# Sustainable urban transport and urban regenerations with the example of Hammarby Sjöstad and Stockholm Royal Seaport

Author: Tim Lundmark

Supervisor: Enza Lissandrello

AALBORG UNIVERSITY

A thesis presented for the degree of Master of Science

URBAN PLANNING AND MANAGEMENT

January 8, 2021

Urban Planning and Management

4th Semester

Technical Faculty of IT and Design

Aalborg University

Rendsburggade 14,

9000 Aalborg

Denmark

www.en.plan.aau.dk

**Title:**

Sustainable urban transport and urban regenerations with the example of Hammarby Sjöstad and Stockholm Royal Seaport

**Keywords:**

Sustainability, Transport, Mobility, Urban regeneration, Stockholm, Hammarby Sjöstad, Stockholm Royal Seaport

**Author:**

Tim Lundmark

**Supervisor:**

Enza Lissandrello

**Pages:**

61 (+ 12 with appendix)

**Hand-in date:**

08.01.2021

AALBORG UNIVERSITY
DENMARK

## Abstract

This thesis investigates how urban regeneration projects can push for sustainable urban transport. Sustainable urban transport is viewed primarily through the lenses of Hutton, a British researcher who has identified several key points on how to achieve sustainable urban transport, these are complemented by other research to give more depth to the thesis. The thesis is motivated by following questions:

- What is sustainable urban transport and why/how is it encouraged in contemporary urban regeneration?
- How have the ideas of sustainable urban transport on different levels influenced the regeneration of Hammarby Sjöstad and later Stockholm Royal Seaport?
- How can regenerations such as Stockholm Royal Seaport and Hammarby sjöstad? contribute to sustainable urban transport?
- How can urban regeneration push for sustainable urban transport patterns as seen in the examples of Hammarby Sjöstad and later Stockholm Royal Seaport?

A case study is conducted to analyse sustainable urban transport in the regenerated Stockholm districts, chose as they are award winning with good possibilities to develop a sustainable urban transport system. Methods include interviews and document analysis that together try to show the complexity of sustainable urban transport. The thesis offer insight in sustainable urban transport regeneration projects and concludes that large scale regenerations can, given the right circumstances push sustainable urban transport planning and development forward.

## Acknowledgments

I would like to thank my supervisor Enza Lissandrello for her valuable feedback and support throughout the process of writing my masters thesis. I would also like to my parents for supporting me in my pursue of higher education. Without their support this work would not have been possible.

# Table of contents

# 1 Introduction

Human civilisation has throughout history relied on ways to transport goods and people. In ancient times a vast network of roads spanned the European continent, connecting different nations, cities and towns with each other to support trade, and to be used in times of conflict. The primarily mode of transport has shifted throughout history, from horse drawn carriages, to boats, to steam powered trams and trains during the industrial revolution. Currently a majority of the people in the global north rely on cars for transportation. (Antrop, 2004), (Banister, 2002 page 1), (Garrison & Ward, 2000 pages 1-3).

Reports indicate that private motorized vehicles are the most common method of transport in Europe, with an annual increase in numbers. In 2016 circa 400-million motorised vehicles were registered in Europe and private cars stood for a majority that number. Private owned cars have in many ways dominated urban transport, planning and development since the early 20$^{th}$ century. These vehicles grant individual freedom as drivers can go almost wherever they like, whenever they want to. This has vastly shaped the way our urban areas look like and how we transport ourselves within them. 100 years ago, the vast majority of people lived on the countryside, today a global majority live in urban areas, a number which is likely to rise even further (International transport forum, 2019). The rising urban population will likely require humanity to revaluate and rethink how we shape our cities and how we transport ourselves within them as most transport systems face the challenge of growing populations and new substantiality aims to comply with any challenges that the future may bring.

Motorised vehicles accumulate significant levels of emissions and cause a negative environmental at both local and global levels. Cars add to air-contamination, noise-contamination, and elevated levels of energy utilization. Aside from that, motorised vehicles have a critical negative impact on the public wellbeing since they are a contributing factor to physical inactivity which can lead to potentially deadly diseases including cancer, vascular diseases, and diabetes.  Motorised vehicles also cause vast numbers of accidents & deaths. According to statistics cars are the most frequent death cause among young people globally. (Banister, 2002, pages1-3), (WHO, 2018).

Thus, some contend that a big shift is required within the field of urban planning, development, and design, in the transportation industry and in government regarding urban transport. Many cities around the world have already started to explore sustainable transport options. This has led to a shift in transport patterns. (Banister & Hickman, 2014), (Nieuwenhuijsen & Khreis, 2016). This work will explore how urban regeneration is able to push sustainable transport from a planning perspective.

## 1.1 Sustainable development

The negative effect cars have regarding health and environmental issues have globally been discussed for more than 30 years as they were first brought up on a worldwide level in the 1987 Brundtland report. This report worked as a framework for sustainable development which is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (UN, 1987). This

definition is regularly separated into three primary objectives; green (environmental), social, and economical objectives. The objectives are connected and must be weighed against one another on worldwide, countrywide, regional wide, local and supralocal levels. (Hutton, 2013 pages 1-18).

The year of 1992 a UN convention was regarding sustainable development resulted in Agenda21. This is a non binding arrangement between all countries to try to achieve a more sustainable future. Its basic objective is to improve, financial, social, and green issues around the world. Agenda21 may be implemented on various different levels. (UN, 2021a).

