Stockholm Royal Seaport Sustainability Report 2017
Stockholm Royal Seaport is one of the largest urban development projects in Europe, with at least 12,000 new housing units and 35,000 workplaces scheduled for completion by around 2030.

About this document
This is the 2017 Sustainability Report for Stockholm Royal Seaport. The sustainability programme for Stockholm Royal Seaport is based on five strategies for sustainable urban development. These were ratified by the Stockholm City Council in 2017. The aim of the strategies is to ensure that the area is developed sustainably over time. The report is based on the Global Reporting Initiative’s (GRI) G4 guidelines (Core option). See page 72.
Stockholm Royal Seaport contributes to the City’s vision 2040 by creating a cohesive Stockholm, based on ecological, economic, social and democratic sustainability. In a rapidly growing Stockholm, our most important mission is to create conditions for more new housing units. In 2017, 425 housing units were completed and sites were allocated for 75 units. Due to the specific sustainability profile of the area, our mission is also to be a leader and pave the way, find new solutions and test them on a large scale. Our sustainability efforts are continuously evaluated and improved, which is highly significant for management of the project and for the City’s ability to share best practices. The Boberg school, sports facility and preschool are currently under construction in Gasverket, representing another step in the process from a closed industrial area to an open city. The sheet-metal gasometer, one of Stockholm’s most famous landmarks, is being dismounted to make room for a new building on the same site with 320 housing units.

The development of Värtahamnen is progressing and during the year, public consultation took place in regard to public spaces in the southern part of Värtahamnen and how links to the rest of Stockholm can be strengthened. Over 750 Stockholmers took part in the digital dialogue and hundreds of comments and suggestions were received.

For Loudden, a number of feasibility studies were conducted and planning has moved forward. The oil operations will be phased-out by the end of 2019, and the container terminal will move to Norvik in Nynäshamn in 2020. This will enable the construction of some 4,000 housing units, sports facilities and a school. Several sustainable housing initiatives were approved during the year and we have tried to encourage these as far as possible. A flea market and swap days on Störängstorget – all activities around the fountain or Christmas tree that residents, business owners and the City have arranged jointly are events that develop a sense of trust, care and security in the urban district that people have moved into.

Stockholm City’s commitment to sustainable urban development is attracting strong interest both nationally and from abroad. During the year, some 5,400 people visited the area with various delegations. Now we can also see the buildings constructed with sustainability requirements from the start. People now living in Norra 2 have green roofs with photovoltaics, energy efficiency and a wide range of smart solutions.

Our aim is that Stockholm Royal Seaport will provide new knowledge about how to build more sustainable cities. And not least, we want to create an urban district with a large number of homes and workplaces, and that welcome all Stockholmers and everyone else who visits our City.

Staffan Lorentz
Head of Development, Stockholm Royal Seaport, Stockholm City Development Administration
Construction start-up for Bobergsskolan in Gasverket
Bobergsskolan (Boberg School) will accommodate 900 students and is scheduled for completion by autumn 2019.

A site-allocation competition commenced for Kolkajen
A site-allocation competition with a special focus on social sustainability and architectural quality is taking place for Kolkajen.  
► Read more on page 13.

Final report for C/O City
C/O City (an R&D project) has helped to show why working actively with urban greenery in the planning process is so important.
► Read more on pages 23 and 30.

The fountain gathers people
The fountain, by the artist Jeppe Hein, in Störstorgt was inaugurated in May.
► Read more on page 11.
The Stockholm City Council appointed Stockholm Royal Seaport based on five strategies focusing on how the physical environment promotes a dynamic, robust and pleasant environment, while also fulfilling several other functions. These efforts are guided by five strategies. A vibrant city focuses on how the physical environment promotes a dynamic, attractive urban environment. Accessibility and proximity refer to a dense and accessible city, where effective long-term solutions contribute to resource efficiency and climate responsibility. Let nature do the work describes how greenery can help to create a robust and pleasant environment, while also fulfilling several other functions. Participation and consultation stimulates motivation and a connection with the place. On page 68 you can read more about the targets and results of these efforts.

City of Stockholm owns the land

The City of Stockholm is a political organisation. The City Council sets targets for the City’s operations, and its members are elected by voters in general elections. Important governing documents for Stockholm Royal Seaport’s sustainability programme are ratified by the City Council. The Stockholm City Development Administration manages the Stockholm Royal Seaport project in close collaboration with other administrations, primarily the Planning Administration, Traffic Administration, Environment and Health Administration and the District Administration. This development is financed through sales of land or site leasehold fees.

Stakeholders

Residents, employees, developers, politicians, researchers, municipalities and authorities are engaged in ongoing dialogue. This dialogue determines the aspects of the sustainability programme that are presented in the Sustainability Report. Ideas and comments are captured by a project employee and resident survey, consultation meetings, research and development (R&D) projects, visitors and City administration and company-wide thematic groups. Issues of major interest include governance, how sustainability and housing development targets are met and the technical solutions that will be created.

Collaboration is a prerequisite

One of the prerequisites is broad political support, and the aspiration that Stockholm should continue to be a leader in sustainable urban development. The project organisation is interdepartmental. The sustainability organisation builds on thematic groups with experts from the City’s administrations and municipal companies, creating joint responsibility and making it easier to share best practices. The task of the thematic groups is to break down the targets into binding requirements and to identify any need for feasibility studies and R&D projects. The City specifies requirements for the design, production and management of buildings, as well as for its own projects. A working method has been developed to manage, lead and quality-assure these requirements. The requirements are monitored, evaluated and fed back, see pages 34–67. Knowledge evolves continuously, and relevant parties are engaged in the process. This enables dialogue, capacity development and experience feedback.

Knowledge generates results

Due to the high requirements for developers of Stockholm Royal Seaport, a capacity development programme is offered, comprising a series of seminars for developers with site allocations, and for the City’s project members who are involved in planning and building public open space. The capacity development programme addresses a range of themes and helps to develop knowledge and understanding of sustainable urban development.

How we work

Based on five strategies

The Stockholm City Council appointed Stockholm Royal Seaport as a sustainability profiled area in 2009. The vision and targets have been updated and are summarised in the revised governing document, The Sustainable Urban Development Programme for Stockholm Royal Seaport, which was ratified by the City Council in 2017. These efforts are guided by five strategies. A vibrant city focuses on how the physical environment promotes a dynamic, attractive urban environment. Accessibility and proximity refer to a dense and accessible city, where effective long-term solutions contribute to resource efficiency and climate responsibility. Let nature do the work describes how greenery can help to create a robust and pleasant environment, while also fulfilling several other functions. Participation and consultation stimulates motivation and a connection with the place. On page 68 you can read more about the targets and results of these efforts.

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Stockholm Royal Seaport’s collaborative model

Forums for Sustainable Solutions are recurring mini trade fairs, where developers and technical suppliers can meet to make contact and develop business. Suppliers can demonstrate their innovative solutions for both products and services.

Systematic occupational health and safety (OHS) management

Performance appraisals and employee surveys are conducted annually. Workload is the greatest challenge and an action plan has been developed. OHS at the construction site is regularly monitored and evaluated. Read more on page 67.

The project members’ slogan is

“We will grow together through commitment and responsibility.”

If you have any questions about this report, feel free to contact us at stockholm.royalseaport@stadshagen.stockholm.se.
Public spaces – streets, parks and city squares – are important meeting places. A variation of spaces is planned – intense and busy walkways, as well as peaceful and quiet settings. The different spaces form a network that connects both internally and with surrounding areas, favouring of security and equality.

When the urban structure is in place, physical barriers will be removed and walkways built. The area’s unique qualities and planned destinations in naturally appealing locations also attract people who do not live in the area. Striving for a mix of housing, offices, retail and public services combined with well-designed public spaces create conditions for a lively atmosphere between the buildings.

→ Mixed-use city
The area is planned and constructed with a mix of housing, businesses, retail and services. Changing needs throughout different life stages are met by a range of unit sizes and types of tenure. The property developers take part in a early parallel design process1 to achieve a high level of architectural quality. The City regulates the design through detailed development plan (development plan) and a quality programme.

→ Norra 2 – with a focus on people
The block structure in Norra 2 is more open than in previous development phases and reflects Gasverket’s plan structure, in which no buildings have rears. This phase contains a variety of housing types – rental and condominiums, large and small apartments, and town houses. The development is characterised by allowing each building to have its own features. Along the main street, the ground floors have premises for non-residential activities. Around Husarvikstorget, which caters to shoppers and residents, the scale is smaller.

The roofs become the fifth façade of the buildings, covered with greenery, solar panels and spaces for people. The preschool is integrated with Kontorsparken, where the park and the school yard extend over the preschool’s roof. Along Husarviken, Husarviksparken borders with the Royal National City Park, creating proximity to nature.

→ Fountain inaugurated
A spring market was arranged at Stockholm Royal Seaport for the third consecutive year. Several stakeholders gathered in the new Storängstorget where a range of activities took place. The highlight was the inauguration of a fountain by Danish artist Jeppe Hein.

AntWalk exhibited up-cycled fashion, while clothing and other objects could be dropped off at the Pop-up Re-use Centre. About 1,500 objects changed hands. The police, the library, sports and cultural associations presented their activities in the area and answered questions. The City of Stockholm’s administrations also exhibited the physical model of the urban development area.

→ Greater access to the water and the Royal National City Park
The water and the Royal National City Park are constantly present in Stockholm Royal Seaport, and give the area identity and dynamics. The southern quay promenade in Värtahamnen is being renovated and will be reopened in 2019. Two bridges over Husarviken will make the Royal National City Park more accessible. One is completed and the other will be constructed in 2018.

1 Parallel design is a method whereby a client assigns the same project to several architectural firms at the same time (Architects Sweden).
The port is a vital element of Stockholm. Enerhughamnen plays a vital role in Stockholm’s industry. Fortum is extending the biofuel storage facility for its CHP plant to secure power supplies. Cementa and the Ports of Stockholm are expanding their operations in Energihamnen which opens up space for residential development in other parts of Stockholm.

The ferry terminal at Värtahamnen has been developed and continues at Frihamnen. The port areas connect to the city to reduce barriers allowing people to move in and out of the area, on foot or by bicycle.

Transforming the steel gasometer from an industrial to a residential landmark

Gas has been produced at Gasverket for the city’s gas network and the area has been closed to the public for over 100 years. In 2019, the area will be partially opened with new activities. The development will preserve Gasverket’s unique character.

In 2017, demolition of the Gasometer 4, commenced. It will be replaced by a 90-meter high residential building with 320 apartments, and surrounded by a sculpture park. The site will receive a new landmark, equally as high but with different content.

The developer is Oscar Properties and the architectural firm is Herzog & de Meuron from Switzerland. The landscape architect is Piet Oudolf. Construction is scheduled to start by autumn 2018.

Kolkajen gives the area its identity

Architects Sweden nominated the planning of Kolkajen for the 2017 Planning Prize with the following citation:

“With its location on Värtan on the outskirts of the Royal National City Park, Kolkajen will be Stockholm Royal Seaports face outwards. The plan strengthens the entire area’s social sustainability and deepens the vision to shape the path towards a sustainable future. The urban planning concept of building a new island at the mouth of Husarviken creates a water arena for residents and visitors. The surrounding development will be dense, with rental apartments accounting for 25%. Gasverket’s old buildings and coal quay will be preserved in a green-blue walkway that gives the area an identity. The plan’s quality programme raises the critical question of how urban spaces can become meeting places for all residents.”

