

# Stockholm Royal Seaport Leading the way towards a sustainable future

Sustainability Report 2015



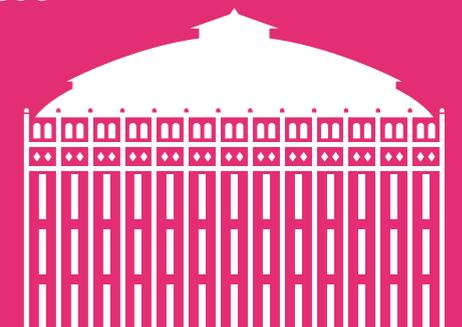
Stockholms  
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Stockholm Royal Seaport is one of the largest urban development projects in Europe, with at least 12,000 new apartments and 35,000 workplaces scheduled for completion by 2030.

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# Leading the way towards a sustainable future

**21**

The City of Stockholm is investing a total of SEK 21 bn in the area.

**4,320**

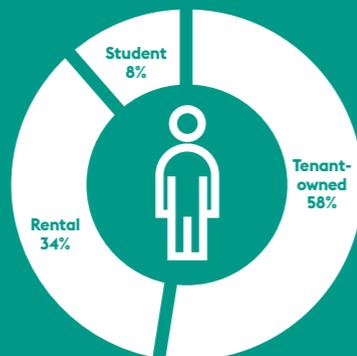
land has been allocated for 4,320 apartments, distributed between 31 property developers and 45 projects.

**3,650**

additional apartments were given the go-ahead in 2015. They will be developed in Södra Värtan and Kolkajen-Ropsten. Land allocations will commence in 2016.

**1,718**

apartments are completed.  
992 Tenant-owned apartments  
586 Rental apartments  
140 Student apartments



Leading the way towards a sustainable future

We take great pleasure in confirming that several of the methods and tools developed for Stockholm Royal Seaport have now been spread to the City's other development projects, and to other cities and projects.

Stockholm Royal Seaport is consistently delivering new housing units. Everyone is aware of the great need, and it feels very satisfying to report that the first two development phases, Norra 1 and Västra, have provided units for more than 1,700 families. In 2016, we will be proposing site allocations for the first of the 3,650 apartments planned for Kolkajen, Ropsten and Värtan. One of our assignments is, in fact, to test new approaches in order to remain a front-runner, and for staying in control of the many complex issues entailed by our urban development mission. Our assignment also includes sharing new knowledge and best practices.

Confirmation that we are on the right track came at the end of the year when Stockholm Royal Seaport

received a C40 Cities Award in the Sustainable Communities category, which was accepted by the Mayor of Stockholm Karin Wanngård at the Climate Change Conference in Paris.

At the same time, there are many challenges and not everything goes according to plan. The project requires revisions and adjustments. Complex issues and cooperation around, for example, agreements, permits and planning requires patience and perseverance.

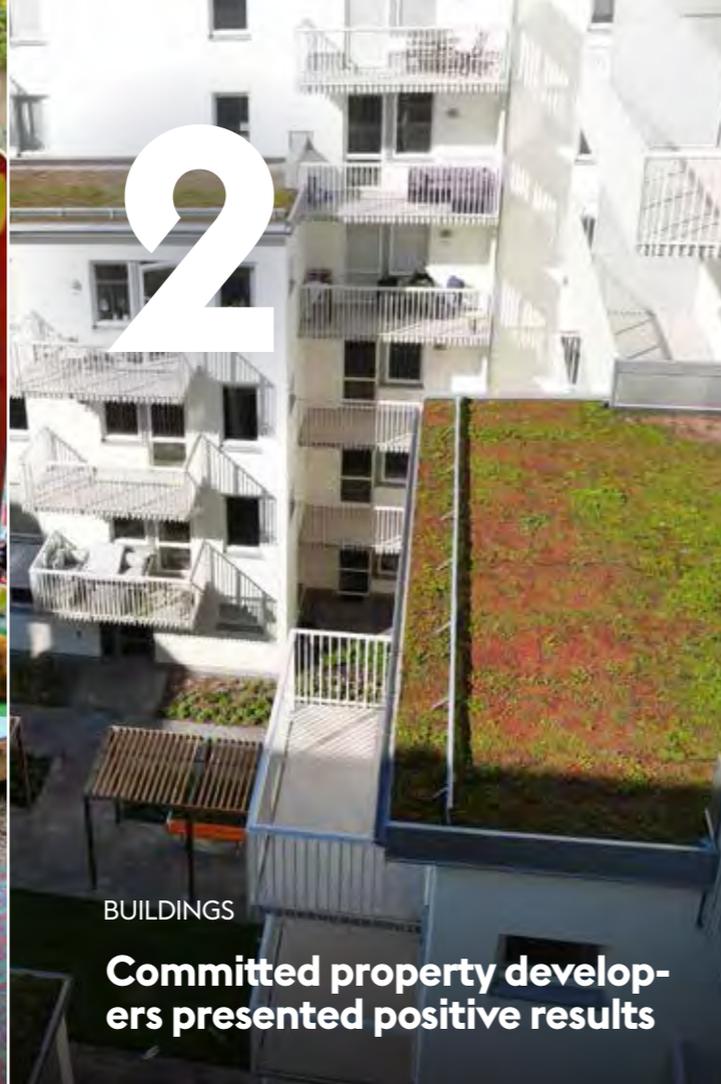
The project has created a great deal of international interest. More than 4,000 people from 43 countries have visited Stockholm Royal Seaport to find out how we work and to learn more about our urban development project. Happy reading!



In October, a mobile reuse centre was tested at Stockholm Royal Seaport. Over a period of five days, visitors were able to drop off clothing and other items, rebuild their furniture, have a coffee and listen to sustainability experts.

The mobile reuse centre is the result of an innovation procurement conducted by the City of Stockholm to develop a reuse centre for the future, based on the principles of re-use and recycle.

► Read more on page 13 .



The first results from the operational building in the first development phase, Norra 1, came in 2015.

For all property developers in Norra 1 who have reported energy use to date, the results have an excellent margin compared with the Swedish Board of Housing Building and Planning's (BBR) national requirements.

► Read more on pages 16 and 17.



An early-stage dialogue about public spaces in Kolkajen-Ropsten was conducted last autumn. Many excellent submissions were received and have impacted the development of the area's urban park, water arena and quay promenade.

The dialogue was conducted both on site in Hjorthagen and in digital form, which also made it possible to research and comment on a digital 3D model of the area.

► Read more on page 13.



In competition with other urban development projects around the world, Stockholm and Stockholm Royal Seaport received an award for the best sustainable urban development project. The award was presented at the UN Climate Change Conference in Paris by the C40 Cities Climate Leadership Group, a network connecting more than 80 of the world's megacities. The award is proof that Stockholm is an international leader in sustainable urban development.