## 1.2 Aim of the thesis

There is an ever-growing interest & demand for sustainable urban transport systems. This thesis aims to examine how certain ideas of sustainable transport can be understood and used as a concept within urban regeneration; and how this may affect the urban planning with focus on Hammarby Sjöstad and Stockholm Royal Seaport. The thesis will be conducted through a cast study analysis, with interviews & documentary studies.

### *1.2.1 Objectives*

- To examine concept of sustainable urban transport.
- To study how sustainable urban transport can be understood within urban regeneration.
- Identify 2 suitable examples for urban regeneration from different time periods with a particular focus on sustainable transport.
- To analyse the examples through documentary studies and interviews.
- Examine sustainable transport in urban regeneration as demonstrated by the cases study compared to relevant scientific background.
- To critically compare how planning for a sustainable transport system was conducted in Hammarby Sjöstad, and later Stockholm Royal Seaport in regard to sustainability urban transport issues, and how the planning evolved over time.

### *1.2.2 Research design*

**Initial wonder:** Can contemporary urban regeneration push for sustainable urban transport?

**Theoretical research:**

**SQ 1:** What is sustainable urban transport and why/how is it encouraged in contemporary urban regeneration?

**Aim:** Define what sustainable urban transport is and why it is important. Creating the theoretical frame necessary for the rest of the research.

**Methods**: Literature review

**Empirical research:**

**SQ 2:** How have the ideas of sustainable urban transport on different levels influenced the regeneration of Hammarby Sjöstad and later Stockholm Royal Seaport?

**Aim:** To understand the current situation of sustainable transport in the areas and the efforts that have been made to achieve these.

**Methods:** Interviews, document analysis, results of sq1.

**SQ 3**: How can regenerations such as Stockholm Royal Seaport and Hammarby sjöstad contribute to sustainable urban transport?

**Aim:** To understand the role and importance of large-scale regenerations have in urban planning and developing for sustainable urban transport.

**Methods:** Interviews, document analysis, results of sq1 and sq2.

**Conclusion**

**Research question:** How can urban regeneration push for sustainable urban transport patterns as seen in the examples of Hammarby Sjöstad and later Stockholm Royal Seaport?

## 2 Sustainable development and sustainable transport

This chapter aims to investigate and explain what sustainable urban development is and it can affect transport. This chapter contains information from global organisations such as UN and from scientific reports.

### *2.01 Transport, mobility and accessibility*

The Oxford English Dictionary defines transport as "*To take or carry (people or goods) from one place to another by means of a vehicles, airship or ship.*"

This is a narrow definition; this thesis will add e.g. walking as a fundamental mean of transport that is excluded if movement is only to be confined by mechanical means. Escalators, lifts and other mechanical equipment are not seen as vehicles but nonetheless transport good and people and are therefore transport. A broader definition of transport can be the movement of people, information, commodities, energy, and waste. The essence of transportation is the movement to a location more desirable than the current one. (Hutton 2013, page 19).

Mobility and accessibility are two similar concepts both relevant for this thesis even though the main concept is transport. Accessibility applies to places, either by geographical location or any activities occurring there. Mobility focuses on people, as groups or individuals and their mobility is defined by the maximum range of places and functions, they perceive accessible. Personal or group mobility is constrained by factors such as available time and money, physical abilities, and the extent and nature of two available transport system. (Hutton 2013, page 202).

### *2.02 Sustainable transport*

How to achieve a sustainable transport system is a relatively debated topic. Many researchers argue that a combination of methods that include prioritising of walkability, cyclists and public transport are needed. (Bruun, Kenworthy & Schiller, 2010), (Gunn, 2017).

Transport researcher Barry Hutton identifies a number of key points in the book "*Planning sustainable transport*" On how one can plan for a sustainable transport system, these can be summed up as:

- **Set criteria for desirable densities**.
  By reducing the distance between homes, important nodes and public transportation access hubs one can reduce the demand for motorized traffic. High density neighbourhoods allow for more points of interest within walking distance. Reducing the level of parking spaces in residential areas can be accepted if good public transport is provided. Restricting car ownership instead of car use is unlikely to be successful.
- **Foster local support for public transport**.
  There is a relationship between the density of neighbourhoods and what type of transport that serves them. Public transport is strongest along linear routs though high density neighbourhoods where the average walk to/from public transport is minimum.

- **Non residential parking**.
  Terminal facilities are important for all transport modes. Densely developed neighbourhoods may sometimes suffer from a lack of parking spaces. Solutions to this can be a highly accessibly public transport system or indoor parking facilities.
- **Make spatially selective policy.**
  Cities must adopt transport policies matching sufficient levels of density, parking and public transportation in combinations suitable for particular parts of cities. Policies that only favour one transportation mode will likely fail.
- **Develop park and ride.**
  Cars are best in low density areas, outside city centres, public transport is the reverse. By planning for car parks adjacent to public transport in the outskirts of cities one can make journeys as smooth as possible for commuters living outside of the cities
- **Research the nature of adequate, acceptable public transport**
  If public transport is seen as inadequate car will be the default mode of transport for the majority of the public. This is partly due to the matter of image rather than the efficiency of the transport mode.
- **Create public transport priority areas**
  By prioritising public transport one can fundamentally enhance the publics opinion about mass transit as well as its capacity, accessibility and efficiently. Public transport should therefore be given its own lanes where possible and be prioritised at traffic lights. This makes direct improvements, making public transport superior to other traffic and enhances its cost profile.
- **Encourage and facilitate walking**
  Walking is a mode of transport particularly important since it is not only a way of transport in its own but also a component of almost every journey. High levels of walkability increase the possible use of both public transport, cycling, and to some extent automobilism. Urban pedestrian ways should be well lit and maintained. Pedestrian crossings should be safe and prioritise pedestrians to minimise conflicts with vehicular traffic.
- **Facilitate cycling**
  Cycling has a useful role to play in a sustainable transport system as it does not generate emissions or noise, use a small amount of space and is relatively quiet. It also enhances public health and is a mode of transport suitable for longer journeys than walking. Cyclists should therefor be planned for, safe cycle ways, safe places to park your bike, close to public transport. (Hutton, 2013 pages 403-410).