Södra Värtan’s development plan was previously nominated for the Planning Prize.

Competition for future housing types and tenures

A site-allocation competition commenced for 860 housing units in Kolkajen where property developers were asked to produce concepts for designing housing and other functions in the properties to better meet the current and future needs of Stockholmers. The entries will be evaluated in 2018. The other evaluation criteria are architectural quality, and to contribute to the employment of people who are least likely to find work.

Loudden – city instead of oil

The planning of Loudden commenced during the year and an urban area will replace the current container terminal and oil depot. The process is backed up by several feasibility studies on cultural history and landscape environment. See page 61.

A key condition for the planning of Stockholm Royal Seaport is that the City owns most of the land and is driving the development. To achieve an overall solution, the City is setting the framework and providing the context, while the property developers, together with architects and landscape architects, are responsible for the execution and the details in each phase. We are a team, and working with issues like qualitative methods for urban planning. That includes using the unique characteristics of the areas, creating a coherent city and promoting high architectural quality. The architectural quality is discussed and the conclusions are documented in a quality programme. This ensures that the most important elements of each project are included until the project is completed and delivered.

Malin Klåvus, physical planner, Stockholm City Planning Administration

The spring market attracted 3,000 visitors.

33 m² open space per apartment.

12% commercial floor area.

3.9 km the waterline will have public access.

91% feel safe in Stockholm Royal Seaport compared with an average of 71% for the City of Stockholm.

SUSTAINABILITY REPORT 2017
Accessibility and proximity

A prerequisite for transport planning in Stockholm Royal Seaport is the implementation of a transport hierarchy. Because of proximity to services in the local area, and a clear connection between the area and a coherent urban fabric, walking or cycling become more convenient. This creates more sustainable travel patterns and the area is perceived as safer and more accessible.

The street structure creates an attractive city
The street space gives priority to pedestrians, cyclists and public transport. Due to fewer on-street parking spots, more space is available for greenery and social interaction.

In the first development phases, parking spaces are only available for loading, visitor parking and carpools. In later development phases, the streets are almost car-free – traffic-free zones. They are designed to ensure lower traffic speeds. Because of the space limitations, flexible use is preferred: a space can be used for loading at certain times of the day, but for other activities at other times.

Appropriate infrastructure from the start
Infrastructure designed for walking, cycling and electric vehicles can change people’s attitudes and behaviour. Paths for walking and cycling are being expanded. Easy access to charging points will promote the use of electric vehicles. Access to car and bicycle parking at property level is a key tool for facilitating sustainable travel patterns. The car and bicycle parking spaces per development phase are presented below, see pages 52–53 and 58.

Public transport is the backbone
Public transport in Stockholm Royal Seaport is based on the Metro system and buses. In 2017, rapid transit bus route 6 replaced bus route 73 and runs from Ropsten, via Ödenplan, to Karolinska.

Average no. of car and bicycle parking spaces per development phase

The values for Norra 1 and Västra are based on voluntary commitments. The number of bicycle parking spaces has subsequently increased.

* final report

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In the planning process for Stockholm Royal Seaport, the main focus is to ensure accessibility for pedestrians, cyclists and public transport from an early stage of the process. But there are many challenges. Especially during the construction period, when the street space is limited and residents and businesses have already moved in.

Cecilia Sjödin, transportation planner, Stockholm City Traffic Administration

The City of Stockholm’s CCC innovation project has contributed to the development of a construction logistics concept for the industry. Several research projects have been tied to the CCC, which serves as an arena for learning and development. By reducing the number of truckload movements, controlling access to the worksite with an automatic gate system and reducing the volume of material stored at worksites, both health and safety have improved. The CCC has enabled measurement of construction logistics at an overall level. A key effect is that property developers become aware of construction logistics-related matters at a much earlier stage of planning than normal.

Fredrik Bergman, Head of Implementation, Stockholm City Development Administration

Making everyday life easier
Designing an urban district with high population density and a high rate of development makes it easier to live without a car. Access to daily services is within a five-minute walk. See page 59.

Mobility Index
The design of a property is important, with security-related measures, access to parking, goods management, mobility services and so forth, and contributes to opportunities for sustainable travel. The aim of the mobility index is to promote and evaluate measures with a positive impact on sustainable travel. The tool will be introduced from the Södra Värtan phase and be adapted for future development phases. See pages 52–53.

The five modules included in the mobility index are the walkable city, the cyclable city, stationary vehicles, goods management and mobility services.

Decentralized garage solutions create a better urban environment
A decentralized garage for residents, workers and visitors has been planned in a cavern adjacent to Gasverket and Kolkajen. The streets can be used for social interaction, with room for cyclists and public transport. When a mix of parking needs are met in one place, opportunities for co-usage increase. By not building garages under the courtyards, these can acquire more greenery and maintain higher quality.

Centralized logistics facilitates accessibility
During construction, all property developers and the City’s contracts are affiliated with the Construction Consolidation Centre (CCC). By coordinating and combining transport to the construction sites, the number of vehicle trips is reduced both in and across the urban development area, while increasing accessibility and safety during the construction period. Anyone who visits the construction site is required to undergo an introduction to Stockholm Royal Seaport’s sustainability mission. For more information about the CCC, see pages 31 and 63.

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The diversion ratio in Norra 2 varies between 1.07 and 1.36 for those with the longest walking distance to destination points.

In 2017, co-loading via the CCC reduced the number of truckload movements through the area by 5,500. The co-loading effect is 60%. The diversion ratio in Norra 2 varies between 1.07 and 1.36 for those with the longest walking distance to destination points.

A total of 426 children are enrolled at 7 preschools. 2.1 bicycle parking spaces per apartment on property level, and 0.18 per apartment in public spaces.

0.46 car parking spaces per apartment on property level, and 0.1 per apartment in public spaces.

27 carpool parking spaces, representing 10% of the total number of on-street parking spaces.

Every 7th parking space on property level in Norra 2 has an electric vehicle charging point and every 10th parking space in public spaces has an electric vehicle charging point.

The circle shows the functions that are within a walking distance of 450 metres from a central point in Norra 2.
Towards a fossil-fuel free urban district

There are many challenges to achieving a fossil-fuel-free urban district. Transport is regional and governed by national instruments. The residual waste used to fuel Stockholm’s district heating system still contains fossil matter. A roadmap has been produced according to the Climate Positive Development Programme’s (CPDP) framework, see page 29, and shows that Stockholm Royal Seaport could reduce greenhouse gas emissions by about 60% compared with Hammarby Sjöstad, Stockholm. The calculation refers to reductions of greenhouse gas emissions in the areas of energy, transport and waste. Monitoring will start in 2018.

Optimised mass balance

Former industrial activity has caused a great deal of soil contamination in Stockholm Royal Seaport. When buildings and streets are built, rock needs to be blasted, and soil and deposited material is excavated. Local soil remediation and on-site re-use of excavated material reduces the need for transport. Material that does not meet quality requirements is transported to a treatment facility or to landfill, see page 62.

Low-energy buildings

The buildings in Stockholm Royal Seaport are close-to-zero-energy buildings, which means they are well-insulated and air-tight, and have energy-efficient installations. Energy consumption is also determined by the shape of the building. The local production of energy, such as photovoltaics on the roof, reduces climate impact and saves resources.

Resource efficiency and climate responsibility

The built environment is robust over time which requires that buildings and facilities are designed with high quality. Materials, water and energy are resources that must be used efficiently by, for example, creating eco-cycles. Using non-hazardous materials reduces impacts on human health and the environment. The generation and use of renewable energy is encouraged to make the area fossil fuel-free.

Average energy consumption per development phase in kWh/m²  

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As of Norra 2, the development phases are 40% lower than the BBR requirements that were currently applicable.

LED for lighting

As of 2017, only LED lighting has been used in public spaces, resulting in energy savings of 50%. See page 62.
All construction also has an indirect climate impact due to the materials used. The City of Stockholm is involved in a project to test an LCA tool developed by the IVL Swedish Environmental Research Institute, funded by the Swedish Energy Agency. See page 66.

The indoor temperature and relative humidity are important for the health and well-being of occupants. Quality assurance during the construction period and demand-controlled ventilation in the building are essential for achieving good air quality. Daylight and low noise levels also contribute to high standards of comfort. See page 55.

Built-in materials can contain both hazardous and harmful substances. The large volumes of material and long lifespan of the buildings increase the risk that building materials can impact human health and the environment.

With the precautionary principle as a starting point, all buildings and facilities shall be free of hazardous substances as far as possible. All built-in materials shall meet environmental performance standards and be documented in a logbook. See pages 54 and 65.

Waste can contain both harmful and valuable materials. Separating waste saves energy and natural resources. The risk of spreading hazardous substances is reduced. The waste system in Stockholm Royal Seaport includes a waste disposal unit, vacuum waste collection system, recycling rooms, a mobile re-use station and a hazardous waste station.

The placement of the recycling room and waste-chute inlet makes it easier to separate waste. The vacuum waste collection system helps to reduce the amount of transport in the area and increase well-being. For the results, see pages 49–51, 61 and 63.

Optimised systems for energy and resource flows from waste-water (food waste and blackwater) have been studied in the Vinnova-funded MACRO project. The aim of the project is to create circular systems. In 2017 the preliminary design of a source-separating system was initiated for Södra Värtan and Kolkajen. See page 31.

Stockholm Royal Seaport has developed its own eco-cycle model, REFLOW (reflow.stockholm.se), based on Hammarby Sjöstad’s model. The model clarifies how the City’s resource usage interacts with local, regional and global flows of energy, water and materials. REFLOW visualises the City’s hidden flows. In 2017, a research project funded by the Swedish Environmental Protection Agency commenced, with the aim of developing a model to quantify physical resource flows in an urban district.

FACTS
“Mitt Glörra” in collaboration with the IVL Swedish Environmental Research Institute, the City of Stockholm has developed a tool for making overall assessments of the indoor environment in energy-efficient housing units, and to enable comparisons between housing units.

Examples of hazardous substances: Zinc ions are harmful to the aquatic organisms that form when the zinc metal is oxidised by contact with oxygen and water. It is particularly important that children are protected from endocrine disrupting chemicals. Zinc must never make its way into stormwater runoff. This requirement was introduced as of Norra 2.

Examples of hazardous substances: Lead is toxic to humans and animals. It is particularly important that children are protected from lead. Lead is found in solders, paints and floor layers. This requirement was introduced as of Norra 2.

Chemical-smart preschool: The preschools follow the City of Stockholm’s chemical-smart preschool guidelines. In 2017, the preschools removed materials suspected of containing hazardous substances. Active choices were made when purchasing new materials.

Caverns in Hjorthagsberget that were previously used for storing crude petroleum and flammable in contact with air. The water is purified with archaea, ancient microbes that can break down oil and petroleum. The remaining substances – water, CO2 and compost – are harmless. This purification method could also be used in future remediation projects, such as caverns on Louden.

It is important that the materials used are produced in a socially sustainable manner. In 2017, efforts to further develop ethical standards for natural stone and tropical wood continued.

The indoor environment quality

Sound materials

Ancient microbes remediate caverns

Resource-efficient water and wastewater treatment

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The challenge in constructing a building that meets all energy performance requirements, especially when the requirements are tougher than the applicable building standards, lies in never losing sight of energy-related issues throughout the entire process. One of the key factors behind Stockholm Royal Seaport’s success is the ongoing dialogue with property developers, which ensures systematic monitoring. The City believes that we can work together with the property developers towards an ambitious joint target. At this stage, we have no measured values for the development phases with more rigorous requirements, but our experience from previous development phases shows that this unique form of collaboration has generated positive results.