► Read more about external interest on page 21.

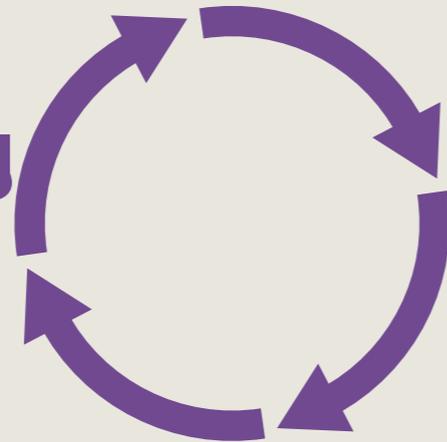


## Political will

One of the prerequisites for the development of Stockholm Royal Seaport is broad political support, and the aspiration that Stockholm should continue to be a leader in sustainable urban development. One of the City's strategies is to work with areas with an environmental profile to test what is currently feasible and to push the boundaries of what is possible. In 2010, the Stockholm City Council decided that Stockholm Royal Seaport would be designated an area with an environmental profile.

## Requirements and monitoring

Sustainability requirements are fundamental to planning. Since the requirements affect the design of buildings and the urban district, they must be clear and verifiable. Monitoring compliance with the requirements ensures that the high ambitions are put into practice. While this is highly significant for progress in the right direction, it also enables the City's stakeholders and property developers to use this experience in other projects.



## Collaboration and training

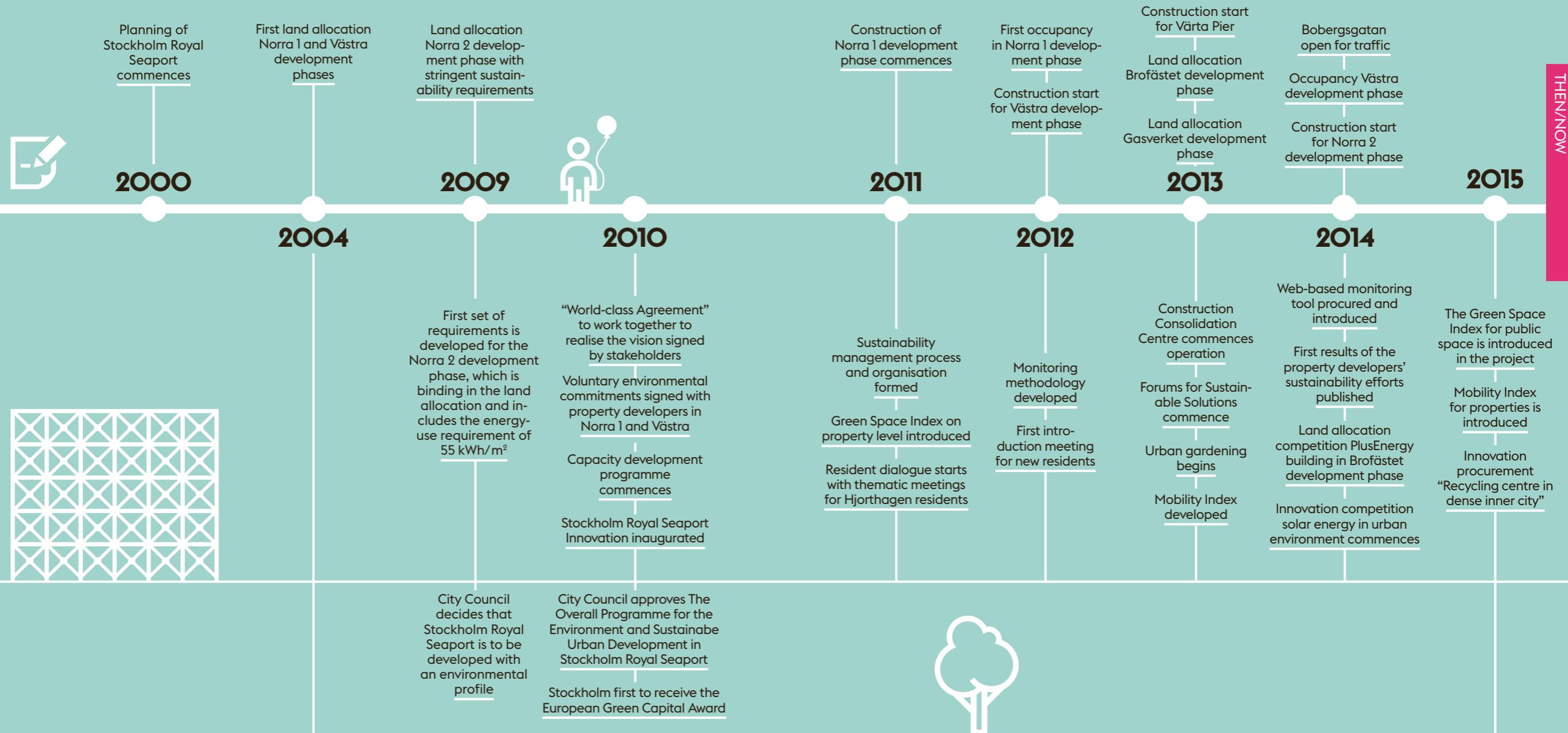
To ensure that the sustainability ambitions are put into practice, the City's administrations and companies contribute expertise via a number of focus groups. Various forms of collaboration have also been established – forums and training initiatives that enable dialogue and exchanges with, and between, the City, property developers, consultants and suppliers. These occasions represent meaningful communication interfaces between the City and property developers, and also provide a joint learning platform.



## Research and development

To ensure that the urban development project remains at the cutting edge, new knowledge and solutions are required. Various applied research projects are therefore initiated, based on needs identified on the basis of the ambitious sustainability targets. About 20 research and development projects linked to Stockholm Royal Seaport are currently ongoing.

# Some milestones and important conditions along the way



»» **2004–2007** The City of Stockholm's environmental programme identifies the need for new areas with an environmental profile that can take over from Hammarby sjöstad.

»» **2008–2011** The City of Stockholm's Environmental Programme names Stockholm Royal Seaport as one of the areas to be developed with a unique environmental profile.

»» **2012–2015** City of Stockholm adopts Stockholm Royal Seaport's maximum energy-use requirement of 55 kWh/m<sup>2</sup> per year for new production for the City's Environmental Programme, in all projects.



The Stockholm Royal Seaport Race was started in 2015. The race is held every year in May and arranged by Yärtans IK, a local sports club.

**137** 

charging points are now available in the parking garages in Hjorthagen, a total of 600 charging point will be available when Hjorthagen is completed.