## 2.1 The idea of a sustainable city

This part of chapter two explores the research and ideas about sustainable urban transport.

### *2.1.1 Public Health*

Car dominated societies often lead to a decrease of physical activity for the general population. Lack of physical activity is a major issue in modern societies that can lead to several health issues including diabetes, obesity, cancer and, cardiovascular diseases. Lack of physical activity accounts for more than 5 percent of all deaths worldwide, significantly more in developed countries. Health advisers state that the risks of these diseases can be significantly reduced if a person is physically active for a minimum of half an hour every day.

By prioritising non motorized transport modes such as pedestrians and cyclists in urban areas one also promotes physical activity, thus reducing the risks for several potentially deadly diseases. Such planning will also minimise local emissions, which leads to an increased air quality that is also beneficial for the general public health and wellbeing. Planners can provide the general public with an infrastructure that enables more physical movement; however, every individual must decide whether he or she wants to use this infrastructure and be physical active. High levels of non motorized traffic can also increase local cohesion and bring a sense of security by bringing more people to the streets. (Badland , Giles-Corti, & Koohsari, 2013), (Banister, 2002, pages246-247),(Haskell et al 2007).

### *2.1.2 Space efficiency*

Urban areas have a limited space, and land tend to be expensive in cities. Congestion issues have always been an issue, even in ancient and medieval towns. The issue has grown bigger since the industrial revolution and the introduction of cars. Cars use a lot of space and are on average not used more than 90 percent of the time, and therefor contribute a lot to congestion issues in modern society. From a certain perspective, congestion functions as an indicator of a successful neighbourhood, as it primarily appears in or in close proximity of districts where citizens are willing to spend time, for example highways leading to town centres. Motorized congestions, however, leads to long commuting times, higher frustration levels and increased emissions.

By planning for, and promoting alternative, sustainable transport modes, congestion issues can be eased. Transforming automobile dependent systems to more sustainable ones by for example prioritise cyclists, pedestrians and mass transit while restricting car use congestion issues can be heavily reduces. By planning for dense mixed style developments congestion can act to bring people together, through e.g. social interactions on the streets. A shift to such transport systems will reduce pollution and improve the possibilities of mobility in cities. Limiting space for cars will result in more available space for e.g. parks, landscaping, urban dwellings and safe environment resulting in a greener, less noise polluted, and safer urban environment. (Banister,2005, pages16-17),(Crawford,2000 pages228-229).

### *2.1.3 Noise*

Motorized vehicles are, in most modern cities the main source of high levels of noise and noise pollution. Exposure to such noise levels during an extended time period can be harmful and lead to high levels of stress, sleeping disorders and annoyance. At low speed noise is primarily caused by a vehicle's engine, at higher speeds the air resistance causes high levels of noise, regardless of engine type. By promoting sustainable transport systems and restriction automobiles noise levels can be minimised, which is beneficiary for human health.

### *2.1.4 Safety*

Accidents involving motorized vehicles are the most common death cause among people under 30 and the eight in total. Car accidents contribute to more than a million severe injuries every year. This is not only a big expense for our healthcare systems but also a source of suffering for many. Many of these accidents could be prevented with the prioritisation of safe traffic environments. One can argue that as a society grows richer its inhabitants are more likely to prioritise and value safety measures. Motorised vehicles are a threat to human health both directly as they cause traffic incidents and indirectly as they are the cause of dangerous air pollution and physical inactivity. (Giles-Corti, 2016), (Banister & Hickman, 2014).

### *2.1.5 Economic benefits*

Throughout history economic growth has relied on well functioning transportation systems. Financial systems need to be accessible and well connected to flourish as this increases productivity and decreases costs for companies that have the opportunity to relocate to cheaper locations where their services are equal accessible. (Garrison & Ward,2000 pages 3-5).

For the past 70 years, the sale levels of motorised vehicles have been an indicator of economic growth and development. However, with the disadvantages of mass automobilism becoming more apparent, this has started to shift in many places. Mixed-use dense areas that are less car dependent and accessible by more sustainable means of transport can be argued to have higher levels of economic activity than traditional car dependent suburbs. Land and property values in such neighbourhoods may be higher as they can accommodate local services and work opportunities within the area. (Carey,2018).

### *2.1.6 Sustainable transport and covid19*

At the first peak of the Corvid19 pandemic in Spring 2020 most European Nations severely limited their citizens freedom of movement by imposing restrictions and so-called lockdowns. This was achieved with the aim to save lives by slowing the pace which the virus could spread. Different countries imposed different restrictions, however, walking and biking was still allowed as exercise or a way of transport in most nations. (DW, 2020). This indicates how sustainable transportation options can be viable even during a global pandemic and how important walking and biking is to our societies. It is too early to say how the Covid19 will affect human travel patterns long term but several cities throughout

the world have taken actions to promote and increase the levels of bikers and pedestrians both during and post lockdown as it is seen as a safer way to travel. The opposite can be said about mass transit, as many governments encourage its citizens to use other modes of transport where social distancing is easier during the pandemic.

