

**Stockholm Royal Seaport
Sustainability Report**

2018



Reading guidelines

This is Stockholm Royal Seaport's sustainability report for 2018. The sustainability work is centred around five strategies that were adopted by the City Council in 2017. The reporting is based on the Global Reporting Initiative (GRI) guidelines, Standard Core. Follow the QR code to the right to read the monitoring report and GRI Index.



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The results and GRI Index can be found on www.norradjurgardsstaden2018.se or through the QR code below.



Please note that the links in this document are linked to pages in Swedish. The monitoring report will be available in English in February 2020.

Current status

Stockholm Royal Seaport is one of the largest urban development projects in Europe. When complete, about 12,000 new residential housing and 35,000 new workplaces will have been constructed. Planned completion 2030.

13

detailed development plans
have been approved to date.

5 386

residential apartments have been land
allocated to 45 different developers

6 000

residents have moved into the area

The total development area covers

236

hectares

LIDINGÖ

Development phases

Area	Number of housing units	Commercial floor area m ² *	Construc- tion start	Occupancy
Hjorthagen				
Norra 1	670	1 200	2011	2012–2014
Västra	1 250	3 200	2012	2014–2017
Norra 2	600	2 500	2014	2016–2017
Brofästet	600	3 000	2017	2018–2019
Gasverket	200	80 000	2017	2018–2025
Gasklocka 3 och 4	320	1 600	2018	2021
Jackproppen	57	1 750	2018	2020
Ängsbotten	520	3 000	2020	2022
Kolkajen	1 600	1 100	2020	2023–2028
Värtahamnen				
Södra Värtan	1 900	125 000	2020	2021–2025
Värtaterminalen	–	16 000	2014	2016

*Based on commercial floor area: the floor areas taken up by lobbies, enclosed machinery rooms on the roof, stairs and escalators, mechanical and electrical services, lifts, columns, toilet areas, ducts, and risers.



Phase Brofästet under building construction. Neighbouring the Royal National City Park and Gasverket.

"It is important that we as landowners set strict requirements and ensure that these requirements are monitored."

This report presents several examples that demonstrate that Stockholm Royal Seaport is in the frontline of sustainable urban development in Sweden. Our requirements are usually more onerous than the national building regulations, and we are developing important knowledge for the building and construction sector. If we, as a city, are to live up to Agenda 2030, we need projects that spur development, and we need to share lessons learnt. Consequently, all results and figures from our work are found on norradjurgårdsstaden2018.se. This is consistent with the construction sector's roadmap 2045 for fossil-free competitiveness, which specifies the need for increased knowledge regarding the possibilities of reducing climate impact during the entire planning and construction process.

It is important that we as landowners set strict requirements and ensure that these requirements are monitored. This is also the mandate we received from the Stockholm City Council. The developers showed great dedication in meeting the sustainability requirements for Norra 2, the first phase with strict requirements. Even so, the metered energy consumption is higher than expected. However, we are still 15 % below the Swedish Building Code Regulations of the Swedish National Board of Housing, Building and Planning. The developers will continue to tune their buildings in order to reduce energy consumption, and at the same time gain new knowledge. The large difference between the metered and calculated values continues to be a challenge for the sector, as well as an opportunity for improvement.

We also notice an increased interest from the residents to participate in stakeholder dialogues, and be part of developing various local initiatives.

In Stockholm Royal Seaport, there are many ongoing projects within a confined area and at the same time many residents have moved in. This requires cooperation and collaboration as we have a zero vision for workplace and traffic accidents. Unfortunately, despite all measures taken during the year, there has been one fatal and one serious construction related accident. The accidents have been thoroughly investigated by the developers and the contractors to prevent something similar happening in the future.

There is ongoing planning of new development phases with residential housing, commercial development involving about thirty developers. There are also several large contracts being carried out for initial soil remediation and extensions of quays, streets, and parks. The work is progressing with a good result. We who work with Stockholm Royal Seaport are proud of being part of the redevelopment of a former industrial area into an attractive, safe, and resource-efficient part of Stockholm.

Welcome to follow the development of Stockholm Royal Seaport!

Staffan Lorentz
Head of Development,
Stockholm Royal Seaport,
Stockholm City Development
Administration





The UN global sustainability goals we contribute to:



Agenda 2030 consists of 17 global goals for sustainable development that all countries are subject to, and that are to be achieved by 2030. Stockholm Royal Seaport contributes to meeting 13 out of the 17 goals. How we contribute to each goal is described within each strategy, and in the target tracing report starting on page 23.

Highlights of the year



One of Stockholm's largest photovoltaic plants is located at the Mass Consolidation Centre

To begin the ground works at Kolkajen, a Mass Consolidation Centre was established in Frihamnen. The consolidation centre is a new concept to enable reuse of rock and soil within the development. On the roof of the building more than 1,500 m² of photovoltaic are expected to produce 270 MWh per year. This makes it one of the largest solar PV installations in Stockholm.



Art inauguration and spring market

In the spring of 2018, seven bronze sculptures by the artist Kirsten Ortved were inaugurated in Hjorthagsparken. The sculptures combine organic and artificial forms with enigmatic formations in which seriousness and playfulness meet. In parallel with the art opening ceremony, a spring market was held at Storängstorget, and several of the shops in the area joined with pop-up stalls on the square together with several cultural and sports associations. The bronze poodle "Theo" by Johanna Karlsson was also inaugurated in 2018.



Open House at Gasverket attracted many visitors

Stockholm Royal Seaport participated in the annual Open House architecture festival, for which some parts of Gasverket were opened to the public. The Open House attracted more than 1,200 people to the guided tours that were organised in cooperation with SISAB, Oscar Properties, CA Properties, Klätterverket, the Railway Museum, and the Sports Department. Of the 10,000 visitors to the Architecture festival, one out of ten chose to visit the guiding tour through Gasverket.

Stockholm Royal Seaport put Stockholm on the map

During 2018 the project has received 7,000 visitors as part of various national and international field trips. In total, more than 33,000 people have visited the project since 2012.

Stockholm Royal Seaport – unique qualities in an attractive location

Stockholm Royal Seaport is an urban development project where former industrial land, owned by the city of Stockholm, is converted into an attractive residential neighbourhood. The land is managed by the Development Administration, which also leads the development of the project in close cooperation with other city administrations*. The project is funded by selling and leasing land. By 2030, at least 12,000 residential apartments and 35,000 workplaces will have been built within the development area.

Some of the industries in the area, such as the energy production at Värtaverket, and the activities at the port, will be further developed, while others, such as oil handling at Loudden, will eventually be decommissioned and phased out.

The project's central location, close to both the water of Lilla Värtan and the Royal National City Park, provides a unique setting. The small-scale city neighbourhood of Hjorthagen connects to Gasverket, where gas production ceased in 2011. The distinctive architecture of the old industrial buildings has a great potential for new and inspirational use.

The proximity to water contributes to the dynamics of the site. The quay area is planned to be an integrated part of the city. As the Stockholm Royal Seaport opens up and connects to the rest of Stockholm, it will become easier for people to move around, on foot or by bike, within as well as across the area.

*The companies and administrations that are predominantly involved in the development are the Planning Administration, the Traffic Administration, the Ports of Stockholm, and Stockholm Vatten och Avfall AB (water and waste management utility).