**5** 

preschools have now opened in Stockholm Royal Seaport. Two of them achieved Green Flag certification during the year, and the remaining three will be certified in 2016.

**6** 

carpool spaces included in the first development phase.

**75** 

planting boxes for urban gardening are available in Stockholm Royal Seaport.

**1,350** 

residents have attended

**34** 

resident meetings over a three-year period.

# More participation and consultation

Residents in both new and older parts of Hjorthagen are able to influence their conditions by participating in early-stage dialogue, resident meetings, urban gardening and security walks. When planning the new public Kolkajen-Ropsten area, we requested ideas from a wide range of groups from different parts of Stockholm. We received many excellent suggestions and have included them in future plans.

**EARLY-STAGE DIALOGUE ABOUT QUAY PROMENADE AND WATER ARENA** A quay promenade, a water arena, a large urban park and 2,000 apartments have been planned for Kolkajen-Ropsten. When completed, the area is expected to attract many visitors. The City asked local residents to help plan these public places by taking part in an early-stage dialogue.

The City's dialogue pavilion was used for a three-day dialogue in September, complemented by a digital dialogue open for a month. In total, about 80 ideas were submitted. Some 400 people visited the dialogue pavilion, while 250 interactions and more than 1,500 page views were recorded for the digital dialogue.

Several ideas have now been included in the planning, or set aside for further review. The regulated park area will be extended from the urban park up the slope. The park will also have a café. A definite interest in spontaneous sporting activities has led to an investigation of the possibility for ball games on top of the old laboratory, such as skateboarding in suitable places.

**TOMORROW'S RECYCLING CENTRE.** In October, a mobile reuse centre was tested at Stockholm Royal Seaport. Over a period of five days, visitors were able to drop off clothing and other items, rebuild their furniture, have a coffee and listen to sustainability experts. Of the total amount of materials left at the centre, approximately 3 tonnes, 45% was recycled in Stockholm Royal Seaport and 33% was donated to Myrorna, a non-profit organisation.

The goal is to make residents more aware of resource efficiency, and to encourage more people to see recycling in a new light, in order to reduce the long-term consumption of natural resources.

**EMERGING URBAN LIFESTYLE.** Proximity to services is important and fundamental to the design of Stockholm Royal Seaport. All premises in the first two development phases have now been let. A supermarket, bank, bakery, flower shop and five restaurants have opened in the area.

**LIGHT EVENT IN GASVERKET.** The gasometers in Stockholm Royal Seaport won ÅF Lighting's international lighting competition. More than 100 people, mainly residents of Stockholm Royal Seaport, attended the light event, equipped with light rods and torches to illuminate Gasverket's historical buildings.

**PRESCHOOLS WITH SUSTAINABILITY FOCUS.** Green Flag certification shows that the preschools are working systematically with sustainability. One preschool has introduced yoga and mindfulness for children, another works with aquatic animals, and a third with litter, where rubbish is re-used for creative activities. Each preschool has access to a garden box where the children can follow the lifecycle of plants at close range.

**BEEKEEPING.** Based on the honey crop, the bees in the beekeeping project's two hives have pollinated more than 2 million flowers. A beehive contains about 60,000 bees during the active season, and about 10,000–20,000 over the winter. In an urban environment, a hive can yield up to 40kg of honey. On several occasions, both preschool classes and residents in the area have been invited to participate in beekeeping.

Smart management and recycling are helping to reduce the property's energy use. Solar panels have also been mounted on the roof, alongside of sedum plants that retain stormwater. SKB constructed 100 rental apartments in development phase 2, with occupation commencing in 2015.

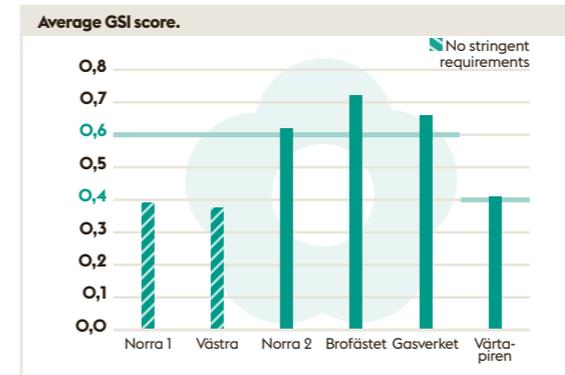


# Committed property developers deliver positive results

Land allocation is subject to a number of sustainability requirements that are set out in the development agreement. The requirements are fundamental to the developer's continued planning. The City monitors compliance on numerous occasions, from the early stages until a building becomes operational. To meet the challenges, property developers are offered capacity development programmes and forums for sustainable solutions, which are also open to non-project participants.

**THE GREEN SPACE INDEX.** The physical design of the urban district will be able to adapt to the impact of future climate change, including increased rainfall, a warmer climate and rising sea levels. Points are given for green roofs that retain rainwater, and for spaces and plants that increase biodiversity and create conditions for social interaction. The Green Space Index (GSI) is attracting increasing attention and has now been introduced by the Municipalities of Täby and Nacka.

- ▶ Several conditions must be met to achieve a high GSI score, such as green roofs, deep layers of soil and a rich diversity of flora.
- ▶ deep layers of soil (>800 mm) creates ideal conditions for retaining stormwater and protecting the roots of large plants, which in combination give high GSI scores.
- ▶ Trees give high GSI scores across all categories – a tree uses a lot of water, provides shade and attracts birds and insects.



Average GSI score in completed and ongoing development phases.

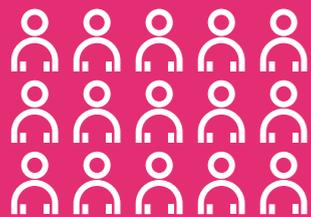
**SUSTAINABILITY REQUIREMENTS.** The first two development phases, Norra 1 and Västra, are not subject to stringent sustainability requirements. The property developers in these development phases were allocated land before Stockholm Royal Seaport was designated an area with an environmental profile.

## Best practice



**BRÖFÄSTET**  
Besqab, Oscar Properties and Åke Sundvall will have large areas of wall covered by climbing plants and outdoor spaces for a wide range of social activities, such as gardening opportunities for the residents, playing areas, and hard surfaces designed to hold stormwater.

**HÅLLBARHETSPORTALEN.** An IT support tool for monitoring sustainability requirements, known as Hållbarhetsportalen, was introduced in 2014. The City's experience thus far is that the tool contributes to more efficient monitoring, which reduces the risk of important issues being forgotten. It is also positive that results and documentation are compiled in the same place. A survey of all property developers using the Hållbarhetsportalen tool showed that about 70% consider the tool effective for monitoring environmental requirements, while more than 80% consider the tool easy to use.