#### *2.1.7 Local environment and global climate*

It is widely acknowledged that cars have severe negative impact on both the local environment and the global climate. This can be argued as one important reason to promote and work for sustainable transport and transportation systems. Motorized vehicles negatively impact local and regional air quality, climate change, and are a large contributing factor to global warming, a process that is causing mass-destruction of entire eco systems, biodiversity and wildlife, thus arguably being one of the greatest threat to our species and planet today. (European Commission, 2021a,b).

In 2015 all the worlds governments signed the Paris agreement with the aim to not let global warming exceed 2 degrees centigrade. At the time, this was a, unique, historical moment as every nation represented in the UN now held the same aim and agenda. (UN 2021b). The US, however, later announced that they intend their withdrawal from the historical agreement (USA, 2019) something that may change again with the inauguration of a new American president in 2021. (CNBC, 2020). The European Commission states that human civilisation is the primary cause of climate change. If we cannot change our society the climate targets will never be achieved resulting in catastrophic events including sea level rise, flooding and major heat waves. (European Commission, 2021a,b).

Urban areas account for approximately 70 percent of all global co2 emissions and a similar proportion of global energy use, primarily from fossil fuel. Transportation is a major contributor to such numbers and account for an estimated 16 percent of all global co2 emissions. (C40, 2021), (Ourworldindata, 2021). From a planning perspective, a number of initiatives with the aim to reduce transmissions exists, including encouraging car pool services, shared bike systems, mass transit and a shift to electric vehicles. (Banister, Hall & Hickman,2013), (Richards, 2001).

### 2.2 Transport and sustainable development

What role does transport have in sustainable development?

#### *2.2.1 Car free cities*

Cities, towns and villages have throughout history always relied on well functioning transportation systems, from horse drawn carriages, to waterways and canals, to steam powered transport to our modern means of transportation one can argue that urban areas have been dependent on transport systems to flourish. Well functioning, well connected transport systems increase all mobility and makes it easier for citizens to connect with each other, as well as with necessities such as workplaces, education and leisure. High mobility levels increase possible trade, thus prosperity in a geographic area. Any transport system is a product of many professions, including planners, engineers, designers and developers and greatly affect the opportunities to travel to, from and within a community. (Banister, 2005, page13),(Crawford, 2000),(Kreiss & Nieuwenhuijsen, 2016).

Personal automobiles bring several benefits to its user, including the sense of freedom, however, mass automobilism lead to many sustainability issues, including local and global environmental problems, public well-being and health, high noise levels and safety.

In recent decades more than a billion cars have been manufactured, a number that is estimated to double before 2050. Personal automobiles are a large source for air pollution, co2 emissions, noise levels and contribute to a number of potentially deadly diseases and public health issues. They also demand vast amount of space, substantial parts of modern cities are dedicated to parking or driving areas. (Gross, 2016),(WHO, 2021).

With the aim to minimise these negative effects a shift can be seen where many cities across the world are focusing on eco-friendly transportation options. Several ideas of how to best shift from a car centric transport system to a more sustainable one exists, including banning cars from entire districts to focusing on mass transit and walkable/bike friendly urban design. (Kreiss & Nieuwenhuijsen, 2016).

Cities free of cars are a dream of many urbanists and attempts of car free districts have been made in several major cities. However, no urban area is completely car-free and as long as vital mobility such as emergency services and cargo deliveries depend on cars, cities cannot be completely free of them.

Many urban areas have however, successfully restricted personal car use within their territory by promoting sustainable transport, prioritising non motorized vehicles, investing in mass transit, and limiting parking and driving spaces. Many planners aim to create mixed used, high density neighbourhoods with low levels of car dependency and use. Examples of this can be found in e.g., Copenhagen and Amsterdam, two cities that successfully have reduced motorized traffic, by focusing on sustainable modes of transport such as public transport and bikes thus reduced local emissions. (Crawford, 2000),(European Commission, 2016),(Gehl, 2010).

### *2.2.2 Public Transport*

Mass transit is, in many cases that promote sustainable transport options the backbone of the transportation system. Means of transport such as public busses, metros, light-rails and trains are more space and energy efficient than cars and cause less pollution and co2 emissions.

To achieve an increase of mass transit ridership different strategies have been tested in various cities. This includes car free days/weeks, mass media campaigns and handing out free public transport passes to make people try and adjust their ideas about mass transit. This can be labelled as soft measures, with the idea to change their mind of what public transport is and stands for. Challenges include that many find public transport unreliable, inflexible and lacking personal space. So called hard measures include an upgrade of mass transit systems, studies prove that it is important that mass transit is accessible, well connected and reliable to make drivers chose the more sustainable mode of transport. If the infrastructure is well planned more people will choose mass transit.

According to research public transport is able to compete with personal car use if stations/stops are located within 500 meters from a person's origin and destination within an urban area, this approximately correlates to walk of 7 minutes. Services should be frequent, ranging from departures every hour to every two minutes depending on the location and preferable run both during the day and at night time. Average speed should not be lower than that of a cyclist. Any mode changes should be made as smooth as possible with short, safe walkways between e.g. busses and trains. Electronic real time information signs and mobile applications with real time service information should be available as they can improve the user experience and give travellers important information of their journey including that of any potential interruptions and delays. A combination of these factors, along with a focus on walkability and cyclists are important to make mass transit more attractive to the general public. (Gehl, 2010).

### *2.2.3 Walkability*

Transportation on foot has throughout history been human's main mode of transport. Before the industrial revolution cities were primarily built for pedestrians, resulting in a dense environment with short distances. This is noticeable in city and town centres of old throughout the world and many such environments that are still standing today have been partly, or fully re-pedestrianised.

