrain and vegetation have been incorporated into the new developed landscape.

So, what does this mean for the people who live in these areas? Circular action results in places with a more site-specific character and diverse visual expressions, where nature is made more visible and available in the urban environment. Simply put, circularity helps to create more attractive places that are more appreciated by citizens.



THE TRANSITION TO CIRCULARITY

The concept of circularity has many positive effects, as we can observe by developments in society in general and the construction business in particular, which is starting to embrace an overall positive attitude to circularity. Traditionally, it has been easier to demolish and build new rather than restore existing buildings, and to lead rivers and rainwater into pipes rather than let water flow or drain along the ground. But if we look back at history, we can see that circularity is nothing new. A few generations ago, some garments lasted a lifetime, farming was practiced where the land was most suitable, houses were built according to local building practice and methods, and landscape changes were minor. The question now is: how do we return to circular practices adapted to today's challenges on a larger industrial scale?

The engagement of the architectural profession is broad. The engineering knowledge required is on track. And to a greater extent than before, developers regard their role in society as community builders more than traditional property developers, with an increasing will to take action using a circular approach. But overall knowledge and experience are still at an early stage. And the design and planning process is different, and perhaps also more complex, than the conventional straightforward mindset that has dominated most urban development processes in recent decades.

To succeed in the transition to a circular approach in developing urban environments, we need to recognise differences in the linear and circular approaches. Every site has its own character defined by natural conditions and how these are managed over time. This means that every project requires individual assessment regarding solutions and design. However, as many good examples have shown, circularity is possible!

Yet facilitating circular projects requires flexibility in terms of scope for innovation. Formal guidelines often greatly lag behind society's mindset, presenting a huge challenge. The value base that motivates a development is therefore vital for achieving circular urban development.

It is crucial that governments and other stakeholders ensure effective implementation. Laws and regulations must reflect the change and make it happen, and developers must include circularity as a part of their requests. We all have a role to play.

VISUALISATIONS THROUGH DIGITAL TOOLS

During the design phase, we can pinpoint noncircular components and materials and prevent their use of these in the project. With the integration of circularity aspects in BIM models, we can communicate various reuse scenarios and their economic consequences directly in the BIM model and create preconditions for an effective reuse in the future. In fact, future generations count on us to pass on state-of-the-art BIM models with circularity aspects on the object level, if they are to reuse materials and components effectively.





The Devonshire Square (UK) project shows the conversion of a previously used space. It includes the reuse of materials and the upgrade and reconfiguration of existing plant systems. Photos: Nick Clark



TRANSFORMING FUTURE CITIES AND SOCIETIES TOGETHER

In 2020, five architecture and engineering students worked on finding out how an area in the middle of the city could become circular, considering everything from energy to material use, production, goods and urban offerings. This illustration shows how the students envision a potential use of the top of the railway tracks of Oslo Central Station.



Sweco Norway in collaboration with the estate developer Aspelin Ramm invited students to explore current social issues and future solutions.

TRANSFORMING THE BUILT ENVIRONMENT

In the UK, White City Place, a project made up of 6 buildings of 950,000 sq.ft. on 17 acres of land, was awarded a BREEAM (sustainability assessment) 'Excellent' rating. The rating recognised the way in which the 3 existing buildings were transformed into modern working environments through refurbishment and repositioning.

In terms of retention of the existing building, the following was retained:

- All the existing structural elements of the building. In terms of demolition, reused on site where possible crushed material including for the new courtyard landscaping base and where waste was removed from site virtually 100% was diverted from landfill and reused.
- An energy efficient sub-floor displacement ventilation system was provided which utilised the existing air shaft risers in the building.
- Substantial upgrade to the existing ecology of the site with a new landscaped courtyard that incorporated external café and seating at first floor level.
- Repurposed some of the floors in order to secure the longer-term future of the development.



The UK White City Place.

RESTORING A HISTORICAL ELEMENT

The Voer, a tributary of the river Dijle in Belgium, has been uncovered and exposed again after a century of being hidden from sight. Residents of the Kapucijnenvoer can now experience a pleasant, green living space and enjoy views of the water once again.

The chaotic traffic situation has been tackled and a safe link has been created in the bicycle axis between the city centre, the apartments and the campus. The reconstruction has restored a historical element that refers to the urban and economic development of Leuven. The project combined various objectives: creating a clear traffic situation, making the Voer visible again in the townscape, improving water management and increasing the image value of the Kapucijnenvoer.



Kapucijnenvoer, Belgium. Photo: Tom D'haenens.

CIRCULARITY FOR THE ENVIRONMENT AND FOR US ALL

The need to take climate action is urgent. Understanding and accepting circularity as a mindset – and respecting nature – can be the driving forces that help us to implement and develop concepts of circularity, in the present moment and over time.

Circular methods can be general, and the solutions partly technical, but the design needs to be adapted to the site – each place is unique. This places some limits on the project's options, but mainly offers possibilities to create amazing projects by showcasing and cultivating the character of a particular place.

Nina Marie Andersen, landscape architect

In the transition to circular urban development:

- Policymakers set requirements while facilitating the implementation of circular practices by updating regulations.
- Estate developers approach their projects with circular ambitions, but at the same time recognise the complexity of circular projects and the expertise that is needed to shed light on the decisions that need to be taken in every case.
- Architects and landscape architects set circular goals and work out circular design concepts.
- Engineers have the skills and use the tools to evaluate the properties of different materials in terms of durability, suitability, longevity and quality, and map waste streams in a project or an area with a view to reusing energy and materials.
- Educators inform and prepare the next generation for the transition by educating around circular methods and mindset.

By enabling circular methods in construction and landscape planning and by embracing a vision for the industry's transition, we can create unique projects and unique urban environments – ones that will benefit citizens today, in 2050 and beyond, and will make a key contribution to solving climate change.



Skytterdalen, Norway. Photo: Kristina Holmblad/ Sweco.

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REVIEW: Stein Stoknes is an architect and project manager at Futurebuilt. Futurebuilt's vision is to show that climate-neutral urban areas, based on high-quality architecture, are possible. The aim is to complete 50 pilot projects with the lowest possible greenhouse gas emissions.

SPECIAL THANKS TO OTHER CONTRIBUTORS:
Kayleigh Elizabeth Smith, Sweco Norway. Øystein Rapp, Sweco Norway. Susanna Friman, Sweco Finland. Evalyne de Swart, Sweco Netherlands. Alex Drysdale, Sweco UK. Tove Lindfors, Sweco Sweden. Richard Koops, Sweco Netherlands . Marius Fiskevold, Sweco Norway. Ørjan Kongsvik Aall, Sweco Norway

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Urban Insight

Urban Insight is a long-term initiative that provides insights about sustainable urban development, seen from a citizen's perspective. The initiative is built on a series of reports, based on facts and research, written by Sweco's experts. The initiative provides society and decision-makers with facts needed to understand and meet current and future challenges.

This report is part of a series of reports on the topic Climate Action in which our experts highlight specific data, facts and science that are needed to plan and build safe and resilient future urban environments.

Find out more by visiting our website:
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