By strengthening and creating dispersal zones for flora and fauna throughout the Stockholm Royal Seaport connecting it to the adjacent Royal National City Park, strengthens the values and connections to nature. The many parks and green areas in the district gives this part of Stockholm a special character.

Sustainability efforts

In 2000 planning commenced for Stockholm Royal Seaport and in 2004, soil remediation began. In 2009 the Stockholm City Council decided that the development would become a model of sustainable urban development. The Development Administration established a sustainability organisation, and provided resources to lead and manage the sustainability work. For support, there are thematic groups for each of the five strategies involving city experts from many fields, including traffic and energy.

The visions and targets decided by the City Council in 2010 were reviewed and revised in 2017 and published in the Sustainable Urban Development Programme. The programme connects sustainable development targets with the urban planning principles. The programme originates from the 'The City of Stockholm, 2040 Vision', and the global sustainability goals. The work is based on five strategies, involving ecological, economic and social aspects. The full programme can be read via the QR code to the right.

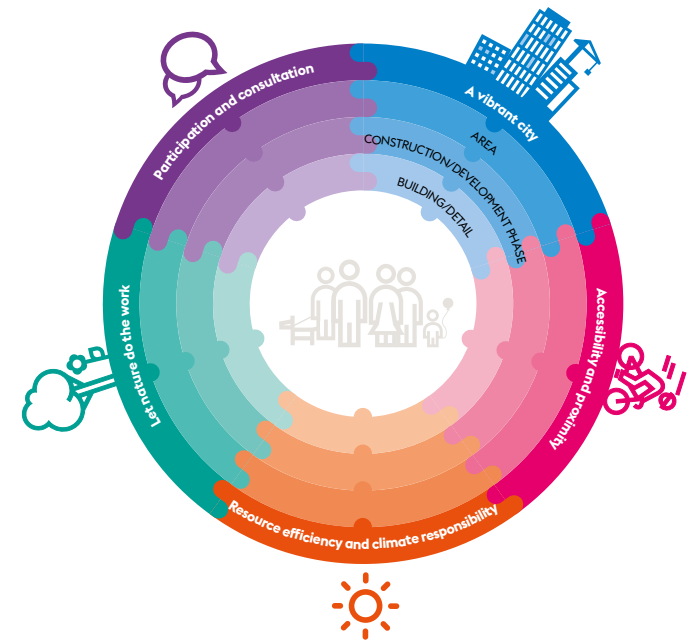


Illustration 1: Five strategies for sustainable urban development

On the following pages, this year's sustainability work is presented and arranged according to strategies and underlying targets. City planner Stefan Modig begins with an assessment of how the urban planning principles have been translated into the city planning process.



Sustainable Urban Development Programme (PDF)

Five strategies for sustainable urban development

How the urban planning principles are put into practice in the development of Stockholm Royal Seaport – the city planner's perspective:

Vibrant city

The planning takes advantage of the potential and characteristics of Gasverket. The buildings are given new mixed functions that will become a destination for the whole of Stockholm. Opening the district will contribute to increase the interconnectedness of the city. In Kolkajen (see the image on this right) the water arena will become a new and eventful public space.

The public space in Södra Värtan will provide various functions and tempos. Two new parks are being planned; Värtanparken, which is seen in the picture on the next page, will be more vibrant and activity-based, while Saltparken will become a quiet park on the waterfront. Flexible spaces that can be used for farmers' markets, and an open-air-stage for the summer and an ice rink for the winter, are also planned. The planning regulations and quality control programme ensure a thorough design, and a variety of new buildings, concentrated at central locations and passages, offering more freedom within the area. In 2018, an art programme for Södra Värtan was developed, locations for the artwork were selected, and artists chosen.

Accessibility and proximity

The principle of adapting the urban environment to the human scale is expressed in Gasverket by the presence of pedestrian streets between the historical buildings. In other places, such as along the main street in Södra Värtan, the same principle partially conflicts with the desire to make room for sustainable

modes of transport, since space for different kinds of transport require larger-scale urban spaces.

One of the challenges is managing the barriers, for example, between Gasverket and existing developments at Hjorthagsberget. There is a need for stairways and elevators in order to link the different precincts together. In Södra Värtan, the railway yard needs to be dismantled in order to make way for a new main street. This initiative offers a solution that helps link the area with the adjacent Gärdet.

The people who move to Royal Seaport will have access to services such as: preschools, playgrounds, grocery stores, restaurants, and public transport (buses and metro) from day one.

Resource efficiency and climate responsibility

This year, the detailed development plan for the new garage in a cavern under Hjorthagsberget was approved. It provides conditions for an efficient parking solution that does not compete with other land uses. The man-made island, and the floating student housing planned to be built at Kolkajen, do not claim existing land. A public dialogue was held around the detailed development plan for Energihamnen, the challenge is to merge several industrial activities into a limited space. Already existing buildings in Gasverket, and other places, are being restored and redeveloped. »

Visionary image: Adept / Mandaworks





Let nature do the work

The green court yards in Stockholm Royal Seaport provide beauty and serve as meeting places for residents, while at the same time taking care of stormwater runoff and strengthening biological diversity. Trees and other vegetation in the public space reduce the effect of heat waves and contribute to a better acoustic environment. Solutions for managing the stormwater runoff are well designed to provide the public space with social values and flexibility. One example is the skateboard rink in Värtanparken, which is designed for skateboarders, while at the same time taking care of stormwater runoff and offering aesthetic qualities.

Participation and consultation

To raise interest and participation in Stockholm Royal Seaport, public activities for residents and visitors are arranged. There is the pier for sunbathing at Kolkajen, as well as planter boxes and excursions in the city. The Open House event which was held in the autumn, invited those interested to see what is going on behind the fences at Gasverket.

Through land allocation competitions, new ideas and technologies are being tested. As an example, the plus-energy buildings at Brofästet were evaluated with regard to energy efficiency and architectural quality, while the buildings at Kolkajen were evaluated in terms of social sustainability and architectural quality.

Stefan Modig

City Planner,
Stockholm City
Planning Administration



Vibrant city

Robust and interconnected urban structure

Public open spaces with streets, parks and public squares form a network that keeps the city structure together and connects the area with the adjacent neighbourhoods. This year, a new bridge for biking and walking was constructed over Husarviken, which links Stockholm Royal Seaport with the Royal National City Park. The construction of a new bridge over Värtabanan, replacing the existing bridge, started during the year. The bridge, with a double-sided walkway and two-way bicycle path will open in 2019.

Equality

Stockholm Royal Seaport aims to be an attractive and welcoming place for everyone. The district offers different types of residential apartments of varying sizes. More than half of the residential apartments that have been built so far consist of rental apartments, and every tenth apartment is for student housing or group dwelling. Forty-five percent consists of tenant-owned apartments. [Read more](#)

This year, the land allocation competition in Kolkajen was evaluated. The purpose was to encourage developers to innovate and create housing that suit different kinds of lifestyles, and different life stages. The proposals consist to a large extent of space-efficient apartments, complemented by additional shared space. Employment of people outside the labour market was also rewarded in the competition. Land allocations are planned to take place in spring 2019.

In 2018, suggestions for improvements based on results from the social impact assessment and the extended stakeholder dialogue in Södra Värtan, were further developed. The most highlighted issues were the importance of ensuring the proximity to the water for all, to create a healthy microclimate at the quays and to provide opportunities for physical activities and recreation.