FORUMS FOR SUSTAINABLE SOLUTIONS

1570

participants have taken part over the past four years.



CHARGING POINTS/TOTAL NUMBER OF PARKING SPACES

|           |     |
|-----------|-----|
| Norra 1   | 2%  |
| Västra    | 5%  |
| Norra 2   | 15% |
| Brofästet | 20% |

475

people have taken part in capacity development programmes over the past five years.



In 2015, five Forums for Sustainable Solutions were arranged and about 100 people, on average, attended.

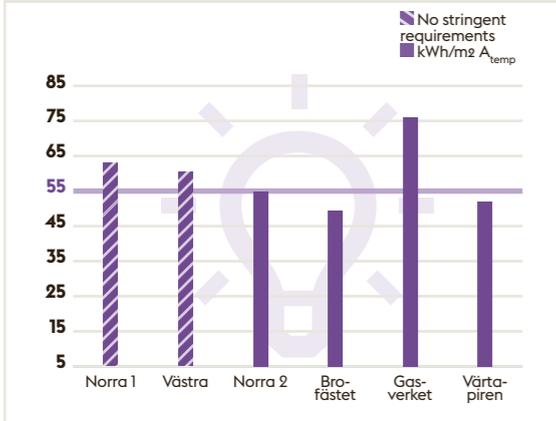
Continued – Committed property developers deliver positive results

**ENERGY.** The design of buildings is subject to strict energy-efficiency requirements. Self-generated energy is also a requirement, meaning solar energy to increase the amount of locally generated and renewable energy, and to reduce greenhouse gas emissions.

Property developers in the Norra 1 and Västra phases have voluntarily agreed to work with energy-efficient buildings. Close dialogue and cooperation with property developers has generated results. The diagram below shows how the property developers' efforts have generated excellent results.

As of the Norra 2 development phase, the energy-use requirement has been 55 kWh/m<sup>2</sup> per year A<sub>temp</sub> and, according to calculations, the Norra 2 and Brofästet development phases have remained below this level. The estimated values of earlier development phases are also much lower than national BBR requirements. The proportion of locally generated energy is growing. In Brofästet, which has an energy usage level of less than 50 kWh/m<sup>2</sup>, the estimated amount of energy that can be generated by two PlusEnergy buildings (16 kWh/m<sup>2</sup> per year A<sub>temp</sub>) will cover the estimated need for purchased energy (15 kWh/m<sup>2</sup> per year A<sub>temp</sub>).

Average energy use per zoning plan



The Värta Pier is a terminal building and ideally located. The bar for Gasverket comprises both new and existing buildings. The average energy use for new buildings is 49.5 kWh/m<sup>2</sup> A<sub>temp</sub>, and 101.5 kWh/m<sup>2</sup> A<sub>temp</sub> for existing buildings.

# Results for Norra 1

The results of the first development phase – Norra 1 – will be compiled when the measured energy use of all buildings in 2016 has been reported. The first results from the operational buildings were presented in 2015. It should be noted that reported calculations and results have not been reviewed by the City of Stockholm.

The property developers in Norra 1 were allocated land before Stockholm Royal Seaport was designated an environmentally profiled urban area. When the environmental profiling decision was adopted, all stakeholders in the area signed the World-Class Agreement that was produced to define the ambitions for Stockholm Royal Seaport. Voluntary commitments are based on this agreement and the requirements stipulated for Norra 2 (see the table).

Dialogue and cooperation with the property developers, in addition to the awareness that Stockholm Royal Seaport is an external showcase, have been the driving forces behind such excellent results.



|  | Requirement level as of Norra 2                 | Reinhold Gustafsson   | Lennart Ericsson            | Erik Wallin                        | Järntorget | Viktor Hanson                      | Seniorgården              | NCC                         | Familjebostäder | SBC Bo | Svenska Hus                        |
|--|---|-----------------------|-----------------------------|------------------------------------|------------|------------------------------------|---------------------------|-----------------------------|-----------------|--------|------------------------------------|
| <b>Form of tenure</b>                      |   | R                     | R                           | TO                                 | TO         | TO                                 | TO                        | TO                          | R               | TO     | R/TO                               |
| <b>No. of apartments</b>                   |   | 39                    | 26                          | 42                                 | 34         | 30                                 | 69                        | 123                         | 109             | 69     | 31/98                              |
| <b>Other</b>                               |   |                       |                             |                                    | Preschool  |                                    |                           |                             | Preschool       |        |                                    |
| <b>Estimated Energy</b>                    | kWh/m <sup>2</sup> A <sub>temp</sub> per year   | 49 (electric heating) | 60                          | 72                                 | 72         | 66.4                               | 62                        | 70                          | 53              | 66     | 68                                 |
| <b>Measured Energy</b>                     | kWh/m <sup>2</sup> A <sub>temp</sub> per year   | 35 (electric heating) | 79.5                        | In operation for less than 2 years | 60         | In operation for less than 2 years | 55                        | 66.3                        | 65              | 61     | In operation for less than 2 years |
| <b>Self-generated electricity</b>          | 2 kWh/m <sup>2</sup> A <sub>temp</sub> per year | No                    | No                          | No                                 | No         | No                                 | No                        | No                          | No              | No     | No                                 |
| <b>GSI SCORE</b>                           | 0.6   | 0.34                  | 0.34                        | 0.34                               | 0.34       | 0.34                               | 0.6                       | 0.6                         | 0.31            | 0.31   | 0.38                               |
| <b>Green roofs</b>                         |   | Yes                   | No                          | No                                 | No         | No                                 | Yes                       | No                          | No              | No     | No                                 |
| <b>Bicycles/apartment</b>                  | 2.2   | 1.0                   | 2.2                         | 2.2                                | 2.0        | 2.2                                | 2.2                       | 1.5                         | 1.8             | 1.8    | 1.0                                |
| <b>P/apartment</b>                         | 0.5   | 0.5                   | 0.7                         | 0.52                               | 0.67       | 0.5                                | 0.55                      | 0.5                         | 0.55            | 0.55   | 0.47                               |
| <b>Construction waste</b>                  | 20 kg/m <sup>2</sup> GFA                        | 37                    | 34                          | 31                                 | 29         | 43.8                               | 32                        | 49                          | 49              | 49     | 30                                 |
| <b>Recycling room in property</b>          | Yes   | Yes                   | Yes                         | Yes                                | Yes        | Yes                                | Yes                       | Yes                         | Yes             | Yes    | Yes                                |
| <b>Building material assessment system</b> | Phase-out list substances must not be used      | BASTA, VGV            | Sunda Hus                   | Sunda Hus                          | BASTA      | Sunda Hus                          | Own system based on BASTA | BVB, BASTA                  | BVB             | BVB    | BVB                                |
| <b>Certification</b>                       | Not mandatory                                   | No                    | Miljöbyggnad, Silver rating | No                                 | No         | No                                 | No                        | Miljöbyggnad, Silver rating | No              | No     | No                                 |

\* The requirements commencing with Norra 2 stipulate that property developers must achieve a Gold rating in the Miljöbyggnad, Indoor Environment Quality category. The information pertaining to Norra 1 relates to the overall Miljöbyggnad rating, i.e. not only for Indoor Environment Quality.  
\* According to the property developers, some of the construction waste was mixed up, which means that the right amount has not always been registered for the right property developer.