A major shift in transport- and urban planning occurred with the mass introduction of automobiles (and more advanced public transport), these inventions changed travel habits and it was no longer necessary for workers to live in proximity to their place of work. The technological advancements of the past century gave urban areas the possibility to sprawl with a car dependent lifestyle as a result. Today this lifestyle is criticised by several researchers and urbanists who claims it to be unsustainable, and leading to inactive, unhealthy lifestyles and choices. (Antrop, 2004),(Banister, 2002 pages 1-4).

This shift occurred in most of Europe in the 20$^{th}$ century, some cities have however, managed to regenerate substantial parts of their territory, shifting primary transport patterns from personal cars to other, sustainable means of transportation. Such cities include Copenhagen, Barcelona and Hamburg.

Research shows that high levels of walkability contribute to increased levels of safety, as well as lively and healthy urban environments. As most people chose other modes of transport if the distance to their destination is further than 0.5 kilometre (or maximum 1 kilometre) mixed environments with relatively high levels of density that enables important nodes within walking distance may be needed. An urban fabric where local and regional destination and nodes are in proximity to each other is considerably more walkable then a sprawled city.

High density levels do not always equal walkable neighbourhoods though, how to plan for walkability is debated. Factors that are important to achieve high walkability levels include well lit streets, easily accessed, safe streets, a well connected network of streets, a well intergrated mass transit system for longer journeys and safe sidewalks. (Bruun, Kenworthy & Schiller, 2010),(Gunn, 2017).

### *2.2.4 Cycle friendliness*

Before the introduction of mass automobilism bicycles were the most used transport mode in many cities. With the introduction of affordable, mass produced cars the bikes importance diminished. Cars have the capacity to transport more goods, more people and heavier loads faster than a bicycle and quickly became a symbol of status. This status made it prioritised by both planners and developers during the second part of the 20th century. This breakthrough lead to increased mobility for individuals, but with severe negative impacts on environmental issues, general well-being, & public health.

To minimize these negative impacts a shift can be seen in many cities, where planners and developers shift to a more cycle friendly infrastructure and transport planning. The most prominent example of this are Copenhagen, Denmark and Amsterdam, The Netherlands. These two cities both have promoted the bike for around 50 years and have high levels of bike usage all year round. By prioritising bikes in all stages of planning e.g. plan for safe bike parking adjacent to mass transit, plan for an increased amount of safe bike lanes, plan for rental bicycles schemes safer bicycle environments can be achieved. Technological advancements such as the increase of electric and semi electric bicycles in recent time have made cycling more accessible for a wider group of people living in e.g. hilly areas.

Benefits with cyclism are many since it is a mode of transport that is cost efficient, both for the cyclists and the society. Cycle paths are cheaper to develop and maintain than car lanes as much less space is needed. Biking is there for a more equal mean of transport than private motorised vehicles as it is more affordable. Cyclists are physically active while traveling and the mode of transport is quiet and emission free. Almost everyone, regardless of gender, social status or age can operate a bike and no licence is needed. For journeys of 5 kilometres or less it is a quiet, reliable mode of transport that, in urban areas on many occasions can compete with motorised vehicles in terms of speed and the duration of time.

Cyclists are, despite helmet usage relatively unprotected as they lack the protection of a chassis. In locations where cars are the main mode of transport mixing the two can lead to an increase of accidents and exposure to high pollution levels for bike users. Other factors that can harm cyclists include irregular terrain, bad weather, and negative social attitudes towards cyclists and bicycle helmets. (Bruun, Kenworthy & Schiller, 2010),(Crawford, 2000).

### *2.2.5 Micro mobility*

Micro mobility and ride sharing apps are emerging technologies that provide access to transport with small environmental and ecological impacts. By renting e.g. an electric scooter to a low cost new travel patterns can arise that are not dependent on existing public transport or heavy infrastructure. This new way of transport can be a complement to other sustainable transport methods as gives its user a unique experience which combines the freedom of the car with sustainability of the bike to a low cost. Different cities have different micro mobility strategies and some European capitals have banned e.g. rental electric scooters within their territory as the lack of structure can be perceived as negative. (McQueen, 2020).

## 2.3 Conclusion of chapter 2

How to achieve a sustainable transport system is a complex topic and there is not just one single right answer. Thus, there is not one single action that singlehandedly can turn a transportation system into a sustainable one. When planning for sustainable urban transport it is important to see the bigger picture and not to focus on just one or a few issues. Different cities also face different challenges and have different prerequisites. However, it is obvious that if done right a sustainable transport system can greatly benefit the inhabitants of a city and on a broader scale the global climate. This thesis will focus on two cases in the same city, one that is currently being regenerated and one that was mainly regenerated in the early 2000s. In order to answer the follow the objectives and try to answer the research questions the main emphasis will be on how sustainable transportation in these two areas were planned in relation to motorized vehicles, walkability, cycle friendliness and public transport. This will primarily be done by comparing the work done in the 2 case areas with Burry Hutton's identified key points for a sustainable transport system.

# 3 Methodology

The methodology of a thesis can describe any philosophical underpinnings to chosen methods and explain they were chosen and how they have been used. The methods used for this thesis are primarily qualitative, and do not involve many numbers or numerical data. This paints a complex picture which is useful when researching why and how questions.

## 3.1 Research Methodology

The chosen research methodology for this thesis case study. This type of studies are commonly used in smaller scaled research projects and allows for a large variety of methods and data collection. It brings depth to the thesis by researching something precise instead of something wide and general. A number of mixed methods are commonly used, this is called triangulation which aims to give a comprehensive and deep understanding of the chosen topic. (Denscombe, 2017 pages 2-6).