The **Vibrant city** strategy serves as a guideline during the planning process, in order to guarantee a mix of residential buildings, shops, offices and social services that, together with well elaborated public spaces, making it possible to live a pleasant and comfortable everyday life.

Target

1.1	Create a robust and interconnected urban structure
1.2	Contribute to the creation of a city that promotes equality
1.3	Plan for a well-functioning everyday life
1.4	Create attractive and safe places at all times day and night

55% rentals

including 10% student apartments

26% of the public open space have social values which equals 20 m² per apartment

7 preschools with 426 registered children

” The social impact assessment of Södra Värtan highlights issues that are important for the continuing planning process. For example, it is important that the sites within the area are connected to the rest of the city, in order to promote natural flows. Also, for the children, it is important that the walking and bicycle paths are safe and secure.”

Hillevie Jernberg

Planning project leader Södra Värtan
Stockholm City development administration

Well-functioning everyday life

Social services such as grocery stores and schools that have been positioned at the centre of the development contributes to an accessible and close by urban life. In 2018 a new playground was completed, and eight new sculptures were inaugurated.

Planning of Gasverket is ongoing, including service such as retail and cultural amenities. The Boberg school and the sports center will be ready to open at the school start in autumn 2019. Klätterverket, an indoor climbing facility, will also open in autumn 2019, while the Stockholm Transport Museum will open in 2020. In addition, there are plans to build, among other things, a library and a cultural arena in Gasklockan.

To create a vibrant city a mixture of residential housing and commercial space is needed. So far, 12% of the completed area consists of commercial space.

Attractive and safe urban spaces

The public urban space is an important meeting place, offering a variety of intense, crowded areas, as

well as silent and calm areas. This, in combination with a variety of functions, creates good conditions for safe places.

A dense city requires a high plot ratio, and it is therefore important to provide ample amounts of free public space. In the Stockholm Royal Seaport, the public open space with social values makes up 26% of total area, equalling 20 m² per apartment. In other newly built areas, like Hammarby Sjöstad, the public open space with social values is 18.5%.

The average plot ratio for the areas completed in Stockholm Royal Seaport is 2.3, to be compared to Hammarby Sjöstad's plot ratio of 1.7, and Hagastaden's 7.2. [Read more](#)

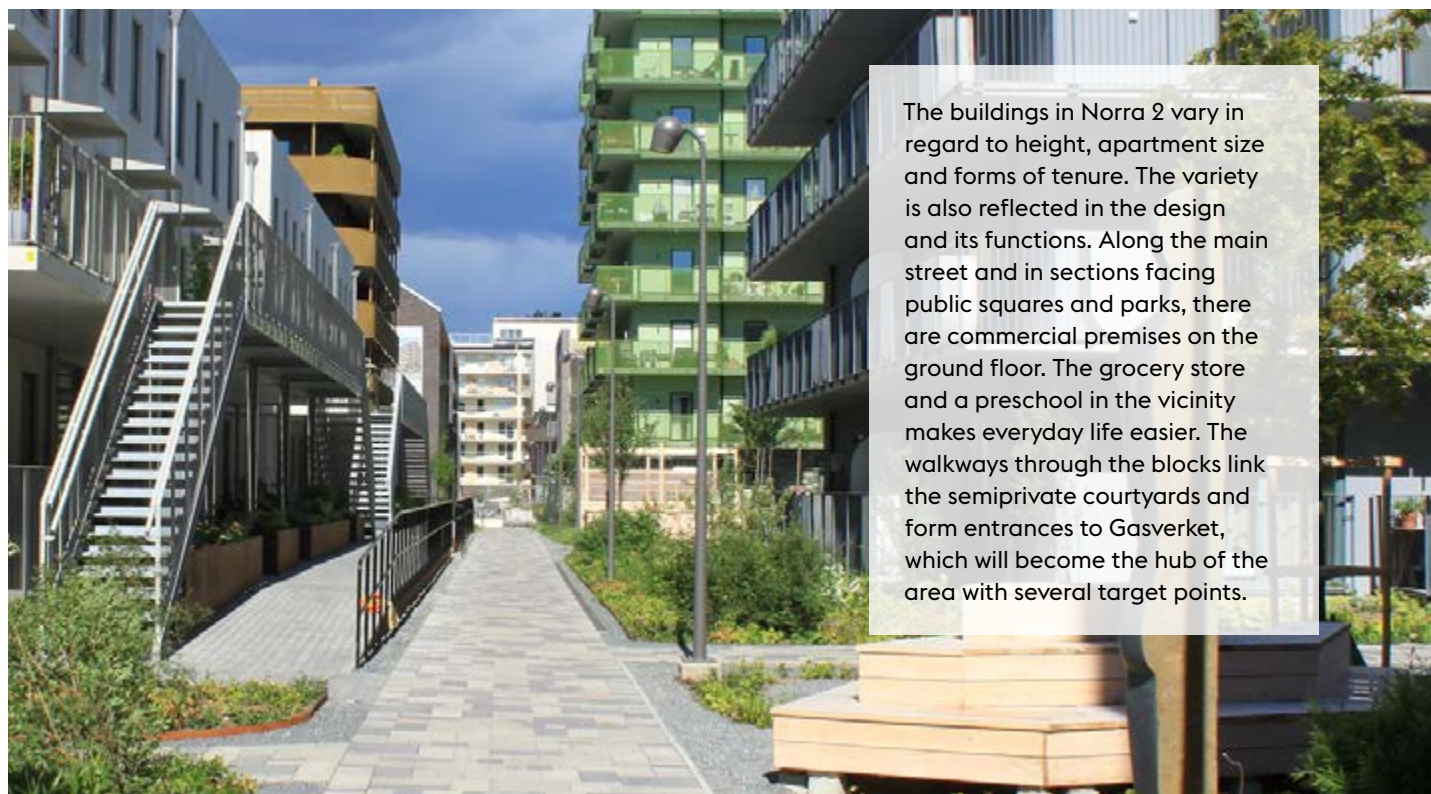
This year, the section of the Hjorthagsparken closest to Bobergsgatan was completed. It will be an environment rich in experiences including a playground and seven of the eight new sculptures in the

The plot ratio gives an indication of the density of a district. For Stockholm Royal Seaport, it covers everything already constructed, and what is still being planned in the development.

area. There is also a large section with a meadow that serves as a protected and peaceful place.

Walks and fire protection drills have been carried out together with police and emergency services to assess the safety in the area. This has resulted in additional traffic signs for speed limits, speed control, as well as a closer cooperation between the Construction Consolidation Centre and the public moving in or through the area.

The 2016 resident survey showed that 91% of the people who live in Stockholm Royal Seaport felt safe in the area.



The buildings in Norra 2 vary in regard to height, apartment size and forms of tenure. The variety is also reflected in the design and its functions. Along the main street and in sections facing public squares and parks, there are commercial premises on the ground floor. The grocery store and a preschool in the vicinity makes everyday life easier. The walkways through the blocks link the semiprivate courtyards and form entrances to Gasverket, which will become the hub of the area with several target points.

Accessibility and proximity

Photo: Lieselotte van der Meijis

The **accessibility and proximity** strategy promotes sustainable travel patterns, giving priority to pedestrians, bicycles and public transport.