Örjan Lönngren, Climate Change and Energy Advisor, Stockholm City Environment and Health Administration

More than 80% of the properties have achieved the USGBC’s Gold rating for Indoor Environmental Quality.
Let nature do the work

In the planning process for Stockholm Royal Seaport, water and green structures have been designed to provide important ecosystem services, such as flood protection, temperature regulation, recreation, greater biodiversity and strengthened dispersal patterns for key species. Parks, courtyards and other spaces form a green structure that helps to create a more resilient urban district.

→ Green structure enables ecosystem services
In connection with the C/O City research project, the Green Space Index (GSI) planning tool was developed and tested in Kolkajen and Södra Värtan. The results show the importance of including the ecosystem perspective and applying the GSI at an early stage of the process, in order to influence and achieve a joint vision for the planning. The GSI also makes it easier to communicate the significance of these issues. See pages 30 and 60.

→ Green courtyards create quality of life
The block is used to strengthen the area’s green structure. The GSI for property level ensures that the block is developed for multiple functions simultaneously – enhance well-being, provide food for insects, manage and purify the increasing rainwater, reduce the city’s noise.

FACTS
Green Space Index: The Green Space Index (GSI) is a tool for calculating eco-efficient space, meaning space that makes a positive contribution to its own ecosystems and local climate, and to the social values associated with greenery and/or water.

The GSI rewards a range of ecosystem services. Experience shows the importance of applying the GSI in early stages and integrating the tool into the architecture, see pages 45–47, 60.

FACTS
Ecosystem services are the benefits that humans gain from the natural environment. Urban nature is not only decoration for the City’s residents, it also serves a wide range of critical functions. By planning well, a green space can serve multiple purposes simultaneously – enhance well-being, provide food for insects, manage and purify the increasing rainwater and reduce the City’s noise.
The most innovative element of Stockholm Royal Seaport’s urban greenery is how rainwater is managed. On the streets, all water is led through special drains to plantations with biochar-amended soil. The biochar has a strong dispersal potential and is used to create multifunctional green areas. By preserving and promoting ecosystems for amphibians and oak-dependent animals, for example by building a frog tunnel and planting oak trees, strengthens the habitats. These initiatives are important for securing the dispersal zone.

Gösta Olsson, landscape architect, Stockholm City Development Administration

Important dispersal patterns in Stockholm Royal Seaport, to and from the Royal National City Park, and between different parts of the Royal National City Park.

FACTS

About pollinators: In Stockholm Royal Seaport, plants have different flowering times to provide pollinators with a constant supply of food. Dead wood or cavities and access to water create ideal habitats. Green connections along paved surfaces make it easier for the pollinators to move across large surfaces and areas.

The Royal National City Park has significant ecological values with a rich array of plants and animals, and cultural heritage stocks of sensitive species. The northern section of Stockholm Royal Seaport is part of a green structure providing a dispersal network for oak-dependent species and amphibians. By preserving and promoting ecosystems for amphibians and oak-dependent animals, for example by building a frog tunnel and planting oak trees, strengthens the habitats. These initiatives are important for securing the dispersal zone.

The Green Space Index requirements for property developers are also innovative because they generate multifunctional green spaces on development sites.

But what I am most proud of is the number of parks and playgrounds in the area that are available for play, recreation and exercise, with places to soak up the sunshine and enjoy the flowering gardens and park greenery. We also have a strong link between new and old Hjorthagen, and two new bridges have made it easier to visit the Royal National City Park. The fact that everything is so well-built and attractively designed also makes me very pleased.”

Gösta Olsson, landscape architect, Stockholm City Development Administration

Early planning secures the green structure

In the planning process for Lousaden, a number of feasibility studies were carried out to determine the need for strengthening the green structure, and dispersal corridors to southern Djurgården. These included an ecology study, which discovered the existence of a large protected salamander species in the area. See page 61.

During the year, oak stumps were laid out at preschools around Ekbacken. The oak stumps inspire play and promote dispersal in oak-dependent species in southern and northern Djurgården.

Stormwater runoff from streets and pavements is led to the surfaces of the planting beds by macadam mixed with biochar. Water is also led to lawns in the urban park, which serve as retention areas. The biochar is made from Stockholm’s garden waste and is ideal as a soil conditioner, and for capturing and binding CO2 from the air. Visit stockholmvattenochavfall.se

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Participation and consultation

The sustainable city can only be created by cooperation between residents and businesses, the City’s administrations and companies, property owners, academia and other stakeholders. The parties are engaged, and invited to take part in dialogue, in order to shape and manage Stockholm Royal Seaport together.

Research and development projects contribute to solving complex challenges, working across organisational boundaries, and developing sustainable and innovative solutions. The projects also contribute to sharing knowledge and best practices between the various areas. The lessons learned are thus taken forward into other projects.

→ Dialogue led to many suggestions
In 2017, a consultation process for the development plan and an in-depth early dialogue took place, which garnered acceptance from local residents and businesses for the development of Värtahamnen, and also helped to contribute valuable knowledge to the ongoing planning.

The dialogue took several forms: for the general public in regard to the area’s public spaces in a digital dialogue and on-site open house, and for selected target groups. A workshop was held for business owners and an interview was conducted with girls aged 12–18 about how they use outdoor environments in their free time.

The results show that good walking, cycling and public transport facilities are important for the area and that the interplay between these paths of travel must be safe and secure. Parks and squares shall be safe, well-lit and offer a wide range of activities for everyone, even when the weather is less than perfect. A dance floor, basketball court, climbing wall and ice rink were some of the suggestions.

→ Open House attracted many visitors
Stockholm Royal Seaport was one of the destinations during the Open House Stockholm architectural festival. In October, the City held 16 guided tours for Swedish and international visitors. Architectural firms CF Møller, Joliare, Vera arkitekter and Wingårdh Arkitektkontor arranged stations at each of their buildings and strong interest was shown by residents and architecture fans alike.

→ The Sustainable Kids’ Forum – a meeting place for dialogue
The Sustainable Kids’ Forum is mainly intended for children and aims to realise the rights of children to express themselves as set out in the UN Convention on the Rights of the Child. During the year, the Sustainable Kids’ Forum arranged 12 activities with themes including climate-smart food, chemical-smart preschool and sustainable urban planning. The Sustainable Kids’ Forum concept has spread to other parts of the City as a meeting place for dialogue with children.
Activities become regular meeting places
In 2017, a clothing swap was arranged jointly with Folkkulturcentrum. About 200 people attended the event and swapped their clothing and accessories. About 150 garments changed owners during the evening.

The Pop-up Re-use Centre visited Stockholm Royal Seaport twice during the year and a flea market was arranged.

Grocery store with a sustainability focus
At the beginning of the year, Coop’s green supermarket opened in Norra 2. The shop uses 100% green electricity from solar, wind and hydro sources. The building hosting the supermarket was built by Stockholmshem and holds SGBC Gold certification. The shop has energy-efficient solutions with LED lighting and heat recovery from refrigerators and freezers. The product range includes a high proportion of ecological and KRAV-labelled goods.

Three buildings short-listed in the 2017 Stockholm Building Of The Year Award
The Stockholm Building Of The Year Award is an annual competition where Stockholmers vote for their favourite new buildings, parks and infrastructure facilities. In 2017, three buildings from Stockholm Royal Seaport were nominated: the Ferdinand preschool (property developer is Wallenstam with Vera arkitekter) and the multi-family buildings on Gryt hundsgatan, Husarviksgatan and Jaktgatan (Wallenstam, Vera arkitekter and Husarviksgatan (Victor Hanson, JoliArk). Zenhusen (Erik Wallin, C.F. Möller Architects) were nominated for Architects Sweden’s housing award. Värta Terminal (Ports of Stockholm, C.F. Möller Architects) was nominated for the Swedish Transport Administration’s architecture award.

Knowledge is spreading
The ambitions requirements are contributing to the development of innovative tools and ways of working. Stockholm Royal Seaport monitors, analyses and evaluates these, thus contributing to new knowledge and to sharing this knowledge with other projects, both within the City and with other municipalities.

Increasing employment
During the year, the project tested requiring employing people unlikely to find a job. The requirement encouraged two contractors to offer project employment, with the City’s support. One of the contractors subsequently offered probationary employment.

The requirement has been included in all major contracting procurements since 2017, and has also applied for property developers since Stidra Värta.

Royal Seaport Model, such as sets of requirements, requirement specifications and capacity development programmes.

FACTS
International insights: The project’s representatives have been invited to share their knowledge and best practices at various conferences. In Hamburg and Vienna, the focus was on energy planning. A roadmap for a climate-positive urban district was presented at the Ecocity World Summit and in Melbourne, MACRO was presented in Gothenburg and at World Water Week in Stockholm. Stockholm Royal Seaport has also been presented on various visits to Gothenburg, Belfast and St Petersburg, and at international trade fairs in Munich and Barcelona.

More delegation visits: In 2017, approximately 320 delegations visited the area. The visitors are primarily interested in learning more about Stockholm Royal Seaport’s integrated urban planning from a sustainability perspective.

International collaboration
In 2017, Stockholm Royal Seaport became an official member of the Climate Positive Development Programme (CPDP), under C40’s Urban Planning & Development Initiative. The CPDP provides a framework for developing strategies for becoming a climate-positive urban district. The roadmap development process has been instructive, since it has created an understanding and knowledge of choices based on a climate-positive perspective during operation.

We have a wide range of organic products and they account for about 30% of our sales. As the area grows and more people find their way to our shop, that figure will be even higher.

Felix Hartzell, manager of Coop, Stockholm Royal Seaport

The Pop-up Re-use Centre is really fun and for me, as a student, this is perfect. If we find bigger things, it’s also close to home. Fabulous!

Today, I found a shelf for the bathroom and some other bits and pieces that we need, and I also dropped off a few things.

Sofie Kestner, student

FACTS
The digital dialogue in Värtshamnen engaged 750 participants and over 100 suggestions were received.

The Sustainable Kids’ Forum, a meeting place for children, attracted 750 participants during the year, including 600 children.

Since 2010, 27,000 people have visited Stockholm Royal Seaport as part of a delegation.

People attended a capacity development seminar in 2017. About 1,500 people have attended since the start.

800 people visited Pop-Up Recycling in Stockholm Royal Seaport and 1,500 objects were dropped off for recycling. For Stockholm as a whole, 3,000 people visited Pop-Up Recycling and 4,200 objects were dropped off for recycling.

Stockholm Royal Seaport
Research and development

Development of the sustainable city requires cross-sectoral cooperation between civil society and the city’s academia and businesses. Stockholm Royal Seaport is a platform for the development of innovative solutions to complex challenges. In 2017, approximately 20 R&D projects were conducted. A selection of the projects that are either ongoing or were concluded during the year are described below. For more information, visit stockholm.se/royalseaport

C/O City – green structure as an active component
C/O City was initiated to develop knowledge of how the target “Stockholm Royal Seaport is to be an urban district with a green structure that supports and develops the ecosystem and biodiversity, as well as upholding valuable ecosystem services” could be achieved. The project took place between 2012-2017 with 12 parties representing municipalities, property developers, consulting firms and academia, and was funded by Vinnova. In 2018, the project members are planning to start an association to leverage the lessons learned, visit cocity.org

The Swedish Environmental Protection Agency and the National Board of Housing, Building and Planning now have ecosystem services on their agendas. C/O City’s has developed methods and tools such as the Green Space Index for public open space, and guidance for ecosystem services in urban planning.