### *3.1.1 Reason to the chosen cases*

Stockholm was chosen as the Swedish capital by some is argued to be a world leader in sustainable urban development and have been so for decades. The Hammarby Sjöstad regeneration project was world leading in sustainable development in the early 2000s and was at the time the biggest urban development in Stockholm.

Stockholm Royal Seaport is among the biggest urban regeneration developments in Northern Europe. The district was planned and developed with sustainability as a main focus, and is also award winning. The district is currently under construction and it is interesting to see how planning for sustainable transport has changed in the Swedish capital during the past 30 years.

### *3.1.2 Comparative studies*

In this thesis the relevant governing documents of each district are analysed and compared. The thesis is based on a qualitative text analysis that with the help of comparative factors create a deeper understanding of the two districts relevant documents and theirs connection to reality by asking questions about the context outside the text. (Hellspong 2001, pages78-79), (Fejes & Thornberg 2015,pages 179-180, 184). The study can, by applying a qualitative text analysis in combination with comparative analysis review relevant documents and highlight the similarities and differences between the two districts. (Hellspong, 2001, page 80). The purpose of reviewing the documents is to create a deeper understanding and raising (Ritchie & Lewis 2003, page 35) the issues concerning transport planning in the reviewed the documents. The comparative analysis will mainly focus on the content of the documents to see how Stockholm municipality highlighted and worked with transport planning while redeveloping the two districts. (Hellspong 2001, page 80).

## 3.2 Methods of data collection

### *3.2.1 Document analysis*

A qualitative research method used in this thesis is document analysis. Document analyses are conducted by obtaining information from pre-existing documents, this may help to give a wider understanding of the researched topic. It can be a relevant and important tool for e.g. social scientists. (Denscombe, 2017 pages 225,232,239).

While conducting a document analysis one should take into account that the analysed documents are produced by stakeholders in various governance positions. In this case, Stockholm Municipality. (Bowen, 2009),(Triad3 2016).

According to O'Leary's (2014) several key steps need to be thought of while doing a document analysis. These are:

- Creating a list with the documents that is to be explored and analysed;

The documents are:

  - Hammarby sjöstad, vision (1991)
  - Hammarby sjöstad Environmental program (1999)
  - Hammarby sjöstad bo02 (2002)
  - Stockholm City Plan (Municipal Comprehensive plan from 2018)
  - Stockholm Mobility plan (2012)
  - Stockholm Royal Seaport – vision (2009)
  - Stockholm Royal Seaport Roadmap – the journey has started (2017)
  - Stockholm Royal Seaport Sustainability urban development program (2017)

Together these documents paint the picture of how Stockholm municipality planned for sustainable transport in the two districts over a time period of almost 30 years.

- Considering any cultural differences when analysing the texts. The author of the thesis is from Stockholm which minimises the risk of cultural differences, however, one must acknowledge that some of the documents were written almost 30 years ago which may affect e.g. cultural values, expressions, design, e.tc.
- Acknowledging the biases of the documents; the documents are all produced by Stockholm municipality.
- Figuring out the valid information for the terms of this project.
- Formulating the strategies of producing knowledge from the acquired Information. (O'Leary, 2014 pages 273),(Triad3, 2016).

### *3.2.2 Interviews*

Research interviews is a method of data collection where one uses the respondent's answers as data. The data is normally collected at a pre arranged meeting where the interviewer asks the interviewee a serious of questions about a specific topic. Due to Covid19 all interviews were conducted thorough e-mail.

The interviews conducted were structured interviews which involves a tight control of the questions, similar to a questionnaire. It is good practice to let the interviewee understand the meaning of the interview and approve his or her participation in the interview and thesis. The interviewee shall, if he or she wants to be anonymised. In this thesis the

participants gave their approval through email. If needed clarifications were needed these could be asked in subsequent emails. (Denscombe 2017, pages 264-267).

The aim of the interviews was to achieve a greater understanding of the two cases. According to researcher Alan Bryman, interviews can be "viewed as particularly helpful in the generation of an intensive, detailed examination of a case." (Bryman, 2012, page 68). The framework for the interviews were inspired by Steinar Kvale and his book, 'Doing Interviews'. In order with guidelines for good interviewing, the following points had to be achieved:

- The interviewer was knowledgeable and wanted to know more about the topic.
- The questions have to be critically evolved by the interviewer to make sure that no presumptions are implied which can lead the interview in the wrong direction.
- The interview should be focused on a few specific issues, addressing them without being too wide or close.
- No hidden agenda could be allowed; the interviewer must not lead the interview in a certain way to get desired results. (Kvale, 2008 page 9).

When investigating how and why the planning for sustainable transport was done the way it was, it made sense to interview experts who worked with the cases as planners. Transport Planner Jenny Simonsson was chosen as she is working in the Stockholm planning department with a focus on north east part of the city. Professor Staffan Fryxell was chosen as he worked with the development of Hammarby Sjöstad in the 1990s and 2000s. The author of the thesis conducted an interview with Mr Fryxell in 2018 for his semester project, data from this interview have also been used and the same ethical standards were applied during that interview in 2018.

During the interviews, it was important to eliminate the possibility of any ethical issues. Therefore, safety steps had to be taken. When formulating the questions, it was important that they would not cause harm to the interviewees, the interviewees also gave their consent of having their names used in the thesis, and were given the option to withdraw their consent at any time. By performing the interviews, the author of the thesis was given access to people who are directly involved in the process of planning a sustainable transport system in the two cases. The interviews became a useful method for qualitative data collection that together with other data gave the possibility to analyse the cases in depth.