Target

- 2.1** Prioritise pedestrian, bicycle and public transport in the planning
- 2.2** Plan for vibrant street spaces for flexible use
- 2.3** The infrastructure is to promote consolidated shipment and efficient sustainable goods shipments

2.1 bicycle parking lots and
0.5 car parking lots
per apartment on
the properties
7% of the parking lots on
the development sites
have electric charging
5 minutes
to everyday services.

Giving priority to pedestrians, bicycles and public transport

Priority is given to pedestrians, bicycles and public transport on the streets. The density of the city, and the proximity to public and private services, are of great importance to ensure sustainable travel patterns. Having been closed down for a period of time due to construction work, the walkway and bike path leading to the Ropsten metro station in Hjorthagen was reopened this year.

Stockholm Royal Seaport has received funds from the City of Stockholm to invest in projects reducing climate emissions. Various solutions for facilitating cycling have been tested. For example, Stockholm Parking will test an automatic bike garage in 2019. A bicycle repair station and a bicycle pump have been set up.

The project has also participated in Region Stockholm - Traffic Management's process, investigating future public transport needs for Stockholm Royal Seaport.

In 2018, bus services were strengthened with a new bus line 75 that runs from Ropsten to the City terminal. Bus line 6, the trunk route from Ropsten to Karolinska Institutet was inaugurated at the end of 2017 and has made a positive contribution to the availability of public transport in the area. Gasverksvägen has been reopened for bus traffic, and consequently, bus line 55 can now once again return to its ordinary route.

Norra 2 was designed with a dense urban structure and everyday services located within a five minutes' walk in mind. The number of parking lots for bikes is greater than in the earlier phases, which increases the likelihood of cycling. On the streets, there is space for temporary parking for cars (loading and off-loading), parking for visitors and carpools. In the garages, the number of parking lots for private cars is limited to 0.5 per apartment.

Development of the Mobility Index (MI) tool has continued during 2018. The MI was developed with inspiration from the Green Space Index, and gives developers greater possibilities to design solutions customised for their property.

In the public space, the Husarviksbron was completed and opened in 2018. Work is ongoing to ensure safe roads to school before the beginning of the 2019-2020 school year, with a focus on walking and biking. [Read more](#)

Vibrant streets

In future phases, the plans is to create several multi-functional streets that will be almost car-free within the residential areas. The streets are designed and furnished in such a way that they are safe and accessible. Over the course of 2018, the design of these streets began.

Garage usage was also assessed during 2018 and showed a high occupancy rate. 12 of the 15 garages have an occupancy rate exceeding 95%. The detailed development plan for the cavern garage, Hjorthagsgaraget, was also adopted. The 1,600 parking lot garage will be built in a cavern, servicing Kolkajen and Gasverket. At present, remediation of the cavern is being carried out, and the garage will be opened in 2022. The garage is placed away from the residential areas with the purpose to decrease traffic within the residential streets and facilitate sustainable choices of transportation.

Efficient and sustainable transportation of goods

Logistics in the completed neighbourhood needs to be streamlined to ensure good urban qualities. Investigations on goods transportation during the operational stages have been made, but they need to be pursued in greater depth in 2019.

Even during the construction phase, logistics

planning is important. Less transportation within the construction sites creates safer workplaces. Since 2013, there has been a Construction Consolidation Centre, CCC, to which all developers and their contractors are connected. The CCC coordinates logistical flows and offers services to reduce goods traffic in the surrounding area. CCC transports material in and out of the construction sites. Due to a change of the operator and computer system, there is a lack of complete statistics on how much construction transport has declined. [Read more](#)

In 2018, a new procurement of the CCC operator was completed. Through the new business model, consolidation of material transport through the CCC has increased. There is an increased focus on logistics planning in early project stages and in the implementation stage. The new transport booking system is open to other logistics systems and is compatible with construction sector standards.

Great efforts have been made to control construction transports in order to ensure traffic safety. However, a traffic accident involving a truck and a cyclist occurred. The investigation into the accident is still ongoing.

The CCC serves as a platform for innovation and has attracted several R&D projects. It is an arena for learning and development related to construction consolidation and logistics.

In order to streamline the handling of excavated soil and rock, a Mass Consolidation Centre (MCC) was established in the port area, funded by the Stockholm City climate investment fund. The centre's activities include local sorting and remediation, as well as removal of non-usable soil and rock by boat. This way, landfills outside Stockholm can be used. The goal is to reduce climate emissions with up to 50%. In addition, the reuse of excavated soil and rock will can increase to 50%, which also reduces the number of shipments. [Read more](#)

” The co-operation with the CCC has contributed to preventive and proactive logistics and transport operations that ensures safety as well as accessibility to the public, the contractors and other involved parties. We are proud of the Rescue Service's recognition of proactive fire prevention during the construction stage, which creates safety for everyone.”

Stephan Wrang

Working environment coordinator,
Stockholm City Development Administration



Resource efficiency and climate responsibility

Reduced waste and increased waste purity

The waste management system in Stockholm Royal Seaport is designed to enable material recycling. The waste handling system includes kitchen grinders, vacuum waste collection system, recycling rooms, a mobile re-use station, and an automatic station for hazardous waste. Three waste streams are collected in the vacuum waste collection system, causing a reduced number of transports which contributes to a more attractive urban environment.

The system is built by the City of Stockholm, and when completed, Stockholm Vatten och Avfall will take ownership. The residual waste in Stockholm Royal Seaport amounts to 213 kg per apartment and year, compared with the national Swedish average of 520 kg per apartment and year (avfallsverige.se). [Read more](#)

Resource efficient water and wastewater management

Stockholm's wastewater management is efficient in terms of water purification and low climate impact, but there is potential to improve the system further. In 2016 the R&D project MACRO started and has since investigated conditions for source separating wastewater systems. MACRO is managed by the City of Stockholm in cooperation with, among others the city of Helsingborg, and is funded by VINNOVA. The results show great potential for source-separating systems for the three streams; greywater, blackwater and organic food waste. The aim is to increase the generation of biogas, the reuse of nutrients and waste heat than in conventional systems.

There is still a need to investigate the prerequisites for a system in the area of Loudden. Three specialised seminars and one Forum for Sustainable Solutions have been carried out on the topic. During the Forum,

With the **resource efficiency and climate responsibility** strategy the city embarks on a fossil-fuel-free, low-resource and toxic-free future. Resource flows should be circular and cause as limited environmental and climate impact as possible.

Target

3.1	Reduce the amount of waste and increase waste
3.2	Effective water and wastewater management
3.3	Circular construction and management processes
3.4	Energy efficiency in buildings and facilities
3.5	Fossil fuel-free by 2030
3.6	Low climate impact
3.7	Healthy indoor environment
3.8	Sustainable choices of building materials
3.9	Robust construction

* Includes energy for heating, domestic hot water and real estate energy

Measured energy use for buildings in Norra 2 is averaged to

76 kWh m² per year A_{temp}*

which is 15% lower than the current Swedish building code regulation

240 MWh

of solar energy has been produced in Norra 2

213 kg

residual waste per apartment and year compared to the national average of 520 kg

suppliers of wastewater heat exchangers, vacuum toilets, and kitchen grinder presented their products. An extension of the MACRO-project is planned to facilitate the transition to circular and regenerative cities.