FACTS
Measurements of green roofs in Stora Sjöfallet, Norra 3, 2011

As part of the C/O City project, NCC and RISE conducted joint moisture content measurements of the green roofs. The results showed that the green roof had no adverse effect on the underlying structure, nor did it promote mould growth on the boards under the roof membrane during the measurement period. Read more in the Green Roof Manual at grolgrontahallens.se (available in Swedish only)

Municipal grants
In 2015, Stockholm Royal Seaport was granted funding for climate projects that help to reduce climate change impacts. The aim of one of the projects is to change the transport of contaminated material from truck to boat. A boat can carry the same amount of materials as 100 trucks.

Other ongoing investment projects include the installation of vacuum toilets and a bike service station serving as demonstration models for property developers. Completed projects include the development of a vacuum system for collecting residual waste from construction site cabins, and the Pop-up Re-use Centre.

Construction Consultation Centre is driving innovation
The Construction Consultation Centre is a platform for innovation projects to improve construction efficiency. In 2015-2017, the method was developed via the EU-financed FREVUE project. The aim of the project is to make data collection related to building materials logistics more efficient. The solution consists of automatic recognition of registration plates using ID cameras with video analysis that register the number plates of all vehicles. This registration enables gathering of data about the vehicle’s mileage, model and fuel type.

Food and energy in a circular economy
The Food and Energy in a Circular Economy project – funded by the Carbon Neutral Cities Alliance Innovation Fund (CNCA – a member of the C40 network) – estimates the resource-efficiency potential of source-separating wastewater systems in densely populated urban areas. The study shows how resource utilization can be significantly increased and help to reduce climate change impact. This mainly takes place by recovering residue energy at property or area level, but also by replacing commercial fertilisers with plant nutrients from the wastewater. By increasing the use of disposal units that can separate food waste, the potential for biogas recovery is considerably higher.

The future’s sustainable energy systems
In 2017, a systems analysis of future sustainable energy systems was conducted. The systems analysis is funded by the Swedish Energy Agency and focused on how a fossil-fuel free, resource-optimised and cost-efficient energy supply can be created for the last development phase, Loudenden. The study is looking into the possibility of using and storing locally generated energy and waste energy. The results form the basis for the ongoing efforts with the development of Loudenden.
Milestones
Towards a sustainable city

2004
- City Council adopts an environmental profile for Stockholm Royal Seaport

2005
- City of Stockholm adopts Stockholm Royal Seaport’s maximum energy-use requirement of 55 kWh/m² per year for new buildings.

2006
- City Council approves the overall programme for the environmental and sustainable urban development in Stockholm Royal Seaport

2007
- The City of Stockholm adopts Stockholm Royal Seaport’s requirements for energy, Green Space Index, digital infrastructure and materials. As well as working methods, such as the capacity development programme, thematic groups and monitoring.

2008
- Sustainable Urban Development Programme ratified by City Council
- Pop-up Re-use Centre moves around Stockholm

2009
- Stockholm Royal Seaport now has at least 12,000 more housing units and 35,000 new workplaces

2010
- Hållbarhetsportalen introduced
- Systems analysis for decentralised energy storage commenced
- Thematic group planning commenced
- MACRO R&D project commenced

2011
- First sustainability report published
- Best Sustainable Urban Development Project award from C40
- Expanded civil dialogue

2012
- MACRO R&D project completed

2013
- Site-allocation competition in Kolkajen with a focus on social sustainability for fixed price
- Relocation and new procurements for GCC

2014
- Expanded civil dialogue

2015
- Sustainable Kids’ Forum introduced

2016
- Best Sustainable Urban Development Project award from C40
- Expanded civil dialogue

2017
- Stockholm Royal Seaport becomes a part of the European Union’s Sustainable City Pioneer Programme

2018
- Stockholm Royal Seaport achieves an overall score of 96.5 out of 100 in the European Sustainable City Index

2019
- Stockholm Royal Seaport’s maximum energy-use requirement is reduced to 45 kWh/m² per year for new buildings

2020
- Stockholm Royal Seaport’s maximum energy-use requirement is reduced to 40 kWh/m² per year for new buildings

2025
- Stockholm Royal Seaport’s maximum energy-use requirement is reduced to 35 kWh/m² per year for new buildings

2030
- Stockholm Royal Seaport’s maximum energy-use requirement is reduced to 30 kWh/m² per year for new buildings

Planning
- Begins

First site allocation for the Norra 1 and Västra development phases
- First site allocation for the Norra 2 development phase with stringent sustainability requirements

Occupancy
- Norra 1
- Västra
- Norra 2

Construction start-up
- Norra 1
- Västra
- Norra 2

Green Space Index applied for public open space
- Mobility Index applied
- Pop-up Re-use Centre inaugurated
- MACRO R&D project commenced
- Systems development phase on source-separating wastewater system in Södra Värtan and Kolkajen
- Thematic group planning commenced
- Site-allocation competition in Kolkajen with a focus on social sustainability for fixed price
- Relocation and new procurements for GCC

Oil handling at Ljus达尔 discontinued and urban development commenced
- Construction start-up for Brofästet and Gasverket västra
- Site allocation competition in Södra Värtan for energy performance and fixed price
- Permanent vacuum waste collection system rolled out

Hjorthagen is fully developed with about 6,000 new housing units, and premises for offices, retail, preschools, schools, sport and culture

Stockholm Royal Seaport now has at least 12,000 more housing units and 35,000 new workplaces

Värta Terminal completed
- Site allocation for Gasometer 4 commenced
- Site allocation competition in Södra Värtan for energy performance and fixed price
- Occupancy of Norra 2
- Fortum’s new biomass CHP opens
- Demolition of Gasometer 4 commenced
- Container operations relocated
- Cavern garage inaugurated
- Occupancy of Gasverket with sports facility, school and preschool
- Planning of Loudden commenced
- Construction start-up for Brofästet
- Energhamnen site allocation

Hållbarhetsportalen introduced
- Sustainable Kids’ Forum introduced
- First introduction meeting for new residents
- New thematic groups started
- Fun Park
- MACRO R&D project commenced
- Systems analysis for decentralised energy storage commenced
- Thematic group planning commenced
- Site-allocation competition in Kolkajen with a focus on social sustainability for fixed price
- Relocation and new procurements for GCC

Environmental Programme proposed that Stockholm Royal Seaport become an area with an environmental profile
- First action plan defined for Norra 2

Voluntary commitments for Norra 1 and Västra
- Green Space Index introduced

Capacity development programme commenced
- Urban gardening commenced
- Stormwater strategy introduced
- Green Space Index for development sites introduced

First introduction meeting for new residents
- Construction Consolidation Centre started
- Forum for Sustainable Solutions initiated
- First introduction meeting for new residents
- New thematic groups started
- Urban gardening commenced
- Green Space Index for development sites introduced

City Council adopts an environmental profile for Stockholm Royal Seaport
- First action plan defined for Norra 2

City Council approves the overall programme for the environmental and sustainable urban development in Stockholm Royal Seaport
About this appendix

The aim of this appendix is to present the monitoring results for the requirements set for property developers, and for the City’s own work. The report is divided into two sections: one for property developers (pages 38–55), and one for public open space (pages 56–70). The requirements are based on the Stockholm Royal Seaport’s sustainability targets and include a presentation of the results for energy, the Green Space Index, waste, transport, materials and the indoor environment.

About the City of Stockholm’s monitoring

The City sets requirements for the planning and production of buildings and public open space in Stockholm Royal Seaport. The requirements are gathered in an action plan and the City has developed a working process to steer, guide and ensure the quality of the requirements during planning, construction and management. The requirements are governing and monitored regularly. Any deviations must be motivated.

The developers are monitored at five different occasions, from the very early programming of building to two years after occupancy. The monitoring is conducted in close dialogue with the property developers, the City’s planners and contracts, and the data is audited by the City. Deviations are handled in accordance with the City’s procedures, and a web-based tool is used to facilitate the monitoring of property developers.

*The property developers’ results in these site allocation phases are not presented in this document.*
About this appendix

Stockholm Royal Seaport is being developed and constructed in phases, from the subarea of Hjorthagen to Värtahamnen, and lastly to Loudden. Sites are allocated either directly or in competitions, and the land is either sold or transferred as a leasehold property. The action plan that gathers all requirements is appended to each site allocation contract and development agreement and are binding. They include levels for energy performance, stormwater management and green structure, waste management, transport, indoor environment and choice of materials.

Monitoring of property developers is first carried out in conjunction with the early parallel design process. The requirements are monitored at all stages, from programme documentation until two years after occupancy, although the degree of detail varies.

The monitoring means that we are doing our utmost to evaluate our work and meet the high standards. This close dialogue with the City also helps to increase the engagement of everyone involved in the project.

Tina Wisén, Environmental Coordinator, Besqab, Ellevio and Niam
Summary assessment

The building envelope, comprising facades, roofs, floors and windows, is well-insulated and airtight. The quality of the building envelope varies between development phases, as well as within the development phase. In general, the average $U_r$ value in Stockholm Royal Seaport is lower than the Swedish building code (BBR) requirements. The requirements have contributed to the use of special “thermal-bridge-free” fastening products, to higher airtightness which use of higher-quality insulation, and to a stronger focus on the ratio and quality of windows.

A key factor for achieving the requirement is heat recovery from exhaust air. In the Norra 1, an Air Handling Unit (AHU) system was installed combined with district heating. If AHU and district heating cannot provide enough heat for the building, wastewater heat exchangers are installed. The later development phases were more focused on hot water circulation and other system losses.

The energy co-ordinator plays a key role throughout the entire development process. Paying attention to detail in the design stage is important. This prevents all of our efforts with energy planning from becoming merely a paper exercise to be submitted.

Thomas Linderholm, energy co-ordinator, Besqab

Requirements summary:

Housing units

- The requirements for Norra 1 and Västra are based on voluntary commitment.
- The project values are not audited by the City.
- Norra 1, Brofästet and Gasverket: 50 kWh/m² Atemp, year, net energy.
- Södra Värtan: 45 kWh/m² Atemp, year, net energy.
- Existing buildings in Gasverket: reduction target of 50%.

Premises

- Norra 1, Brofästet and Gasverket: 45 kWh/m² Atemp, year, projected energy.
- Södra Värtan: 45 kWh/m² Atemp, year, net energy.
- Existing buildings in Gasverket: reduction target of 50%.

Results – energy performance

1. Norra 1 – housing units

- The City engaged in dialogue with the property developers at an early stage. The results are well below Swedish building code applicable BBR 18 building regulation.
- The values are normal - year correction of measured energy consumption based on statistics for 2010 or 2010.
- Half of the property developers have lower measured values compared with the project values. In Norra 1, the average actual energy consumption is 49 kWh/m² Atemp. Which in comparison to the calculation mean values at 7%.
- All buildings have district heating with exhaust air heat pumps, except for Lennart Ericsson which has district heating plus AHU. Reinhold Gustafsson has a geothermal heat pump plus AHU, and it is connected to the district heating system.