**ENERGY.** The measured energy use reported by all property developers to date is close to the requirement level of 55 kWh/m<sup>2</sup> A<sub>temp</sub>, representing an excellent margin compared with the BBR requirements applicable at that time (110 kWh/m<sup>2</sup> A<sub>temp</sub> and 55 kWh/m<sup>2</sup> A<sub>temp</sub> electrically heated, respectively).

The results also show that the differences between estimated and measured values are relatively minor, indicating well-performed calculations based on realistic data.

**GSI SCORES.** The property developers show a range of estimated GSI scores, partly due to the unique circumstances of each block. On the Garphyttan block, which comprises both NCC and Seniorgården and where the requirement level for Norra 2 has been achieved, there is a relatively large eco-efficient space since the outdoor area has not been excavated, which enables deeper soil layers. It should also be noted that the Green Space Index was introduced relatively late in the process.



Stockholm Royal Seaport is merging with the port area, and housing, offices and parks will be integrated with the Port's ferry services. The zoning plan for Södra Yärtan contains about 1,600 apartments.

# An urban district with a holistic approach

Stockholm Royal Seaport incorporates a robust and flexible urban structure. Infrastructure and urban environments have been planned to last, and to cope with future climate change. To achieve the ambitious sustainability targets, the project has developed a roadmap for fossil fuel independence. Lessons learned from past experiences and the generation of new knowledge are essential for success.

**SUSTAINABLE TRAVEL.** It should be easy for people living in Stockholm Royal Seaport to walk, cycle or use public transport. A preliminary assessment of the conditions shows that the built and planned road network in Stockholm Royal Seaport is well-suited to walking and cycling, both within the urban district, and to other parts of the City. However, some barriers must be overcome, since large areas are inaccessible to the public. The waterfront connection could be an ideal route for pedestrians and cyclists.

The assessment also shows that public transport has not been as highly prioritised in Hjorthagen as in the southern parts of Stockholm Royal Seaport, partly because the area was planned in the early 2000s, before Stockholm Royal Seaport was environmentally profiled.

## SMART AND MULTIFUNCTIONAL SPACES.

Under the right conditions and using smart design, the same space in a park or street can perform several functions, while simultaneously generating multiple ecosystem services.

One example of multifunctionality is a space primarily allocated for stormwater disposal that – with proper design and selected plants – can also be used for recreation, and to increase pollination and biodiversity. A tool as the Green Space Index for Public Space has been developed to facilitate the planning of these urban spaces. The tool is being tested in Stockholm Royal Seaport during 2015–2016.

## ROADMAP FOR A FOSSIL FUEL-FREE URBAN DISTRICT – A MODEL URBAN DEVELOPMENT PROJECT.

A roadmap has been developed to show how Stockholm Royal Seaport is working to become fossil fuel-free. The roadmap's estimations show that the City's requirements on property developers in the area will dramatically reduce greenhouse gas emissions from transport, buildings and waste. Greenhouse gas emissions will be reduced by more than half (-60%), compared with the average rate for construction in Stockholm in 2010. The greatest reduction will be achieved by replacing the fossil fuels used in the district heating system with biofuels, by constructing energy-efficient buildings and creating conditions for sustainable transport. The greatest challenges are fossil-fuel dependent transport and the proportion of fossil fuel used in the district heating system. The estimations are based on the Clinton Climate Initiative's Climate Positive Development Program.

## SOLAR ENERGY CHALLENGE ATTRACTS GLOBAL ATTENTION.

An international innovation competition, the Stockholm Solar Challenge, attracted 70 creative contributions from all over the world. The competition was designed to source ideas for how solar energy solutions could be integrated, and made visible, in urban environments. A total of 775 people participated in 458 teams from 71 countries. Most of the contributions were from India, Sweden, Russia and the US.



**FAST CHARGING STATION.** A fast charging station has been installed in Stockholm Royal Seaport that is open to the public. These stations are fast and simple to use, making it easier to use electric cars in the city.

**141,361 tonnes**

of rock mass, stone and boulders were crushed on site in 2015, eliminating the need for transport equivalent to