Circular construction

The Stockholm Royal Seaport site is contaminated from its previous industrial activities, 25% of the land area has been remediated to date. By remediation and reuse of materials the need for transports is reduced considerably. Only materials that do not meet quality requirements due to pollution or structural requirements are being disposed of. So far, two million tonnes of have been handled on site, and 770,600 tonnes have been reused, contributing to a mass balance of approximately 40%. [Read more](#)

An innovation procurement project to identify methods for remediation, started in 2016 and was completed in 2018. During this process, various in-situ remediation methods were tested and evaluated in order to avoid both excavation and transport to external processing. The results show that treatment combining chemical oxidation with persulphate and chalk for cement stabilisation, can be used to remediate the most of the contaminated land onsite. The project was funded by Vinnova.

Energy efficiency

All new buildings are being built as low-energy buildings to reduce energy use. The buildings are provided with a well-insulated building envelope and energy efficient installations. The roofs are used to generate solar electricity and solar heating which increases the production of renewable energy.

Experiences from Norra 2 show that the requirements have led to the installation of energy efficient

air treatment systems with air handling units (AHU) and all buildings are connected to district heating. The buildings have varying form factor, glass areas, and quality of the building envelope, but as all local produced solar energy was accounted for, it partially compensated for deficiencies in design and systems.

The first metered results for Norra 2, two years after occupation, demonstrated that the calculated energy use have been exceeded. The developers have worked on trouble shooting measures. The largest deviations consist of measurement errors and high heat uses, i.e. ventilation and warm water circulation losses, thermal bridges and problems of commissioning and tuning. The developers will continue the efforts to correct errors as far as possible in 2019.

Energy use for automatic waste collection systems does not yet reach the set requirements. This is due to the system not being fully deployed, which, among other things, leads to leakage. [Read more](#)

LED lighting are used for public places which represents an energy saving of 60% compared to traditional lighting. During 2018, light steering controlled by the frequency of pedestrians and bikers was tested. The aim is to further reduce the energy use while increasing security. The evaluation will be completed by the end of 2019.

A total of 240 MWh of solar energy has been produced on the roofs of Norra 2. [Read more](#)

Fossil fuel free by 2030

The target for Stockholm Royal Seaport is to have fossil fuel free energy-, waste- and transport systems by 2030. Important conditions for achieving this target are circular waste systems, energy-efficient buildings combined with local production of solar energy, as well as implementing the traffic hierarchy,

i.e. giving priority to pedestrians, bicycles and public transport. The biggest challenge is a fossil-fuel-free transportation system, since traffic is regional and regulations on the vehicle fleet would require changes in national regulations.

Stockholm Royal Seaport has participated in the C4O initiative (Climate Positive Development Program, CPDP) since 2010. The participation involves developing a road map on how to become a climate positive district. The C4O framework includes only the operational stage of energy, waste and transportation. The road map has been approved and during 2018, Stockholm Royal Seaport became a partner within the CPDP. In order to follow up on the road map, a method for calculating climate emissions has been developed. A first trial to calculate the climate impact of the energy use, shows 1,567 tonnes of CO₂ emissions during 2018. Emissions from transports and waste have not yet been considered. [Read more](#)

Low climate impact

A building contributes to large climate impact, depending on the materials used. The impact can be reduced both in the design and construction phases. Therefore, all developers must complete a climate calculation for their buildings starting in an early stage. The calculations received to date have been of various quality. The Stockholm Royal Seaport therefore takes part in a project funded by the Swedish Energy Agency to test and evaluate climate calculation tools for the building sector that was recently launched by the Swedish Environmental Research Institute (IVL). The evaluation of working methods and the tool will be completed in 2021.

Good indoor environment

Quality assurance during the construction process and on-demand ventilation, are important factors for ensuring a good indoor air quality. Other important factors for health and well-being are good access to daylight and low noise levels. [Read more](#)

Ninety percent of the developers achieve the Gold rating, which is used as an indicator of the indoor environment. The non-compliances that occur are almost exclusively due to poor access to daylight.

In a densely built urban environment, access to daylight is a challenge. The earlier collaboration between architects, energy and indoor environment experts is established, the better prerequisites for achieving the indoor requirements. With future climate change it is expected that the need for cooling will increase, various solutions for cooling (or natural cooling) are seen more frequently. Cooling becomes easier with different types of vegetation that protect against heat gain and give shade from the sun. The greenery allows light and heat in the spring and autumn but blocks the sun and heat during summer months.

One challenge in Södra Värtan is the low-frequency noise from ships in the harbour. There are, for example, no type-approved windows that can cope with these low frequencies. The City organised a seminar where the need and the potentials for new products were discussed.

Sustainable building materials

All building materials should be non-toxic, i.e. not contain any substances that are hazardous to human health or to the environment. All building material must be approved in the national chemical assessment systems for building materials and be documented in a digital logbook. Materials should also meet social requirements.

In 2018, the focus has been to speed up the registration of products in the national building material assessment database. This has contributed to a good coverage for product groups such as playgrounds materials, pipes, wires, cement, chemical products etc. Deviations have occurred due to lack of chemical content information, occasionally these deviations have been discovered after installation. For projects on public space, few non-compliances have been reported.

The City of Stockholm has continued to actively work with sustainable and ethical procurement of natural stones. The aim is to, by better procurement practices, contribute to better working conditions in the production phases. The City of Stockholm is part of a working group to exchange experiences with Malmö, Lund, Helsingborg, Gothenburg and Örebro. In 2018, a workshop was held to set routines for follow-up of imported, as well as Swedish, natural stones. During 2018 all-natural stones procured in Stockholm Royal Seaport were checked, and the requirements were fulfilled. [Read more](#)

Since autumn 2018, Stockholm Royal Seaport contractors are expected to complete a self-assessment on social accountability in the supply chain. The aim of the self-assessment is to obtain information on the City's supply chain to be able to set better requirements in the future.

To reduce the amount of materials hazardous to environment and health, and to reduce the spread of microplastics, requirements to reduce the use of artificial grass and rubber asphalt have been introduced.

Requirements for Forest Stewardship Council (FSC) certified wood products, ethical and environmental aspects in the supply chain are checked. However, there are question marks concerning Azobé, a tropical wood that, despite having the FSC certificate, is associated with ethical and environmental risks. Alternatives

to this wood have been assessed in a study during 2018.