2. Västra – housing units

- The City engaged in dialogue with the property developers at an early stage. The results are well below BBR 18 building regulation.
- Most of the property developers in Västra are connected to the district heating with AHU, except for Tjärnrägen which has an exhaust air heat pump.
- For the SB student apartments (Sladenban), the difference between projected and measured values may be due to high hot water consumption. The projected value was 25 kWh/m² and measured value 41 kWh/m².

3. Norra 2 – housing units

- All property developers are connected to the district heating system and have AHU.
- Erik Wallin, HEBN, Storolofshem and NCC have wastewater heat recovery systems.
- Storolofshem, SHM and Viktor Hanson have calculated with 25 kWh/m² for hot water. The others included 50 kWh/m².
- Locally generated renewable energy can be included in the building’s energy performance. Erik Wallin has the best energy performance, because they included 9 kWh/m² renewable energy, 6.5 kWh/m² of solar thermal energy and 2.5 kWh/m² of solar power.

4. Brofästet – housing units

- Stockholmshem’s Plus-Energy House assumes that the building is highly energy-efficient. This entails good form factor, and that building envelope and technical installations are high performing combined with minimal thermal, ventilation and distribution losses. The system efficiency of the photovoltaics is increased by recovering excess heat from the inverters that reheat the ventilation and optimising the geothermal heat pumps for the production of hot water in the summer.
- Taken Properties has efficient geothermal heat pumps that are topped up with district heating, and AHU with a Geothermal ventilation systems with air pre-heating (pre-cooling). This entails outdoor air preheating via boreholes and outdoor air cooling in the summer.
- The others are working to optimise the building envelope, minimise distribution losses and install wastewater heat exchangers. Half of the buildings have a geothermal heat pump and AHU.

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- Existing buildings in Gasverket: reduction target of 50%.

Summary assessment

The building envelope, comprising facades, roofs, floors and windows, is well-insulated and airtight. The quality of the building envelope varies between development phases, as well as within the development phase. In general, the average $U_r$ value in Stockholm Royal Seaport is lower than the Swedish building code (BBR) requirements. The requirements have contributed to the use of special “thermal-bridge-free” fastening products, to higher airtightness which use of higher-quality insulation, and to a stronger focus on the ratio and quality of windows.

A key factor for achieving the requirement is heat recovery from exhaust air. In the Norra 1, an Air Handling Unit (AHU) system was installed combined with district heating. If AHU and district heating cannot provide enough heat for the building, wastewater heat exchangers are installed. The later development phases were more focused on hot water circulation and other system losses.

The energy co-ordinator plays a key role throughout the entire development process. Paying attention to detail in the design stage is important. This prevents all of our efforts with energy planning from becoming merely a paper exercise to be submitted.

Thomas Linderholm, energy co-ordinator, Besqab

Requirements summary:

Housing units

- The requirements for Norra 1 and Västra are based on voluntary commitment. The project values are not audited by the City.
- Norra 1, Brofästet and Gasverket: 50 kWh/m² Atemp, year, projected energy.
- Södra Värtan: 45 kWh/m² Atemp, year, net energy.
- Existing buildings in Gasverket: reduction target of 50%.

Premises

- Norra 1, Brofästet and Gasverket: 45 kWh/m² Atemp, year, projected energy.
- Södra Värtan: 45 kWh/m² Atemp, year, net energy.
- Existing buildings in Gasverket: reduction target of 50%.

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- Södra Värtan: 45 kWh/m² Atemp, year, net energy.
- Existing buildings in Gasverket: reduction target of 50%.

Premises

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- Södra Värtan: 45 kWh/m² Atemp, year, net energy.
- Existing buildings in Gasverket: reduction target of 50%.

Requirements summary:

Housing units

- The requirements for Norra 1 and Västra are based on voluntary commitment. The project values are not audited by the City.
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- Södra Värtan: 45 kWh/m² Atemp, year, net energy.
- Existing buildings in Gasverket: reduction target of 50%.

Premises

- Norra 1, Brofästet and Gasverket: 45 kWh/m² Atemp, year, projected energy.
- Södra Värtan: 45 kWh/m² Atemp, year, net energy.
- Existing buildings in Gasverket: reduction target of 50%.
5. Gasverket – sports facility, school, preschool

Gasverket’s new buildings have well-insulated and airtight building envelopes with AHU plus district heating.

The Real Estate Administration’s sports facility has variable air volume (VAV) and smart ventilation control systems.

The challenge with existing buildings in Gasverket is weighing cultural heritage values against energy-efficiency measures. SISAB’s preschool has reduced its energy consumption by 80% and the school by 50% compared with the projected energy consumption of the original buildings. The floor and roofs have been partially or fully replaced, which has significantly improved the insulation. Windows have been improved as far as antiquarian aspects allow.

6. Södra Värtan13 – housing units

The basic requirement for Södra Värtan is 50 kWh/m². The Ports of Stockholm’s Värta Terminal is well below the requirement. The energy system consists of energy storage in rock, heat pumps and an adaptive ventilation system.

7. Södra Värtan – offices

Due to a well-designed system to reduce energy requirements, the Ports of Stockholm’s Värta Terminal is well below the requirement. The energy system consists of energy storage in rock, heat pumps and an adaptive ventilation system.

The property developers were allowed to include locally generated energy in their energy performance, which is why their values are high. Wallenstam was allowed to use energy produced in newly built wind turbines outside Stockholm. SISAB’s solar power is generated on NCC’s roof. Erik Wallin and Viktor Hanson both have photovoltaics and solar collector for electricity and heating production.

Due to the property’s unfavourable location, Åke Sundvall is allowed to include the photovoltaics on its coming project in Gasverket Östra.

Stockholms Hem’s Plus-Energy House has a high performing solar PV’s. Stockholmshem is the only property developer to date that has also installed small wind turbines on the building.

The solar power generated by SISAB’s school and preschool meets the requirements of both new and existing buildings.

13 Reported values are based on estimates from the early parallel design process.

Requirements summary:

- The requirements for Norra 1 and Västra are based on voluntary commitments.
- Locally produced 2 kWh/m² Atemp solar power, or 5 kWh/m² Atemp solar thermal energy or a combination of these two14.


due to the property’s unfavourable location, Åke Sundvall is allowed to include the photovoltaics on its coming project in Gasverket Östra.

Stockholms Hem’s Plus-Energy House has a high performing solar PV’s. Stockholmshem is the only property developer to date that has also installed small wind turbines on the building.

The solar power generated by SISAB’s school and preschool meets the requirements of both new and existing buildings.

14 In Norra 2, the property developers could also choose the alternative to generate solar power locally that would account for at least 30% of the building’s energy requirements.

15 Einar Mattsson 2’s reported values are based on calculations from the programme documentation stage.
Energy consumption, construction

Results – energy consumption, construction site cabins

- All use energy-efficient electric-heated cabins. HEBA, Skanska and Stockholmshem have a joint establishment.
- Viktor Hanson has AHU.
- Erik Wallin, Wallenstam and Viktor Hanson do not have separate meters for office and worker cabins.
- All have green electricity for their cabin establishment and construction site.

Requirements summary:

- < 4,000 kWh/office cabin and year
- < 5,000 kWh/worker cabin and year
- Construction transportation requirements
- No requirements were set for Norra 1, Västra and Norra 2.

Energy performance in kWh/year
- Worker cabins (measured)
- Office cabins (measured)
- Worker cabin requirement level
- Office cabin requirement level

Climate-change adaptation

Summary assessment

The Green Space Index (GSI) and stormwater strategy in combination contribute to well-designed solutions that benefit both vegetation and stormwater retention. The size and shape of the courtyard determine how much eco-efficient space can be created. The coordination of property developers and various technical competencies is a key condition and should take place in the early stages. At the same time, properly designed planting beds with sufficiently deep soil, abundant plants and stormwater units connected in a series that supply water to the vegetation are key factors. With this foundation, the design can vary considerably.

The tendency is a reduced GSI score between the early stages and the as-built documentation, which may be due to several factors, including lack of coordination between, for example, designers, architects and the stormwater engineers. In later development phases, the number of green roofs has increased, especially biotope roofs. In Södra Värtan, it has become even more important to make roofs a social place.

"The coordination of property developers and planners will more important for achieving the City’s requirements and further developing the GSI process.

Anders Dahlgren, Project Manager outdoor environment, Stockholmshem"
Results[10] – Green Space Index (GSI) per courtyard

1. Västra – housing units

- Norse Apart, Örken, Åke Sundvall
- Properties and Åke Sundvall are planning a joint stormwater
- Stockholmshem uses greenery on exterior walls as an architectural
- design element.
- Einar Mattsson has planned climate garden with wooden pergolas and
- SISAB’s preschool has a sedum roof, fruit trees, flowering trees and shrubs,
- Bonniers (Pirhuset) is planning roof terraces on different levels, and generous.
- Ports of Stockholm’s terminal building has a green roof covering 49% of
- Mannersons, Erik Wallin and CA Fastigheter are planning a wetland in the
- The vegetation becomes more barren as it moves upward in
- The final report for Norra 1 was presented in the 2015 Sustainability Report, see stockholm.se/royalseaport

2. Norra 2 – housing units

- Erik Wallin, HEBBA, Stockholm
- Riksbyggen are planning a greenhouse and a rain garden in
- Västra – housing units

- Brofästet – housing units

- Borätt and JM (Tyresta) have courtyards with sub-surface structures and
- There are no sub-surface structures under most of Primula’s courtyards, enabling a much greater soil depth. SKB has a sedum roof and the courtyard’s
- Erik Wallin, HEBBA and Skanska have deep planting beds in their courtyard.
- NCC has a biotope roof with sedum, herbs and grass. The roof is a meeting
- Most stormwater is led down into planting areas. There is high-quality plant
- SKB has a sedum roof and the courtyard’s
- The rooftop is made of a green roof and shallow planting beds. 
- Nine of eleven property developers have sedum roofs.
- There are no sub-surface structures under most of Prima’s courtyards, enabling a much greater soil depth. SKB has a sedum roof and the courtyard’s
- Brofästet only has one small green roof and shallow planting beds.
- SISAB’s school yard is small, which will result in hard wear and therefore
- Borärt/yt, JM (Tyresta) ByggVesta only has one small green roof and shallow planting beds.

3. Brofästet – housing units

- Wallfast does not have a green courtyard area, but is planning stepped,
- The vegetation becomes more barren as it moves upward in
- The vegetation becomes more barren as it moves upward in
- The final report for Norra 1 was presented in the 2015 Sustainability Report, see stockholm.se/royalseaport

4. Gasverket (new buildings) and Värtberga Terminal

- Einar Mattsson, Järntorget
- Einar Mattsson 2 is planning deep planting beds and 42 trees, including
- Niam has deep planting beds and due to the shady conditions, the court-
- Erik Wallin, HEBA and Skanska have deep planting beds in their courtyard.
- On their shared roof terrace, there are planter boxes and a greenhouse.
- Stockholmsen has plans for the roof, with sedum, herbs and grass. The roof is a meeting
- Most stormwater is led down into planting areas. There is high-quality plant
- SKB has a sedum roof and the courtyard’s

5. Södra Värtan[20] – housing units

- Erik Wallin, HEBBA and Skanska have deep planting beds in their courtyard.
- HSB has a forest-like appearance with tree and shrubs, providing shelter and
- Wallfast does not have a green courtyard area, but is planning stepped,
- Niam has deep planting beds and due to the shady conditions, the court-
- HSB, JM (Tresticklan)
- SKB has a sedum roof and the courtyard’s

6. Södra Värtan – offices

- Bonnier (Pirhuset) is planning roof terraces on different levels, and generous
- Niam has deep planting beds and due to the shady conditions, the court-
- HSB has a forest-like appearance with tree and shrubs, providing shelter and
- SKB has a sedum roof and the courtyard’s
- SKB has a sedum roof and the courtyard’s

[10] The final report for Norra 1 was presented in the 2015 Sustainability Report, see stockholm.se/royalseaport
[20] The values are based on the early parallel design process. Many property developers are planning roof terraces.
A sustainable waste system

Summary assessment
All property developers are connected to vacuum waste collection systems and have installed waste disposal units in kitchens and recycling rooms. Most of these comply with the distance to the waste collection system. If the distance is exceeded, this only applies to a few housing units or individual stairwells. In most cases, the recycling rooms are within easy access. The average area per apartment for recycling rooms is 0.44 m² in Norra 2, and 0.40 m² in Brofästet. Compared with earlier phases, this means that the areas of many recycling rooms have been reduced. It could mean that the space will not be sufficient for required fractions.