### *3.2.3 Other secondary sources of data*

Other sources of data can be information on websites, news articles, and scientific articles.

## 3.3 Ethical considerations

For documents which are freely available e.g. online, in published books or other public forums, permission for further research use, re-use and analysis can be implied. The original ownership of the data must however be acknowledged. (Denscombe 2017, pages 218,229). Interview ethics include how to not harm any of the participants and make sure that they agree to participate.

## 3.4 Method limitations

Qualitative methods have limitations including ethics and the difficulties of staying apart from the work which may affect the research. It is important to reflect on these issues. The is limited to only two cases, more cases could make findings and conclusion more generalisable.

Under normal circumstances observations would have been a good method to validate the knowledge about IE transport mode share in the two different case areas, however, due to covid19 such data would be flawed. The Swedish government was during autumn 2020 advising against all non-essential travel, especially travel made by public transport. The Stockholm Public Transport company, the organisation running most land based public transport in Stockholm have reported a decrease of passenger with up to 64% compared to 2019, the biggest difference can be seen during rush hour. Data from Telia, the country's largest mobile network provides states that the number of daily trips in Stockholm has decreased with approximately 25 %. Most high schools and universities only offer online teaching and approximate half of the Stockholmers were working from home during autumn 2020. This number can be expected to be even higher in the chosen areas as they primarily are middle class areas and house a population of white-collar workers who have the possibility to work from home. (Telia, 2020),(Dagens Nyheter, 2020),(Novus, 2020).

# 4 The two cases

This Chapter is an introduction to the two cases. First there will be an introduction to Sweden, Stockholm, and planning in Sweden and then to the 2 different cases, Hammarby Sjöstad and Stockholm Royal Seaport. Both cases are districts that have undergone / are undergoing redevelopment as they used to be industrial land in proximity to water and are not being developed into modern parts of the city. Hammarby Sjöstad was originally planned in the 1990s and mostly redeveloped in the 2000s and 2010s. Stockholm Royal Seaport was planned in the 2000s and 2010s, construction began in 2011 and the district is planned to be completed by 2030. Both areas had for high environmental and sustainability goals for their time and they have both won several awards regarding sustainable urban development.

## 4.1 Stockholm and Sweden

Sweden is the biggest Scandinavian country, an entity in North Western Europe during the 20$^{th}$ century known for political and financial stability, well functioning societies and well developed welfare-systems. Approximately 10 million people live in Sweden, out of which 2.3 million reside in Stockholm Metropolitan area, which makes it the most populous metropolitan area in Scandinavia. The metropolitan area consists of 26 municipalities, with Stockholm municipality being the most populous one. Approximately 1 million people live in Stockholm municipality. (Statistiska centralbyrån, 2020).

Sweden is a part of the European Union and is the 8th largest economy in the union, with the 5th highest GDP/capita. (Worldbank,2021). In 2020 the country received the credit ranking AAA according to moody, whichis the highest ranking given to only 11 countries worldwide and indicates economical stability. (Moody's, 2020). The Swedish capital is rated as an Alpha minus global city, making it the current only Scandinavian Alpha ranked city. To be regarded as an Alpha global city a city must be connected to other large financial regions and be well connected on the global market and global economy. Other Alpha minus metropolises include San Francisco, Warsaw, Dublin, and Bangkok. (GAWC, 2020).

As a big, relatively prosperous, well-connected global city, whose wealth heavily rely on people being able to connect with each other, Stockholm might be an ideal city to study sustainable transport as it likely has both resources and a need to develop a competitive transport system.


*Figure 1 Stockholm in Sweden and Europe (Britannica, 2021).*

### *4.1.1 Sustainability in Stockholm*

Stockholm has a long tradition of having ambitious aims and goals for urban and transport planning. For more than 100 years the local authorities and planners have worked towards bold targets to improve the urban life and develop a well functioning infrastructure.

Sweden adopted an environmentalist agenda as early as the 1970s and has had world leading environmental aspirations ever since. Stockholm's first environmental plan was adopted approximately 50 years ago and environmental issues have been included in every step of urban development and planning since. The world's first human environment UN conference was held in the city in 1972 and the phrase sustainable development forged into the Swedish constitution 2 years later. The two cases of this thesis, Hammarby Sjöstad and Stockholm Royal Seaport are two of the city's greatest accomplishments in the field and they have both won several awards for their sustainability work. In 2010 Stockholm was first city to be given the European Green capital award as a result of the steps the capital has actively taken to enhance in matters such as transport, energy supply and, green spaces, e.tc. (Stockholm 2017b, page 9).

### *4.1.2 Planning in Sweden*

Urban planning in Sweden is, like in most countries conducted on numerous different levels. These levels are: nationwide, regionalwide, municipalwide, local, and supralocal. The Swedish Planning and building code grants municipalities the responsibility for the planning within their geographic entity. Every municipality is legally obliged to have a municipalwide comprehensive plan that is up to date and covers issues including land use, planned development and basic characteristics of such, how regional and national goals regarding sustainability issues and environmental quality should be achieved within the municipality e.tc. The municipal-wide plans can be complemented with local plans for e.g. a district or neighbourhood. These municipal and local plans are not directly legally binding but supralocal detailed development plans are based upon them and building permit cannot be granted if it obviously does not follow the guidelines of the comprehensive plans. This results in the municipal-wide comprehensive plans being relevant in all Swedish planning & development.