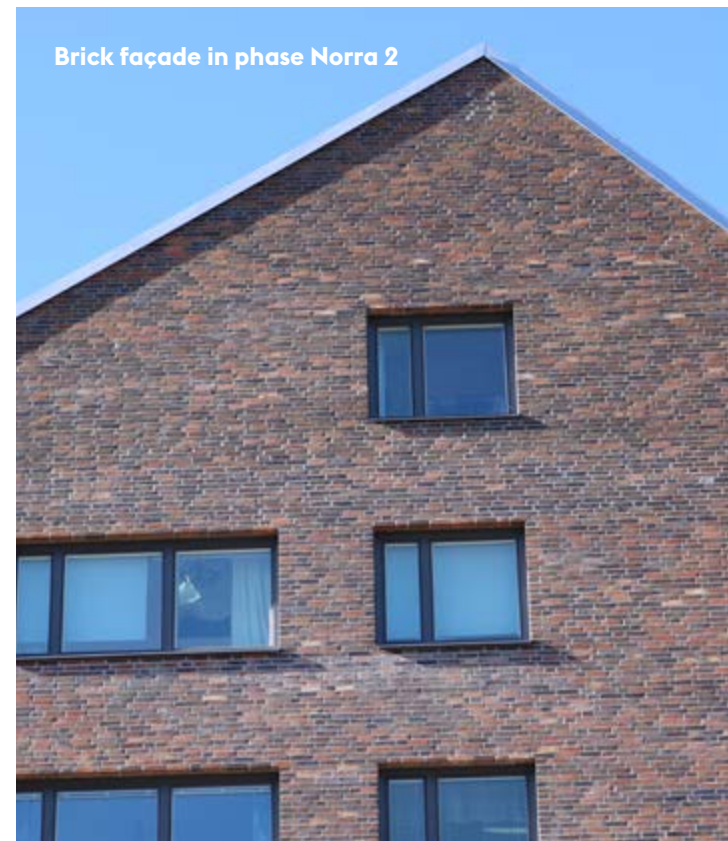
To reduce the use of virgin material such as natural gravel, requirements for a maximum of 25% of the ballast for concrete is allowed to be natural gravel. In 2018 all contractors achieved this requirement.

Robust construction

The built environment must endure over time, which requires buildings and facilities to be designed with high quality. To ensure the architectural quality, parallel assignments to review both the structure and the buildings were carried out.

During the past year, consultants were contracted to better assess the life cycle costs (LCC) of the City facilities. Approaches and working methods will evolve during 2019.

Brick façade in phase Norra 2



Let nature do the work

Create and strengthen ecosystem services

Thoughtful use of greenery and water in the city space contributes to important ecosystem services, such as flood protection, temperature regulation, recreation, greater biodiversity and enhanced proliferation of important species.

Parks, neighbourhoods, playgrounds, streets and other surfaces together create a green structure that contributes to a more resilient city district; one that is able to accommodate the increased stormwater flows due to climate change.

Development sites

For the green structure to be used as an active component in city planning, the developers need to achieve a specified Green Space Index (GSI). The GSI is a tool to assess the amount of eco-efficient surface in a given area. The use of the GSI for green structure has resulted in more multifunctional surfaces on courtyards and roofs. In the courtyards, there are plants from the meadowlands and green facades. Courtyards and roofs retain the stormwater by directing it to various plant beds and containers to be used for irrigation at a later stage. In the first two phases, the green roofs consisted mostly of sedum. 16,700 m² of green roofs and 29,145 m² of green courtyard have been completed to date. [Read more](#)

This year, Norra 2 was completed. There is a great variety of plants, including flowering and fruit-bearing species, as well as examples of local species. The GSI tool and stormwater management play a major role to achieve ecosystem designs thinking. Collaboration in early design stages, monitoring, as well as space for

The **let nature do the work** strategy ensures that greenery and water are used as active components in the design and operation of the city. The green and blue infrastructure replaces and complements technical systems, creates a richer plant and animal life, and contributes to human health and well-being.

Target

- 4.1** Utilise ecosystem services to build a resilient and healthy urban environment

* **Green oasis is green public open spaces with social values.**
In Hammarby Sjöstad 6.8 m² green oasis per resident has been created.

100%

of the residents have a park within 200 meters

16,700 m²

of green roofs

8.2 m²

green oasis* per inhabitant

new thinking, are also factors that contributed to a successful outcome.

In later phases, there are plans for several biotope roofs, i.e. roofs with deeper plant beds that store large amounts of stormwater, allowing for an increased variety of plants. In 2018, a resident survey regarding the outdoor environment was conducted. The survey result showed that 84% experience the courtyards as pleasant outdoor environments during the hot summer.

Public space

The green areas created in public open space consist of parks, street greenery and rain gardens. Among other things, the green structure passively treats stormwater runoff and moderates high temperatures. The latter was especially relevant during the hot summer of 2017. The resident survey showed that 79% of residents experienced the outdoor environment as pleasant during the hot summer days, although the experience of the Storängstorget was 'too open' with too few trees providing shade during hot summer days. On the other hand, the cooling of the fountain was appreciated.

In the streets there are around 20 different species of trees that provide shade and reduces the temperature. Stormwater from the streets is led to tree pits

The **biochar** is produced from Stockholm residents' garden waste. It has good properties for soil improvement and captures CO₂. Through using biochar in plant beds in Stockholm Royal Seaport about 1,300 tonnes of CO₂ has been captured. stockholmvattenochavfall.se

and green passages, where the plant bed is a mix of biochar and gravel. The plant beds retain large quantities of water while at the same time ensuring good growing conditions for plants and trees. [Read more](#)

This year Hjorthagsparken was completed. The location of the park and its function as a dispersal zone, its design and contents, strengthens the local ecosystem, with a special focus on the connections of oak trees and amphibians. The park consists of local plants, such as oak trees, meadows and moisture loving perennials. An amphibian tunnel under Lövängsgatan and Bobergsgatan strengthens this connection with the nearby wetlands and makes it easier for the amphibians to move through this part of the area.

The green structure is also an important part of the district's stormwater management. Large amounts of stormwater are directed to designated wetland passages which assist in ensuring this type of biotope. During heavy rainfall, water is directed from Hjorthagsberget, via open ditches and wetland passages to lower-lying areas. The water is eventually directed to and disposed into Husarviken.

50,000 m², equivalent to 7 soccer fields of new park area, has been built in Stockholm Royal Seaport. This equals 20 m² per apartment. Street greenery and rain gardens amount to an approximate 3,250 m². [Read more](#)

In Norra 2, new solutions have been tested and developed, such as new cesspits for stormwater as well as solutions for draining water from the courtyards to the parks, and biochar plant beds.



Greenery in the neighbourhood of Hornslandet in Norra 2

Participation and consultation

Active participation in urban development

An active dialogue with residents and people working in the area helps to anchor and gather important information for the planning process. In 2018, several public consultation activities took place. An open house was held in Energihamnen and about 20 people attended. The stakeholder comments focused on increased risks and disruptions due to the area's industrial activities.

An information session about the Mass Consolidation Centre was held in Värtahamnen and about 40 people living in the surrounding area attended. Issues discussed included the location of the business, the risk of increased traffic and dust from the premises.

The Stockholm Royal Seaport project has a Facebook page where the efforts with sustainable urban development are regularly discussed. When there were problems with odour and dust from the soil remediation around Gasklocka 4, Facebook served as the most important channel to quickly reach the residents and distribute accurate information on various issues and concerns.

In conjunction to the spring markets, a flea market was held around Storängstorget, where pop-up shops and restaurants were set up on the streets. The City of Stockholm attended and answered questions regarding ongoing and future work in the area. The event attracted more than a thousand people.

Residents also initiated a Christmas market, and the Traffic Administration placed a Christmas tree in Storängstorget. These activities create a sense of community, as well as attract people to shop locally.

The **participation and consultation** strategy aims to stimulate people's interest in participating in the development of the sustainable city. Research, development of knowledge and feedback of experience are important preconditions for solving complex challenges and the building knowledge.