Requirements summary:
- Longest distance from door to:
  - Properties are connected to a vacuum waste collection system[21] with the longest distance of 30 metres from the entrance.
  - Waste disposal units installed in kitchens.
  - Recycling room for other fractions with the longest distance of 50 metres from the entrance.

Results – longest distance to waste-chute inlet

1. Norra 2 – housing units

<table>
<thead>
<tr>
<th>Distance (metres)</th>
<th>HSB</th>
<th>Lääk</th>
<th>Stockholm, Norra 2</th>
<th>SSM</th>
<th>Wallenstam</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>10</td>
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<td>70</td>
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</tbody>
</table>

- Erik Wallin, Stockholmhem and Wallenstam did not meet the requirement. Deviations were approved due to the block’s design.
- SSM has a waste-chute inlet in the building.
- Viktor Hanson has a waste-chute inlet directly outside the entrance.

2. Brofästet – housing units

<table>
<thead>
<tr>
<th>Distance (metres)</th>
<th>Besqab</th>
<th>Einar Mattsson 1</th>
<th>Tobin Properties</th>
<th>HSB</th>
<th>Oscar Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
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<td></td>
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<tr>
<td>10</td>
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</tbody>
</table>

- Tobin Properties, HSB, Oscar Properties and Einar Mattson did not meet the requirement. Deviations were approved due to the block’s design.

**Construction waste**

### Summary assessment

To date, none of the property developers have met the requirement for the amount of construction waste. However, all of them have met the requirement for sending lesser amounts, less than 1 mass percent, to landfill. For various reasons, the property developers have not worked proactively to prevent, and reduce, the amount of their construction waste. Such factors as poor quality assurance during construction have led to moisture damage which, in turn, has meant that damaged material has been discarded. Some projects have had a high employee turnover, resulting in poor communication regarding the applicable requirements. The choice of construction method has also played a major role in the amount of construction waste generated.

Reducing the amount of waste requires good planning throughout all stages of the construction process. The results from Norra 2 led to changed requirements for later development phases. These include the current requirement that a waste management plan shall be drafted during the design stage.

### Requirements summary:

- The requirements in Västra are based on voluntary commitments.
- Max 10 kg/m² GFA.
- 95 mass percent of the construction waste shall be source separated, of which 5 mass percent may be sent to landfill.
- Waste hierarchy.

### Results – construction waste

<table>
<thead>
<tr>
<th></th>
<th>Construction waste in kg/m² GFA</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>source separated</td>
<td>mixed</td>
</tr>
<tr>
<td>1. Västra</td>
<td>50</td>
<td>51</td>
</tr>
</tbody>
</table>

#### How was construction waste handled in Västra?

- JM has a waste advisory board and has worked proactively to reduce its waste.
- Svenska Bostäder, SB (Söderåsen), handed the responsibility for waste management over to the contractor.
- Svenska Bostäder, SB (Björnlandet) had a joint internal target with the contractor to achieve a GFA of 23 kg/m². The façade was plastered on site, which generated more waste, and moving boxes from new residents accounted for some of the reported waste.
- ByggVesta’s contractor built defective constructions that had to be demolished. The contractor was replaced during the project.
- Primula cast concrete with a higher use of formwork timber. A brick façade also produces more, and heavier, waste.
- SKB had heavy brick and mortar waste.
- Stockholmshem did not work proactively to reduce its waste.
- Due to water damage, SSM and Viktor Hanson had to discard gypsum and fill materials.
- Erik Wallin and Wallenstam’s preschool did not work actively with this issue. Wallenstam’s preschool had problems with the disposal of external waste in their waste bins.
- Despite two cases of extensive water damage in the project, Viktor Hanson succeeded in minimising its construction waste by setting reduced construction waste targets at an early stage.
- Stockholmshem planned to prevent construction waste, but problems during the construction stage meant that large amounts of concrete had to be discarded. Another problem was the disposal of external waste in its waste bins.
- Skanska/HEBA believes that the large turnover of employees in projects led to a low priority for waste-related issues.

### How was construction waste handled in Norra 2?

- Due to inadequate source separation or lack of space, some of the waste qualified as mixed waste. The mixed waste is separated for material recycling or energy recovery. Mineral wool is sent to landfill, since it cannot be recycled.

#### Energy recovery

- Materials recovery
- Re-use
- Landfill (mineral wool)

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22 The results are not audited by the City. Järntorget did not use the CCC.
23 Source separation according to the Kretsloppsrådets guidelines.
24 Construction waste should be prevented. Recycling should be the first choice, materials recovery the second choice, and energy recovery the third choice.

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25 The final report for Norra 1 was presented in 2016.
Sustainable transport

Summary assessment
All property developers in Norra 2 and Brofästet met the requirements for bicycle parking. However, there were no qualitative requirements prior to Brofästet, which meant that bicycle parking was not always perceived as attractive and secure. Despite the qualitative requirements as of Brofästet, the effectiveness of the solutions has proved difficult to assess. The mobility index tool has therefore been developed with inspiration from the GSI. This tool gives property developers more freedom to design solutions for their own property, and has been used as of Södra Värtan. The car parking space requirement was achieved by all but two property developers.

Mobility Index
The property developer chooses various actions from five modules, based on the most appropriate measures for their own building. The five modules are cyclable city, the walkable city, stationary vehicles, goods management and mobility services. The actions may be easier or more difficult to achieve but are weighted in relation to their expected effects, on a point scale.

Charging points in garages
Results – share of charging points (%)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Norra 2</td>
<td>Brofästet</td>
</tr>
<tr>
<td></td>
<td>2% (8 of 355)</td>
<td>24% (72 of 300)</td>
</tr>
<tr>
<td></td>
<td>Västra</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7% (38 of 521)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Norra 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2% (8 of 355)</td>
<td></td>
</tr>
</tbody>
</table>

Requirements summary:
The requirements in Norra 1 and Västra are based on voluntary commitments and have not been audited by the City.

Bicycle parking
- 2.5-3.5 spaces/apartment
- 0.25 spaces/employee

Car parking
- 0.5 spaces/apartment
- 0-6 spaces/1,000 m² GFA (office)
- 0-6 spaces/1,000 m² GFA (retail)
- A minimum Mobility Index of 0.65 applies as of Södra Värtan.
- All parking spaces in garages shall be prepared for charging points. Starting with Brofästet, 20% of the parking spaces will have charging points.

Results – number of parking spaces

1. Norra 2 – housing units

- 78% of bicycle parking spaces in Norra 2 are indoors.
- NCC, SHP, Wallenstam and Viktor Hanson have agreed on a distribution model, whereby the entire block met the requirement for car parking spaces.
- SHP's low number of car parking spaces was approved because it offered a carpool car to the housing association and built more bicycle parking spaces.
- Erik Wallin was approved for offering one car parking space per townhouse.
- Skanska has made its indoor bicycle parking spaces more efficient by installing two-tier parking racks in the bicycle room.
- Värta Terminal has a few parking spaces for service vehicles, and 52 bicycle parking spaces for employees.
- The school, preschool and sports facility have accessible parking spaces on property level and 208 on public open space.

2. Brofästet – housing units

- 65% of the bicycle parking spaces in Brofästet are indoors.
- Åke Sundvall was approved for offering one car parking space per townhouse.
- Stockholmshem has bicycle parking spaces on the balcony.

Gasverket and Värtapiren
- Värta Terminal has a few parking spaces for service vehicles, and 52 bicycle parking spaces for employees.
- The school, preschool and sports facility have accessible parking spaces only.
- The school, sports facility and preschool have 95 bicycle parking spaces on property level and 306 on public open space.

Gasverket and Värtapiren
- Värta Terminal has a few parking spaces for service vehicles, and 52 bicycle parking spaces for employees.
- The school, preschool and sports facility have accessible parking spaces only.
- The school, sports facility and preschool have 95 bicycle parking spaces on property level and 306 on public open space.

Södra Värtan – mobility index
- The property developers have a high level of ambition for walking and cycling, but a low level for mobility and goods services.

Results – share of charging points (%)

Norra 1 2% (8 of 355)
Västra 7% (38 of 521)
Norra 2 15% (45 of 315)
Brofästet 24% (72 of 300)

The calculations are based on the 2016 Annual Report.
Sustainable buildings

Choice of materials – chemical content

Summary assessment
Every building contains 100-400 products. All property developers use the BASTA, Byggvarubedömningen or SundaHus environmental assessment system and document their building materials in a logbook. The specific requirements for halogenated materials and endocrine disruptors have led to product development among suppliers and to the development of criteria in the environmental assessment systems.

Results – materials

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Reported deviations</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classified products are avoided in line with national assessment systems, as well as other substances that are not permitted.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halogenated (PVC, etc.)</td>
<td>18 deviations. Found in pipes, lighting, cabling, wet room paneling, reinforcement spaces, doors, sealants, ventilation and window parts.</td>
<td>No alternatives, quality risk, discovered after installation.</td>
</tr>
<tr>
<td>Phase-out list substances (Lead, etc.)</td>
<td>8 deviations. Found in pipes, light sources, sealing joints, water taps, valves, water and sanitation.</td>
<td>No alternatives, functional reasons.</td>
</tr>
<tr>
<td>Endocrine disruptors</td>
<td>11 deviations. Found in sealants, electricity, flooring, wet room paneling, fall protection rubber, antioxidative materials, insulation, grooving, keys.</td>
<td>Functional reasons, discovered after installation, no alternatives.</td>
</tr>
<tr>
<td>Zinc</td>
<td>3 deviations. Found in hoods, roofing/loot space, steps.</td>
<td>Functional reasons.</td>
</tr>
<tr>
<td>Copper</td>
<td>2 deviations. Found in brackets, loop tanks.</td>
<td>Functional reasons (thermal conduction), no alternatives.</td>
</tr>
<tr>
<td>No content information</td>
<td>4 deviations. Chemical products, cabling, pipes.</td>
<td>Discovered after use, assessment pending.</td>
</tr>
</tbody>
</table>

▶ During 2017, 13 of a total of 21 property developers reported deviations from the material requirements. In cases where property developers reported multiple deviations, this usually indicates good control over choice of materials and a systematic working approach.
▶ Some deviations based on chemical content were approved due to the lack of alternatives. SISAB had difficulty finding fittings without endocrine disruptors, for example, but worked proactively to find alternatives.