**848,160 km**

**730,000 tonnes**

of mass were crushed on site, of which

**300,000 tonnes**



corresponding to

**41%**

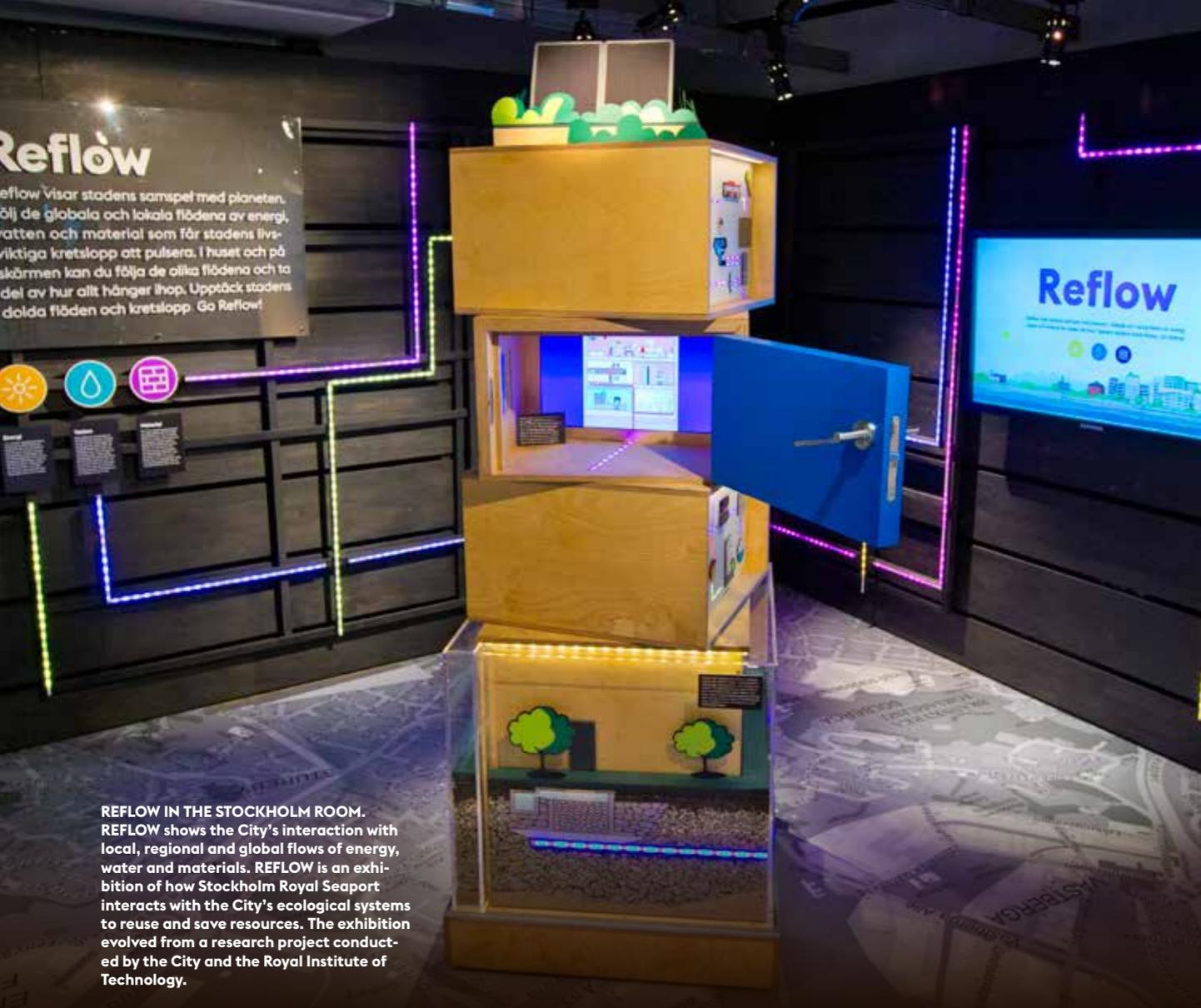
of mass was remediated and re-used.

**2,412**

people underwent training arranged by the Construction Consolidation Centre.

Soil remediation is one of the first activities in the process of transforming Stockholm Royal Seaport from an industrial site to a residential area.





**Reflow**  
 Reflow visar stadens samspel med planeten. Följ de globala och lokala flödena av energi, vatten och material som får stadens livsviktiga kretslopp att pulsera. I huset och på skärmen kan du följa de olika flödena och ta del av hur allt hänger ihop. Upptäck stadens dolda flöden och kretslopp. Go Reflow!

**REFLOW IN THE STOCKHOLM ROOM.** REFLOW shows the City's interaction with local, regional and global flows of energy, water and materials. REFLOW is an exhibition of how Stockholm Royal Seaport interacts with the City's ecological systems to reuse and save resources. The exhibition evolved from a research project conducted by the City and the Royal Institute of Technology.

**4,000**

visitors from

**43**

countries in



**6**

continents visited Stockholm Royal Seaport in 2015.



**1,700**

people follow Stockholm Royal Seaport on Facebook, which is 700 more than in 2014. Many residents, as well as people who are interested in sustainable urban development, are following the project.

**8**

newsletters were sent to

**1,700**

subscribers.

# An inspiring urban district

The number of study visits increased by more than 25% during the year, and the number of inquiries from trade fairs and conferences remained high. At the end of the year, Stockholm Royal Seaport received an award for the best sustainable urban development project at the Climate Change Conference in Paris.

## BEST SUSTAINABLE URBAN DEVELOPMENT PROJECT.

In competition with other urban development projects around the world, Stockholm and Stockholm Royal Seaport received an award for the best sustainable urban development project. The award was presented at the UN Climate Change Conference in Paris by the C40 Cities Climate Leadership Group, a network of committed cities around the world. The award is proof that Stockholm is an international leader in sustainable urban development.

## FOCUS ON STOCKHOLM ROYAL SEAPORT AT EUROPE'S LARGEST TRADE FAIR FOR PROPERTY AND INVESTMENT.

Along with Vienna and Barcelona, Stockholm was invited to participate in EXPO REAL, the largest trade fair for property and investment in Europe, as a role model for the Smart Cities theme. Stockholm, with a focus on Stockholm Royal Seaport, received a great deal of attention for its work on sustainability. Several long-term contacts were made with European investors and property developers.

## MAJOR INTERNATIONAL INTEREST.

Stockholm Royal Seaport received 4,000 visitors from Sweden and the rest of the world, representing a year-on-year increase of 1,000 people. The visitors came from 43 different countries, and six continents. Most delegations came from China, Canada, the UK and the US. There were 117 international groups, which is nearly half of the total number of 239 delegations.

## STOCKHOLM WATER WEEK.

During Stockholm Water Week, a seminar was held at Stockholm Royal Seaport, where water issues were described and discussed from a Stockholm perspective.

## CLIMATE-POSITIVE AND SUSTAINABLE URBAN DEVELOPMENT NETWORKS IN WUHAN, CHINA.

Stockholm Royal Seaport participated in Wuhan, and shared the experiences gained thus far. The workshop was organised by C40 and the City of Wuhan, and Stockholm Royal Seaport was invited to participate as a partner in the Climate Positive Development Programme. The aim of the workshop was to share best practice, identify challenges and to determine priorities in the strategies of the various cities that will lead to climate-positive urban districts.

## INNOVATIVE COLLABORATION.

During the spring, Bahnhof was allocated land to establish a data centre, where excess heat from the data centre will be used to heat apartments in Stockholm via the district heating network.

## 150 ENERGY-SMART APARTMENTS.

The apartments are being built in the Norra 2 development phase and will be equipped with state-of-the-art energy technologies and connected appliances, making it possible for residents to control their energy use. The aim is to develop methods for smarter energy use and to reduce the total amount of energy consumed.

# Significance of research and development

Stockholm Royal Seaport is focused on research and development and 20 Research and Development projects (R&D projects) are currently ongoing. These projects are often conducted in collaboration with the academic community, research institutes and businesses. The mutual learning approach to sustainable construction will thus create widespread benefits. Some of the projects are described below.

**REFLOW.** REFLOW is based on the ecocycle model used by Hammarby Sjöstad. REFLOW is aimed at realising an innovative approach to explaining and describing the complex relationships between energy, water and material flows in Stockholm Royal Seaport. REFLOW is designed to describe the City's hidden flows in a manner that is easy to understand, and to raise awareness of recycling systems. It is also intended to serve as a platform for learning and exchanging ideas about the sustainable development of cities and urban districts in interaction with rural areas. The development of an in-depth version can contribute to using REFLOW as a planning tool, and for monitoring the environmental performance of Stockholm Royal Seaport.