Target

- 5.1** Stimulate active participation
- 5.2** Create conditions for sustainable consumption
- 5.3** Private and public-sector companies add to the sustainable profile
- 5.4** Knowledge and experience is to be shared

During the year

7,000

visitors from **58** countries visited the project

350

stakeholders from the construction and building sector participated in the capacity building programme

200

children participated in the Sustainable Kids' Forum

20

million SEK has been dedicated to innovation projects

The urban farming activities managed by the Hjorthagen Cultivators' Association, with support from the City, has become a natural meeting place for the residents of the area. There are 90 planting boxes available and there is a continuing strong interest in cultivating. The beekeeping run by Bee Urban also contributes to increasing knowledge about biodiversity, and tours have been organised for preschool classes and residents. [Read more](#)

Sustainable consumption

Sharing economy is an important concept for reducing consumption, increases knowledge and awareness of personal consumption. The Pop-Up Reuse Centre is a mobile container solution managed by Stockholm Vatten och Avfall AB in order to facilitate reduction, reuse and recycling of waste. During this year, the Pop-up visited the area twice. 1,500 items, pieces of furniture, clothing and other items that can be reused were dropped off. The aim is to establish a permanent reuse centre at Gasverket.

In the area, various initiatives and ideas from the residents have been implemented. For instance, during this year, a public book shelf was inaugurated in collaboration with the Stockholm City Library, a place where people can exchange books. The furniture was contributed by the second hand store, Myrorna.

In order to involve preschool children and their parents in sustainable development, a forum for dialogue and playful learning, the so called Sustainable Kids' Forum was organised. The focus is on issues related to food waste, recycling, and playgrounds. More than 200 children have

participated in these activities during the year.

[Read more](#)

The Local Life project developed a communication platform to facilitate local involvement, neighbourhood watch and an increased sharing economy. During 2018, 640 residents in Stockholm Royal Seaport joined. Several good suggestions, such as neighbour help and sharing services were submitted, and 11 interest groups were formed. The issues which engaged most were the sharing economy, safety and well-being. The project is run by Royal Institute of Technology (KTH) and funded by Vinnova.

The role of private and public companies

Stockholm City's administrations will, through systematic sustainability efforts, dissemination of information and development of knowledge, set an example. Thus, e.g. all of the City's construction tenders now set requirements to employ people who, for various reasons, are outside the labour market. In 2018, this did not result in any jobs. For the land allocation of Södra Värtan, these requirements will also apply on all developers.

The City District Administration of Östermalm organised two thematic activities to increase the understanding of ecosystem services. Topics have included biochar as well as extraction of honey.

The preschools in Stockholm Royal Seaport are eco-labelled according to the green flag certification of Keep Sweden Tidy. This is a national framework for how schools and preschools can, in an inspiring way, teach issues concerning

sustainability. So far, four preschools of seven have been certified.

Building knowledge and spreading experience

In 2018, about 10 R&D projects connected with the Stockholm Royal Seaport were ongoing. [Read more](#)

One of the projects is Connected SRS, which is testing an IOT platform (internet of things) for gathering and sharing data. The project is a collaboration between the Development Administration and the Executive Office, and is funded by Vinnova.

The project The City's physical resource flows - Re-flow, has identified the resources required to build and operate a city. It is an in-depth study of the Stockholm Royal Seaport's eco-cycle model, with the ambition of mapping the resource flows of the city. The project is funded by the Swedish Environmental Protection Agency. [Read more](#)

National authorities involved in sustainable urban development were invited to a stakeholder dialogue on sharing experiences and promoting Swedish clean tech and services. During the meeting, it was established that Stockholm Royal Seaport is an important body of knowledge, as well as a platform for innovations.

The City of Stockholm contributes to increased knowledge on sustainable urban development through, for example, capacity development programmes and a forum for sustainable solutions that addresses challenges and good practice, both within the organisation and among developers

and their consultants. In 2018, 340 people participated in nine seminars. In total, 3,148 stakeholders have participated in the training and development programmes. [Read more](#)

The Stockholm Royal Seaport attracts increased attention both in Sweden and abroad. The project receives a large number of study visits with people who want to learn about sustainable urban development from the Stockholm Royal Seaport perspective. 7,000 people from 58 countries visited the project during 2018. Since 2012, a total of 33,000 people from more than 120 countries have visited the area. Many visitors have shown interest in learning about tools, such as the Green Space Index, and bring it back to their own municipalities. [Read more](#)

Representatives from Stockholm Royal Seaport took part in many conferences and exhibitions during 2018; World Water Week in Stockholm, Smarta städer in Kista, and Building Sustainability with Sweden Green Building Council. The project also participated in international exhibitions such as Expo Real in Munich, and Smart City Expo in Barcelona. In the context of the C40 initiative, the Climate Positive Development Program, the solutions and approaches of Stockholm Royal Seaport have been introduced at a workshop in Guangzhou, China.

Many people took the opportunity to visit Gasverket during the Open House architecture festival.



How we work

The sustainability vision and targets for Stockholm Royal Seaport were adopted by the Stockholm City Council in 2010. The City Development Administration is responsible for the implementation of the vision and targets.

Subsequently, the targets are broken down into requirements for the developers and City's own projects, by thematic groups, consisting of city experts. Since the city owns the land, the requirements are mandatory and included in the development agreements and contracts. The progress is monitored and compliance is reported several times during the design, planning, construction and operation process, from early project idea to operation.

The developers report their results in an online reporting system. The compliance is reviewed by the city's experts, who give feedback. If a requirement cannot be reached, a request for a deviation may be approved. If the request is rejected, it is regarded as non-compliance.

The thematic groups continuously evaluate the work and the results. This, in combination with experiences from other projects, may result in change of requirements. The thematic groups are also responsible for spreading experiences to other projects within the City of Stockholm.

A continuous capacity development is crucial for reaching ambitious targets. Therefore, the City has since 2010, arranged a Capacity Development Programme, aimed at developers with land allocations and to project staff. In addition match-making seminars, Forum for Sustainable Solutions, have been organised since 2012 to increase opportunities for clean-tech suppliers to meet developers. [Read more](#)

The Stockholm Royal Seaport project also runs, and is an active part of, several innovation projects.

Stockholm Royal Seaport's collaborative model.



Stakeholder analysis

Dialogue is an essential tool for capturing the different expectations from Stockholm Royal Seaport stakeholders. The most important stakeholders are politicians, developers, civil servants from the different administrations and public companies, society at large, as well as the residents in the area. The issues that are the most relevant to the stakeholders have been summarised in an essential analysis. It shows that the most important issues are research and development, energy and climate, transports and waste management.

Safe working environment within the project

Performance appraisals and employee surveys are carried out annually. Heavy workload is the greatest challenge to the organisation and an action plan has been developed. [Read more](#)

Stockholm Royal Seaport works actively for a safe working environment. The project initiates and runs a number of preventative activities in order to create safe construction sites. To account for all who reside within and near the construction area, risk mapping, logistics and work site information, as well as fire protection drills, are carried out with priority on pedestrians and bicycle users.

The sustainability strategist explains

It has been two years since the residents moved into Norra 2, which is the first phase with strict requirements. The results have been analysed and are generally good, with regards to the Green Space Index, indoor environment, selection of material, energy use during construction and source separation of waste during the operational stage.

The requirements for reduced construction waste and metered building energy performance have not yet been achieved. An important lesson learned is that there is a gap between those who design and those who build, as well as a gap between those who build and those who operate and maintain the buildings. Another important lesson learned is the need for increased knowledge and training.