Indoor environment

Summary assessment
The earlier the architect and energy and indoor environment experts are coordinated, the higher the likelihood that the indoor environment requirements can be met. Daylight is the biggest challenge in a densely populated urban district. Climate change is expected to increase the need for cooling and various free-cooling solutions are becoming increasingly common. Various types of greenery that mitigate heat and innovative architectural designs that emit light and heat in the spring and autumn, but reduce summer heat, are also becoming more common.

Results

<table>
<thead>
<tr>
<th>Requirement summary:</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Material should meet requirements for content and documentation.</td>
</tr>
<tr>
<td>▶ Equivalent content criteria in national assessment systems.</td>
</tr>
<tr>
<td>▶ PVC, endocrine disruptors, zinc and copper shall not occur.</td>
</tr>
<tr>
<td>▶ Materials shall be documented in a digital logbook.</td>
</tr>
</tbody>
</table>

Requirements summary:
Gold rating, SGBC™ (indoor environment).
The City Development Administration is responsible for the planning and construction of streets, squares and parks. This is carried out in close cooperation with the administrations and companies responsible for operation and maintenance. Stockholm Royal Seaport is being developed and constructed in phases. At present, 11 contracts are in various stages in different development phases.

The action plan for public open space includes climate-change adaptation, energy and ecocycle systems, transport and material choices. To create the best conditions for property developers to achieve the ambitious sustainability targets, key principles are identified at early stages, such as the integration of transport when planning the urban structure.

During the design stage, the action plan’s general requirements are reformulated into tender specifications. To ensure the requirements are met, continuous monitoring is carried out during the design stage, as well as regular environmental inspections during the construction stage, and some contracts are audited.
Sustainable transport

Proximity to services

Proximity to private and public services play a major role in the travel patterns created in Stockholm Royal Seaport. From a central point in Norra 2, the maximum amount of time to reach everyday services is five minutes, see the table below. Five minutes corresponds to about 450 metres. The diversion ratio compares the actual walking or cycling distance with the straight line distance.

<table>
<thead>
<tr>
<th>Services and activities</th>
<th>D (m)</th>
<th>Diversion ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grocery shop</td>
<td>280</td>
<td>1.28</td>
</tr>
<tr>
<td>Preschool</td>
<td>285</td>
<td>1.36</td>
</tr>
<tr>
<td>School</td>
<td>420</td>
<td>1.35</td>
</tr>
<tr>
<td>Rapid transit bus stop</td>
<td>300</td>
<td>1.30</td>
</tr>
<tr>
<td>Metro station</td>
<td>825</td>
<td>1.21</td>
</tr>
<tr>
<td>Park</td>
<td>160</td>
<td>1.07</td>
</tr>
<tr>
<td>National City Park</td>
<td>460</td>
<td>1.31</td>
</tr>
</tbody>
</table>

The table shows functions linked to parking in public open space

<table>
<thead>
<tr>
<th>Bicycle parking spaces</th>
<th>Norra 1</th>
<th>Västra</th>
<th>Norra 2</th>
<th>Destinations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>144</td>
<td>158</td>
<td>104</td>
<td>58</td>
</tr>
<tr>
<td>Share bikes</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td>27</td>
</tr>
<tr>
<td>Car parking</td>
<td>80</td>
<td>126</td>
<td>-6</td>
<td>-</td>
</tr>
<tr>
<td>Carpool parking spaces</td>
<td>6</td>
<td>13</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>Electric vehicle</td>
<td>10</td>
<td>8</td>
<td>10</td>
<td>-</td>
</tr>
</tbody>
</table>

- Longest distance to services, activities and diversion ratio in Norra 2.

Transport planning – general

Special planning and design guidelines have been developed to enable sustainable transport. The guidelines describe how streets and areas in Stockholm Royal Seaport should be designed to simplify for pedestrians, cyclists and public transport.

The most recent evaluation in 2015 showed that the network of pedestrian and bicycle paths had been well-adapted to promote walking and cycling around the urban district, and connected the area to surrounding walkways and the rest of the city. The potential to further improve conditions includes reducing barriers and creating short cuts for walking and cycling.

Street parking for bicycles is being planned to complement the parking planned on property level. There are designated parking spaces for carpool vehicles and a fast-charging station in the area that is available to everyone. All charging points on public open space are for carpool vehicles.

58 “Destinations” refer to the Metro station, for example. Bicycle parking spaces, car parking space and electric vehicle charging points are available in Ropsten but are not reported.
Sensitive species
Despite the high proportion of contaminated soil, the area is home to sensitive species and these are accounted for when planning and during construction. Considerations include the relocation of endangered plants (potentilla bifurca), and the design and construction of wetlands and an amphibian tunnel. Common red-listed species include the eagle owl, the lesser black-backed gull, the herring gull and the long-horned beetle. Oak and amphibian habitats are protected and strengthened in the area.

On Loudden, the protected giant salamander has been observed in a pond near the oil cisterns. A new pond for the giant salamanders is under consideration, not far from the original pond.

The presence of aquatic and sediment-dwelling organisms has been carefully mapped prior to the planned construction in Lilla Värtan. To identify the fish species living in the development area and how the fish stock will be affected by construction, experimental fishing has also been carried out. An investigation has also been conducted to determine whether the fish contain contaminants that may be derived from former gas production in the area.

Green roofs
13,500 m²

Green courtyards
29,500 m²

Park and rain gardens
50,000 m²

Waste management planning
Vacuum waste collection system
In 2016, the permanent vacuum waste collection facility opened in a cavern in Hjorthagen. Households, businesses and public litter bins are connected to the vacuum waste collection system. 27 of the litter bins are currently in operation.

<table>
<thead>
<tr>
<th>Completed</th>
<th>Planned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norra 1</td>
<td>Västra</td>
</tr>
<tr>
<td>Share of apartments with access to parks and natural areas within 100 metres, %</td>
<td>100%</td>
</tr>
<tr>
<td>Green space – parks, ha</td>
<td>2.5</td>
</tr>
<tr>
<td>Green space – parks – per apartment, m²</td>
<td>37</td>
</tr>
<tr>
<td>Unrestricted area per apartment, m²</td>
<td>37</td>
</tr>
<tr>
<td>Courtyards and roofs, ha</td>
<td>1</td>
</tr>
<tr>
<td>No. of trees planted</td>
<td>18</td>
</tr>
<tr>
<td>Planting beds/tree pits, m²</td>
<td>0</td>
</tr>
<tr>
<td>Rain gardens, m²</td>
<td>0</td>
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</table>

The table shows developed unrestricted areas and green structure.

Stormwater strategy
A stormwater strategy has been created specifically for Stockholm Royal Seaport. The aim is to reduce flood risks, and the need to water street trees and greenery. All planning from 2018 and onwards will include the City’s stormwater strategy.

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</table>

The vacuum waste collection system runs on 100% green electricity.

**Footnote:** “Destinations” refer to the Metro station, for example.
Energy for lighting

Green energy is used for lighting. The light fittings in Stockholm Royal Seaport are energy-efficient and mercury-free. Only LED technology has been used from 2017 onwards. LED has reduced the amount of energy consumed by street lighting to about 1.8 kWh/kilometre\(^3\), representing energy savings of around 50% compared with the previous technology (metal halogen). The City performed a LCC, which gave a repayment period of about 5.5 years for investment costs with retained or improved lighting quality.

Construction

Soil remediation and aggregate management

The soil remediation is based on site-specific guideline values that follow the Swedish Environmental Protection Agency’s guidelines and methods. These guideline values require that contaminants be removed, which may cause inconvenience for the people living and working in the area, or for the surrounding environment. In practice, this means that materials are excavated, screened and re-used locally, or disposed of.

All excavated materials are sorted. Contamination is mainly confined to particulate matter, so coarser materials can mostly be classified as clean and re-used. The material for re-use is crushed into new fractions and used for the construction of roads and other infrastructure, as well as foundations. Contaminated soil and other excavated material, such as sleepers and contaminated concrete, are sampled and classified, and then disposed of.

Drainage water

When excavating under the groundwater level, drained water must be purified before discharged into Lilla Värtan due to soil contamination. In 2017, 7,800 m\(^3\) of contaminated water was purified in the water treatment plant, which is roughly equivalent to the water in ten Olympic swimming pools.

Construction Consolidation Centre (CCC)

The CCC was started in 2013 and coordinates all logistic flows and offers a range of services including co-loading, short-term goods storage, coordinated waste management, surveillance and cleaning. Logistics planning increases delivery precision, minimises damage to materials and the risk of theft, creates a safer workplace and reduces the number of truckload movements in the construction site through co-distribution. The ability to store building materials at the CCC makes the construction process easier for property developers due to lack of space on the construction site.

Co-loading reduces the number of deliveries to the construction site. Coordinated deliveries create better accessibility and good order at the work site. Small deliveries are co-loaded via the CCC, which has now reduced the number of truckload movements for these deliveries by 60%.

The CCC aims to use transport running on HVO100, a renewable alternative to diesel. In 2017, 22% of the fuel used was renewable.

Construction waste

The City requires contractors to reduce the amount of waste they generate. To prevent waste generation, contractors are required to create a waste management plan and appoint a waste management coordinator.

Public open space, construction waste management (%)

Requirements summary:

- 100 mass percent of the construction waste shall be separated at source.
- The construction waste sent to landfill shall be minimised.

Mass balance

- Re-use: 78%
- Disposal/landfill: 22%

<table>
<thead>
<tr>
<th>Material Recovery</th>
<th>Energy Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill material comprises materials with elevated contamination levels. These materials usually have poor geo-technical quality and cannot be used in construction projects.</td>
<td>Most of the construction waste is recovered. This is mainly because the scrap and metal arising from the demolition of Gasometer 4 is recovered. Less than 1% is sent to landfill.</td>
</tr>
</tbody>
</table>

1 The City of Stockholm’s mean value for general street lighting.
Electricity and diesel consumption

The energy consumed during construction is a minor share of the total energy consumption throughout the life cycle. Energy is mainly derived from fossil fuels. Electricity is 100% renewable and the diesel fuel has an environmental classification of 1.

Choice of materials

Requirements – chemical content

Materials and products should meet Byggvarubedömningen (BVB) requirements regarding content and documentation. PVC, endocrine disruptors, zinc and copper shall not occur. Materials shall be documented in a digital logbook.

All built-in materials in Stockholm Royal Seaport are controlled from a chemical content perspective against BVB. Every contract uses about 30 products. Of a total of six contracts completed in 2017, 12 deviations for materials containing phase-out list substances and 14 deviations in relation to no content information were reported. 100% of these deviations were approved. All materials used were documented in a digital logbook.

Requirement Deviations Justification

Materials classified as "avoid" according to BVB and other specified substances must not be used

Halogenated (PVC, etc.)
No deviations

Phase-out list substances
5 deviations
Found in grouting, ground spray, cleaning products, adhesives

Endocrine disruptors
5 deviations
Found in hydraulic oils, umbrellas, sofas, bitumen

Zinc
2 deviations
Found in bike stands, net

Copper
No deviations

No content information
14 deviations
Supplier does not wish to assess the product. When projects started, there were no requirements.
Choice of materials – climate and finite resources

Life-cycle assessments were previously performed on street materials, piles and decking. In 2016, a collaboration commenced with the IVL Swedish Environmental Research Institute to test their LCA tool on infrastructure projects. A pilot project will be conducted in 2018.

In 2017 attempts were also made to gather information about the amount of building materials used in Norra 1 and their subsequent climate impact. Emission factors from the environmental load profile – a tool developed for Hammarby Sjöstad – were used.