**REFLOW** is designed to describe the City's hidden flows in a manner that is easy to understand, and to raise awareness of ecosystems.

**MOBILITY INDEX.** The Mobility Index is designed to help create the right conditions for using sustainable modes of transport. Five modules – the walkable city, the cyclable city, stationary vehicles, goods management and mobility services – describe the various mobility measures available at property level to make walking and cycling, in particular, more attractive.

The index is intended to help property developers plan their properties in a manner that reduces the need for cars. The Mobility Index will be used in Stockholm Royal Seaport's land allocations as of 2016. Several other municipalities have already shown a major interest in using the tool.

**SMART CITY SRS.** Large amounts of data are gathered in cities via sensors in buildings and infrastructure. The aim of the Smart City SRS project is to enable more efficient use of data in decision-making by developing an open integration platform for data that, in combination with real-time analysis and feedback processes, can help to create awareness of the implications of decisions. The project tested integrating and analysing data from the City's various supply systems, such as energy, water, waste and transport, to enable real-time feedback to stakeholders including city planners, private and public players and citizens.

The Smart City SRS project aims to make the use of data in decision-making processes more efficient.

**BIOCHAR.** Biochar is being tested at Stockholm Royal Seaport in stormwater plantings. The biochar is made from garden waste, has soil-improving properties and reduces the amount of CO<sub>2</sub> in the atmosphere. Collecting waste from Stockholm's parks and gardens to make biochar began as part of the Stockholm Biochar Project. The heat generated during the process is used in the City's district heating network. Biochar also has many beneficial properties, such as absorbency, and it retains water like very few other materials.

The biochar has soil-improving properties and reduces the amount of CO<sub>2</sub> in the atmosphere.



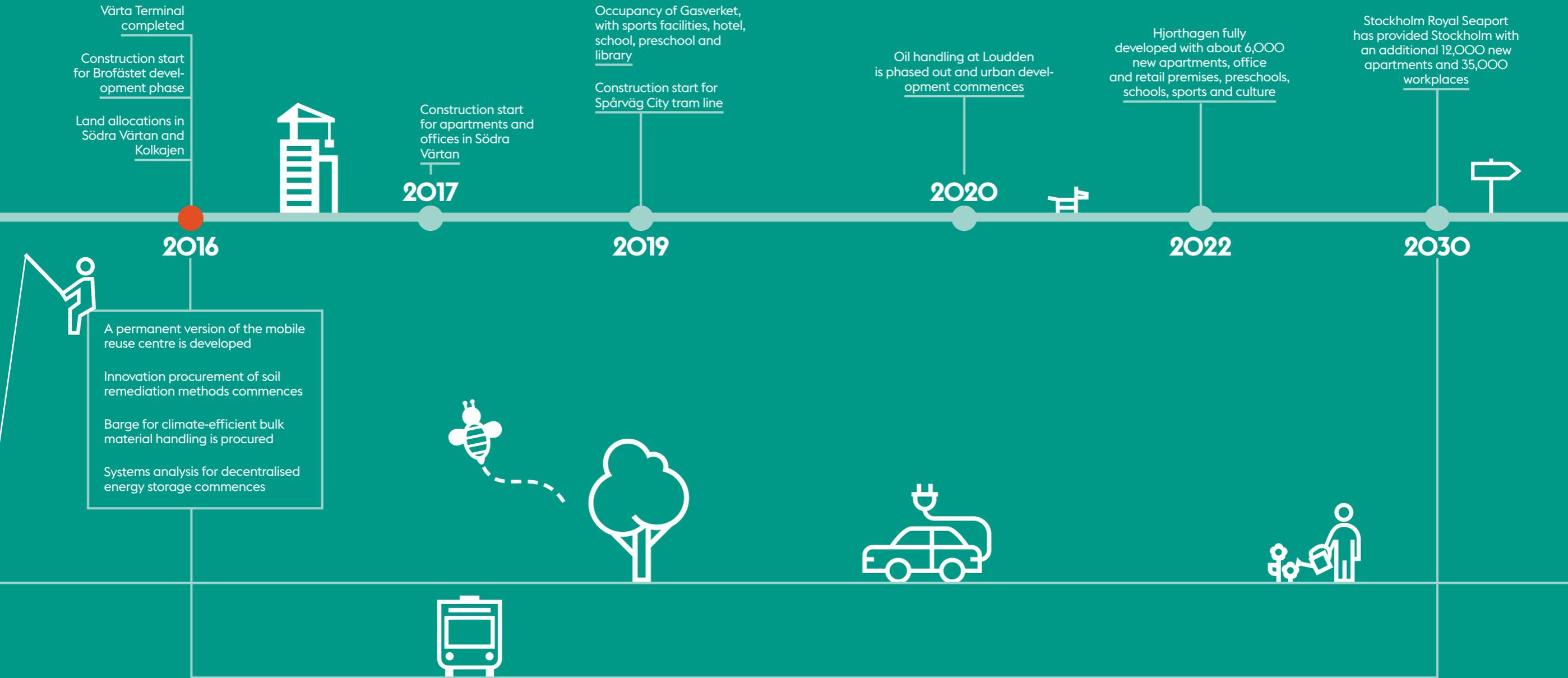
**RIPPLE EFFECT.** Part of the environmental profiling mission is to disseminate knowledge and best practice, and several of the R&D projects originating from Stockholm Royal Seaport have been widely spread. Some examples of this dissemination include:

- ▶ The Green Space Index concept has been adapted for the entire City, based on experiences from Stockholm Royal Seaport. The planning manual developed for C/O City is now used by other municipalities.
- ▶ Smart City SRS has led to more projects. The information platform prototype that was developed was tested

and evaluated in Stockholm Royal Seaport and further refined in areas such as Årstastråket. A mobile device platform for local services is being developed and commercialised in the "Staden in Mobilen" project (The City in your mobile device).

- ▶ Lessons learned from the Active House project are being used in a research project focused on care and safety.
- ▶ Best practices and knowledge generated by Stockholm Royal Seaport are also being widely spread due to the large number of people who are visiting Stockholm Royal Seaport.

# Towards a sustainable city



FUTURE/CURRENT SITUATION

2016-2030



Experience and best practice sharing with the entire City.



Continuous evaluation and tightening of sustainability requirements.



Identification of new R&D projects.

# Target achievement – forecast for 2030

-  The target will be achieved with the current requirements.
-  On track, but some issues remain unclear.
-  The target will not be achieved with today's conditions.