Several new innovation projects have been started during the year. [Read more](#)

Stockholm Royal Seaport fills an important role in developing of knowledge within the construction industry, and the journey has not yet come to an end. We continuously evaluate our choices; we develop and try new tools and methods. More information about our results and detailed information of various aspects of sustainability is available on the website, norradjurgardsstaden2018.se. [Read more](#)

Information about on going innovation projects in Stockholm can be found on vaxer.stockholm.se

Christina Salmhofer
Sustainability Strategist,
Stockholm City
Development Administration



Target achievement 2018

1. Vibrant city

Sustainability target	Follow-up measure
1.1. Create a robust and interconnected urban structure	72% of the residents are very / quite satisfied with the possibility of walking / cycling to nearby neighborhoods. <i>Resident survey 2016.</i>
1.2. Contribute to the creation of a city that promotes equality	55% rental apartments (of which 10% are student apartments) and 45% are condominiums (of which <1% tenure, <1% urban town houses and 3% 55+). The size of the apartments varies.
1.3. Plan for a well-functioning everyday life	The residents are very/fairly satisfied with access to: preschools (62%), schools (24%), range of cultural activities (14%). <i>Resident survey 2016.</i> The residents are very/fairly satisfied with grocery stores (51%), other services such as restaurants (24%). <i>Resident survey 2016.</i> The residents are very/fairly satisfied with access to city squares and meeting places (48%), playgrounds (73%), sports facilities (50%). <i>Resident survey 2016.</i>
1.4. Create attractive and safe places at all times of the day and night	Commercial floor area: 12%, Public open spaces with social values: 26% (20 m ² /apartment). Plot ratio is 2.3 for what is completed. 91% of the residents are very/fairly satisfied with the feeling of security in the area. <i>Resident survey 2016.</i>

Global targets



2. Accessibility and proximity

Sustainability target	Follow-up measure
2.1. Prioritise pedestrian, bicycle and public transport traffic	Diversion ratio varies between 1.07 to 1.36 for those with the longest walking distance to important destinations (Norra 2). The residents are very/fairly satisfied with access to walking paths (77%), bike lanes (55%), road safety for walking and cycling (43%) and public transport (20%). <i>Resident survey 2016.</i> 95% of pedestrian and bicycle paths meet the set requirements. Tyréns, 2015/16. 2.1 bicycle parking spaces per apartment are available on development sites and 0.17 per apartment in public open space. 0.51 car parking spaces per apartment on development sites, and 0.13 per apartment in public open space. 8% of the total number of on-street car parking spaces is allocated for carpool parking spaces.
2.2. Plan for vibrant street spaces that allow flexible use	91% of residents feel safe in Stockholm Royal Seaport. <i>Resident survey 2016.</i>
2.3. The infrastructure shall promote co-loading and efficient, sustainable freight transportation	Co-loading effect 60% (2017)

Global targets



3. Resource efficiency and climate responsibility

Sustainability target	Follow-up measure
3.1. Reduce the amount of waste and increase the purity rate of waste	Residual waste: 0.06% hazardous waste, 22.6% food waste, 30% packaging (<i>Pick analysis 2017</i>). Purity rate paper: 92%. 213 kg/apartment and year. Nearly 1 tonnes of clothing and other objects changed hands at the Pop-up Reuse during 2018.
3.2. Water and wastewater management shall be more energy and resource efficient	100% of households and business have a waste disposal unit in their kitchen.
3.3. Circular construction and management process	Average amount of construction waste: 39 kg/m ² GFA (property developer). In phase Norra 2, 49% went to energy recovery, 22% to materials recovery, 20% is mixed waste, 8% re-use and <1% to landfill. Construction waste (public open space): 50% went to material recovery, 48% to energy recovery, 1% re-use and <1% to landfill. 25% of the area is remediated from soil contamination. Mass balance is 40%.
3.4. Efficient energy consumption in buildings and facilities	Housing units, average measured energy use is 15% below the current BBR in Norra 2. Measured (based on voluntary commitments; Norra 1, Västra) = 73 kWh/m ² A _{temp} Measured (requirements 55 kWh/m ² purchased; Norra 2) = 76 kWh/m ² A _{temp} LED for lighting (public spaces): 1.8 kWh/km resulting in energy savings of 60%.
3.5. Stockholm Royal Seaport shall be fossil-fuel-free by 2030	Housing units, average generated solar energy (Norra 2): Measured 240 MWh/year electricity. 8% of the total amount of on-street car parking spaces is allocated for electric charging (carpool) and there is a fast charging point. 7% of the on-street car parking spaces have electric charging, 0.04 carpool parking space per apartment on development sites, 0.01 electric vehicle charging point per apartment.
3.6. Low climate impact	The average climate change impact (public spaces): Norra 1 (building): 260 kg CO ₂ e /m ² , Västra: 840 kg CO ₂ e /m ² , Norra 2: 100 CO ₂ e /m ² . Climate change impact energy use in Norra 2: Total amount is 420.6 tonnes CO ₂ e which corresponds to 6.8 kg/ m ² .
3.7. Sound indoor environment	More than 80% of property developers meet the Gold rating (indoor environment). Does not include Norra 1, Västra and Södra Värtan.
3.8. Sustainable choice of building materials	Percentage of requested deviations received (not approved): Property developers: 53%, public open space: 0%. 100% of materials are documented. Does not include Norra 1 and Västra and Södra Värtan.
3.9. Robust construction	Wood 100% FSC labelled, natural stone 100% screened according to ethical standards. LCC for LED technology in lighting systems for public open spaces (2017).

Global targets



Target achievement 2018

4. Let nature do the work

Sustainability target

- 4.1 Utilise ecosystem services to build a resilient and healthy urban environment

Follow-up measure

100% of property developers achieved the GSI. Does not include Norra 1 and Västra.

100% of apartments have access to a park and natural areas within 200 metres.

Biochar that are used in planting beds in Stockholm Royal Seaport have so far bound 1,300 tonnes CO₂.

Global targets



5. Participation and consultation

Sustainability target

- 5.1 Stimulate active participation

Follow-up measure

Consultation Energihamnen, information meeting GK4 och MLC.

90 planter boxes, 3 thematic meetings (about 50 participants), spring/flea market/architecture festival Open House (2,300 visitors), 200 children have attended the Sustainable Kids' Forum (3 activities).

- 5.2 Create conditions for sustainable consumption.

Pop-Up Reuse Centre: Twice in Stockholm Royal Seaport 2018 (1156 visitors and over 1,282 objects changed hands on these days).

Thematic meetings

Flea market

- 5.3 Private and public-sector companies add to the sustainable profile

4 of 7 Green Flag-certified preschools.

Local initiatives for example neighbourhood book exchange and Christmas market.

- 5.4 The knowledge and experience shall be shared

10 ongoing R&D projects.

Capacity development 2018: 350 participants.

Capacity development programmes (total 1,234 participants) and Forums for Sustainable Solutions (total 1,914 participants).

7,000 visitors 2018, totalt 34,000 since 2012.

Global targets



Green roofs with photovoltaics in phase Norra 2 borders the Royal National City Park.

Photo: Johan Pontén



Photo: Lennart Johansson, SBK, City of Stockholm