<table>
<thead>
<tr>
<th>Building materials</th>
<th>Climate impact</th>
<th>Embodied energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>15,300 tonnes</td>
<td>1,430 tonnes CO₂</td>
</tr>
<tr>
<td>Steel</td>
<td>1,096 tonnes</td>
<td>320 tonnes CO₂</td>
</tr>
<tr>
<td>Asphalt</td>
<td>3,300 tonnes</td>
<td>115 tonnes CO₂</td>
</tr>
<tr>
<td>Total</td>
<td>1,865 tonnes</td>
<td>185 kWh/m²</td>
</tr>
</tbody>
</table>

Climate change effects and embodied energy in Norra 1.

As of 2016, the requirement is that only 25% of the ballast in concrete shall be obtained from virgin natural materials, such as natural sand and gravel, and pebbles.

Choice of materials – social aspects

Since 2015, Stockholm Royal Seaport has collaborated with several other municipalities in regard to ethical sourcing for natural stone in construction contracts. The aims are to share knowledge and best practice, and to develop joint procedures for influencing and contributing to better working conditions, in accordance with international conventions. In 2017, the group developed a joint monitoring tool. In partnership with the Swedish Association of Local Authorities and Regions (SKL), efforts are ongoing to introduce joint audit sampling and to study how work with other product groups could be developed. All imported natural stone for public open space was verified and the results show that all stone meets the working group’s joint requirements.

All timber building products are FSC certified. On behalf of the City, Swedwatch analysed the environmental and social aspects of Azobe timber, which is used for jetties. The report shows that, despite FSC labelling, the harvesting of Azobe timber is associated with some ethical and environmental risks. In 2018, the City of Stockholm will test and investigate alternative woods and treatment methods.

Stockholm Royal Seaport’s work environment vision

Our construction and infrastructure projects shall be characterised by high standards of safety and quality, and broad involvement at all levels, in order to highlight and strengthen health and safety in construction. Minimising incidents and accidents requires everyone’s active participation.

From the start of construction in 2010 until 2017, only a few workplace accidents have led to long-term absence from the project. The BuildSafe mobile app is used to facilitate the reporting of incidents. In 2017, the number of reported incidents was much higher compared with previous years. This enables the project to work with more preventive measures at early stages.

Preventive occupational health and safety management

Stockholm Royal Seaport initiates and drives a number of preventive activities to create a safe and secure construction site. The aim is to consider everyone who visits the construction site. This includes risk mapping, logistics and establishment information, fire protection and safety inspections, with a focus on pedestrians and cyclists.

The following were reported in 2017:

<table>
<thead>
<tr>
<th>No. of reported incidents</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidents</td>
<td>34</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>Workplace accidents with absence</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
1.1 Create a robust and interconnected urban structure.
1.1.1 Develop natural connections to surrounding urban districts.
1.1.2 Create a flexibility where appropriate in the zoning plans for the area that will accommodate change in function and future changes.

1.2 Contribute to the creation of a city that promotes equality.
1.2.1 Create a variety of housing supply with different forms of tenure that can meet the needs of all stages of life such as tenant-owned and rental apartments, student housing, aged care homes and services under Sweden’s Support and Service Act.

1.3 Plan for good access to private services, workplaces and other services such as restaurants (24%), schools (24%), range of cultural activities (14%).
1.3.1 Plan for good access and proximity to public services.

1.4 Plan for a well-functioning everyday life.
1.4.1 Plan for a mix of functions that give life and movement to selected streets and places.
1.4.2 Create destination points and activities that attract a variety of visitors to Stockholm Royal Seaport.

1.5 Create attractive and safe places at all times of the day and night.
1.5.1 Commercial floor area 6% (completed), 30% (planned to date). 91% of the residents are very/fairly satisfied with their homes and services under Sweden’s Support and Service Act.
1.5.2 Design the public outdoor environment in a way that facilitates and encourages movement and physical activity, both indoors and outdoors.

1.6 Make room for and prioritise sustainable goods that supply the area.
1.6.3 The infrastructures shall be sustainable, facilitate and encourage movement and physical activity, both indoors and outdoors.
1.6.4 Create opportunities for providing services that facilitate everyday life through digitisation of the urban district.

1.7 Participate in the knowledge development process of the City’s administrations and companies in regard to how the housing supply can be developed to meet the needs of a diverse society.
1.7.1 The size of the apartments varies.
1.7.2 Design the ground floors of buildings to create active facades from all aspects, and good access to business premises throughout the entire urban district.
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1.11 Ensure that the infrastructures shall be sustainable, facilitate and encourage movement and physical activity, both indoors and outdoors.
1.11.1 Plan for sustainable infrastructure that allow flexible use.
1.11.2 Plan for vibrant streets and streets that allow flexible use.
1.11.3 Plan for collected organic residues from wastewater being of such a quality that more can be returned to the ecosystem.

1.12 Continuously reduce the amount of waste and increase the purity rate of waste.
1.12.1 Prevent the generation of waste by increased reuse, for example.
1.12.2 Reduce the amount of residual waste over time.
1.12.3 Increase the purity rate for different types of waste.

1.13 Develop knowledge among all players about the benefits of source-separating wastewater systems through pilot projects.
1.13.1 Plan for collected organic residues from wastewater being of such a quality that more can be returned to the ecosystem with optimised energy and resource efficiency.
1.13.2 Capture heat from wastewater in the most efficient way (see also 1.4.3).

1.14 Increase the purity rate for different types of waste.
1.14.1 Prevent the generation of waste by increased reuse, for example.
1.14.2 Reduce the amount of residual waste over time.
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2.2 Create a sustainable and accessible city.
2.2.1 Plan for vibrant streets and streets that allow flexible use.
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2.2.3 Plan so that the proportion of travel by car is lower than the average in the inner city.

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2.15 Create a sustainable and accessible city.
2.15.1 Plan for vibrant streets and streets that allow flexible use.
2.15.2 Plan for vibrant streets and streets that allow flexible use.
2.15.3 Plan so that the proportion of travel by car is lower than the average in the inner city.

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2.20 Create a sustainable and accessible city.
2.20.1 Plan for vibrant streets and streets that allow flexible use.
2.20.2 Plan for vibrant streets and streets that allow flexible use.
2.20.3 Plan so that the proportion of travel by car is lower than the average in the inner city.
### Promote a circular construction and management process.

#### 3.3.1 Prevent and minimise the amount of construction waste.

**TARGET**

- Achieve: 50% reduction in construction waste.

**SUB-TARGET**

- Achieve: 30% reduction in waste generation by 2030.

**PAGE**

- Follow-up Measure: Average amount of construction waste: 30 kg/m² GFA (property developer).

**TARGET ACHIEVEMENT**

- Achieved: 30% reduction in waste generation by 2030.

---

### Efficient energy consumption in buildings and facilities.

#### 3.4.2 Develop knowledge among all players about increasingly energy-efficient buildings through pilot projects.

**TARGET**

- Achieve: Knowledge development.

**SUB-TARGET**

- Achieve: Knowledge development.

**PAGE**

- Follow-up Measure: Not relevant at this point in time.

**TARGET ACHIEVEMENT**

- Achieved: Knowledge development.

---

### Stockholm Royal Seaport shall be fossil-fuel free by 2030.

#### 3.5.2 Plan for fossil-fuel-free energy for housing and business premises.

**TARGET**

- Achieve: Fossil-fuel-free energy.

**SUB-TARGET**

- Achieve: Fossil-fuel-free energy.

**PAGE**

- Follow-up Measure: Utilise surplus energy. See 3.2.3

**TARGET ACHIEVEMENT**

- Achieved: Fossil-fuel-free energy.

---

### Low-climate impact from buildings and facilities from a life cycle perspective.

#### 3.6.4 Design space-efficient housing units and business premises.

**TARGET**

- Achieve: Space-efficient.

**SUB-TARGET**

- Achieve: Space-efficient.

**PAGE**

- Follow-up Measure: More than 80% of property developers meet the Gold rating, SGBC (indoor environment). Does not include Norra 1 and Västra.

**TARGET ACHIEVEMENT**

- Achieved: Space-efficient.

---

### Sound indoor environment in the design and use of buildings.

#### 3.7.3 Develop buildings equivalent to the SGBC Gold rating, indoor environment.

**TARGET**

- Achieve: Green building.

**SUB-TARGET**

- Achieve: Green building.

**PAGE**

- Follow-up Measure: More than 80% of property developers meet the Gold rating, SGBC (indoor environment). Does not include Norra 1, Västra and Södra Värtan.

**TARGET ACHIEVEMENT**

- Achieved: Green building.
Organisation’s policy with regard to seeking external assurance for the report

G4.33 GRI Index The report is not externally assured.

Governance

G4.34 G4.34 Governance structure 8–9

Ethics and Integrity

G4.36 G4.36 The organisation’s values, principles, standards and norms of behaviour 8–9 The project follows the City of Stockholm’s policies.

Environmental impact

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## Social impact

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>WHAT</th>
<th>PAGE</th>
<th>SCOPE OF REPORT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labour Practices and Decent Work</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G4.LA1</td>
<td>Total number and rates of employee turnover by age group, gender and region</td>
<td>GRI Index DMA: 8–9</td>
<td>In 2017, two employees left the project – one man and one woman. The average age was 42.</td>
</tr>
<tr>
<td><strong>Training and Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G4.LA11</td>
<td>Percentage of employees receiving regular performance and career development reviews</td>
<td>GRI Index DMA: 8–9</td>
<td>100% of employees had performance reviews in 2017.</td>
</tr>
<tr>
<td><strong>Diversity and Equal Opportunity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G4.LA12</td>
<td>Composition of governance bodies and management, and breakdown of employees according to gender, age group</td>
<td>GRI Index DMA: 8–9</td>
<td>The management group consists of four women and four men, with an average age of 41.5 years. The Steering Committee comprises three women and seven men, with an average age of 54 years. Minority group membership is not reported in accordance with Swedish law.</td>
</tr>
<tr>
<td><strong>Equal Remuneration for Women and Men</strong></td>
<td></td>
<td></td>
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<tr>
<td>G4.LA13</td>
<td>Ratio of basic salary and remuneration of women to men</td>
<td>GRI Index DMA: 8–9</td>
<td>Men earned 11% more than women.</td>
</tr>
<tr>
<td><strong>Supplier Assessment, Human Rights</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G4.HR10</td>
<td>Percentage of new suppliers that were screened using human rights criteria</td>
<td>DMA: 8–9</td>
<td>66</td>
</tr>
<tr>
<td><strong>Local Communities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G4.SO1</td>
<td>Local community engagement, impact assessments, and development programmes</td>
<td>GRI Index DMA: 8–9</td>
<td>Consultation is mandatory by law.</td>
</tr>
<tr>
<td><strong>Anti-Competitive Behaviour</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G4-SO7</td>
<td>Total number of appeals of procurements</td>
<td>GRI Index DMA: 8–9</td>
<td>None of the 19 contracts awarded were appealed in 2017.</td>
</tr>
<tr>
<td><strong>Grievance Mechanisms for Impacts on Society</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G4-SO7</td>
<td>Number of appeals of zoning plans</td>
<td>GRI Index DMA: 8–9</td>
<td>1 of 1 detailed development plan was appealed in 2017.</td>
</tr>
</tbody>
</table>

The artworks at Värta Terminal received the City of Stockholm’s Art Project of the Year award.
The Capital of Scandinavia

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