This forecast is based on ongoing work and current conditions.

| Target  | Target achievement  | Example of completed actions  | Example of planned actions   | Comments   |
|---|---|---|--|--|
| <b>1.1</b> Stockholm Royal Seaport is a climate-positive urban district (under the international Clinton Climate Initiative (CCI) framework).           |    | A roadmap describing actions for climate-positive development is currently being drafted.   | The roadmap will be completed in 2015. An activity list with milestones and continuous monitoring will ensure target fulfilment.                                   |  |
| <b>1.2</b> By 2020, emissions will not exceed 1.5 tonnes of CO <sub>2e</sub> per person.  |    | Requirements for energy-efficiency and self-generation of energy for properties, increased waste sorting, transport system study, development of mobility index for properties.   | System study to optimise energy solutions, mobility index for the urban district, food waste to tanks and feasibility study of an environmental zone for vehicles. | According to the City of Stockholm's estimations, the target for the entire City will be achieved by 2020.   |
| <b>1.3</b> Stockholm Royal Seaport will be fossil-fuel-free by 2030 (according to the City's system limits, which include energy, waste and transport). |    | Requirements for energy-efficiency and self-generation of energy for properties, increased waste sorting, transport system study, development of mobility index for properties.   | System study to optimise energy solutions, mobility index for the urban district, food waste to tanks and feasibility study of an environmental zone for vehicles. | The project has limited control over heavy investment in infrastructure, such as energy and traffic. Traffic is a regional/national issue. Waste used for district heating is assessed to contain a minor proportion of fossil plastics. |
| <b>1.4</b> Stockholm Royal Seaport is adapted to future climate change.   |    | Levelling, stormwater strategy and stormwater systems in the street, the development of planning tools such as the Green Space Index for privately owned and public land, urban heat island effects.  | Stormwater strategy for Södra Värtan.  | Issues related to levelling in Södra Värtan and Gasverket remain.  |
| <b>2.1</b> Stockholm Royal Seaport has low resource usage.  |  | See targets 1.2-1.3. Requirements for low resource usage in production and operation, local bulk material handling, requirement for affiliation with the Construction Consolidation Centre (waste, materials), systems analyses for source-separating wastewater systems, transport studies, Life Cycle Assessment (LCA) for deck on piles, street materials and building structures. | Simplified LCA tool. An explanatory ecocycle model. Mobility Index at property and urban district level.   |  |
| <b>2.2</b> Stockholm Royal Seaport has a limited impact on health and the environment.  |  | Requirements for material specifications, and for good indoor and outdoor environments.   |  |  |
| <b>2.3</b> Stockholm Royal Seaport is focused on sustainable production and consumption patterns.   |  | See target 2.1 Requirement for property developers and the City's facility constructors. The urban district is planned to facilitate walking, cycling and travelling by public transport.   | Strategy for consumption perspective.  | The City has little control over the consumption perspective – consumption is largely an individual responsibility.  |
| <b>2.4</b> Stockholm Royal Seaport has a green structure that supports and develops the ecosystem, as well as valuable ecosystem services.              |  | Green Space Index requirements for blocks of land have been developed and used. Hjorthagen has been used as a test bed for improving knowledge in the C/O City R&D project, and for development of the Green Space index for public land.   | The C/O City implementation project to test and verify theoretical models and tools. The Green Space Index for public land will be implemented.                    | Using Hjorthagen as a test bed has not proved entirely successful in the area.   |

| Target  | Target achievement  | Example of completed actions   | Example of planned actions  | Comments  |
|---|---|--|---|---|
| <b>3.1</b> In Stockholm Royal Seaport, "doing the right thing is easy" and people who live and work in the area are developing their knowledge and ability to live and act sustainably. |    | Vacuum waste collection system and secure sustainable transport, such as pedestrian and bicycle paths, public transport, carpool, cycle parking spaces, etc. Close to recreation and services.   | Implement the mobility index for buildings, feedback and information.   | The City has little control over the consumption perspective.                         |
| <b>3.2</b> In Stockholm Royal Seaport, the people who live and work in the area are actively involved.  |    | Resident get-togethers, information meetings, thematic meetings, Stockholm Royal Seaport Day, planting boxes, beehives, HIND, etc.   | Expanded civil dialogue and tool development.   |   |
| <b>3.3</b> Stockholm Royal Seaport promotes social integration and interaction through mixed forms of tenure and apartments of various sizes.   |    | Various sized apartments and mixed forms of tenure such as tenant-owned apartments, rental apartments, student housing.  | Further refinement of land-allocation competitions and early-stage civil dialogue.  |   |
| <b>3.4</b> Stockholm Royal Seaport is a multi-functional and secure urban district that is accessible to everyone.  |    | Mixed development with housing, services, offices, etc. Sociotope studies and security walks have been conducted. Places and activities that attract visitors from various parts of the City.  | Social impact assessments, investigation of sustainable transport linked to security and activity on the streets, and the implementation of measures from security walks. |   |
| <b>3.5</b> Stockholm Royal Seaport offers good opportunities for recreation and culture.  |    | Proximity and connections to parks and green spaces in the urban district. Pedestrian and cycle bridge to Norra Djurgården, nature and culture trail, art, etc.  | Open up quays, parks and the Gasverket area. Develop Gasverket into a cultural centre.  |   |
| <b>4.1</b> In Stockholm Royal Seaport, the land is re-used and the cultural built heritage is safeguarded and conserved.  |  | Soil remediation, a high degree of exploitation, conservation of the cultural built heritage and redevelopment of old industrial land.   | Use of caverns for heat storage and parking garages.  |   |
| <b>4.2</b> Stockholm Royal Seaport is an economically viable urban district.  |  | Functional mix of housing, services and commercial activities. Services planned with access to public transport. Trading analyses, sociotope mapping, possibility for public services on the ground floor, dialogue with property owners and business operators, etc.                          | Development of digital plan for the urban development area.   | The City's influence is limited; the situation is market-controlled.                  |
| <b>4.3</b> Stockholm Royal Seaport contributes to innovation, and the development and marketing of Swedish green technology.  |  | The C40 Network connection, R&D projects, forums for sustainable solutions capacity development programme, R&D plan. Best practices are highlighted. National and international marketing through conferences, exhibitions and networks, innovation competitions, land-allocation competition. | Innovation procurement. Identification of R&D needs, appointment of academic reference group. Dialogue and collaboration with other municipalities.                       |   |
| <b>4.4</b> Life Cycle Costing (LCC) applies when constructing Stockholm Royal Seaport.  |  | Robust structure. (LCC for the vacuum waste collection system, 100-year perspective for important constructions, stormwater system that reduces the risk of flooding).   | Development of joint methodology for LCC estimates.   | Need for a strategy to ensure that property developers maintain a long-term approach. |

# The Capital of Scandinavia



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