Detailed development plans are legally binding and through these municipalities in Sweden have the possibility to adjust land and water use within their borders, and what any development should look like within a certain area. Such plans are generally prepared when new construction is planned and span from one to several blocks. They adjust in detail the shape, size and location of buildings and the land, public or private between buildings. They are legally binding and give municipalities power to shape construction within their territory. (Boverket, 2018).

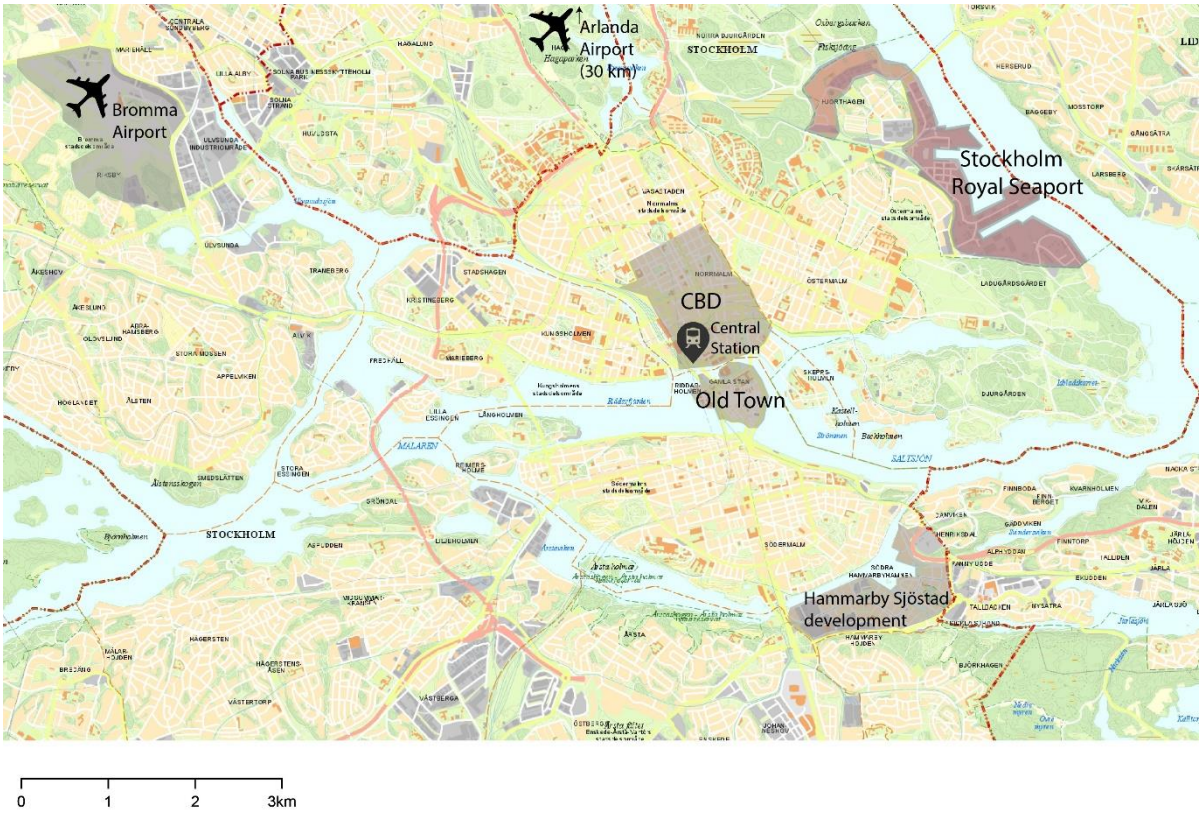


*Figure 2 Stockholm Royal Seaport and Hammarby Sjöstad in Stockholm (illustration by the author).*

## 4.2 Hammarby Sjöstad

**Introduction**

Hammarby Sjöstad is a district in south – central Stockholm which was redeveloped from industrial land to a modern sustainable urban district in the early 2000s. The district covers 200 hectares and is one of the largest urban redevelopment projects in Swedish history.

Plans to redevelop Stockholm southern harbour, Hammarby into a modern urban district arose in the late 1980s. The project officially started in 1994 and as of 2020 house approximately 22000 inhabitants. When fully completed the district will house approximately 31000 people, leaving approximately 29 percent of the district to be constructed, about 3700 apartments remain to be built.

The area was initially planned as the proposed Olympic village for the 2004 Olympics, a bid that Athens eventually won. As a part of the Olympic bid, Hammarby Sjöstad also got its own environmental cycle, the Hammarby model, where the environmental solutions for energy, water and sewage and waste are described. The Swedish Export Council has developed a model for the sustainable city - Symbiocity, which is based on experience from Hammarby Sjöstad.

The City of Stockholm has set strict environmental requirements for buildings, technical installations and the traffic environment in Hammarby Sjöstad. The district received its own environmental program with the goal of reducing the total environmental impact by half compared to an area built in the early 1990s. The districts original vision was that it would be “twice as good” regarding environmental issues. (Stockholm, 2020b).

The district has won several awards and many articles have been written about sustainability in the area. As large parts of the district today are complete it in many ways works as a role model for other redevelopments throughout the city of Stockholm. As the aim of the thesis is to investigate how planning can contribute to sustainable urban transport the identified relevant plans for Hammarby Sjöstad are:

- **Hammarby sjöstad, vision 1991**
- **Hammarby sjöstad Environmental program 2000**
- **Hammarby sjöstad 2002 bo02**

The work also includes an interview with a former planner at Stockholm municipality and other written sources.

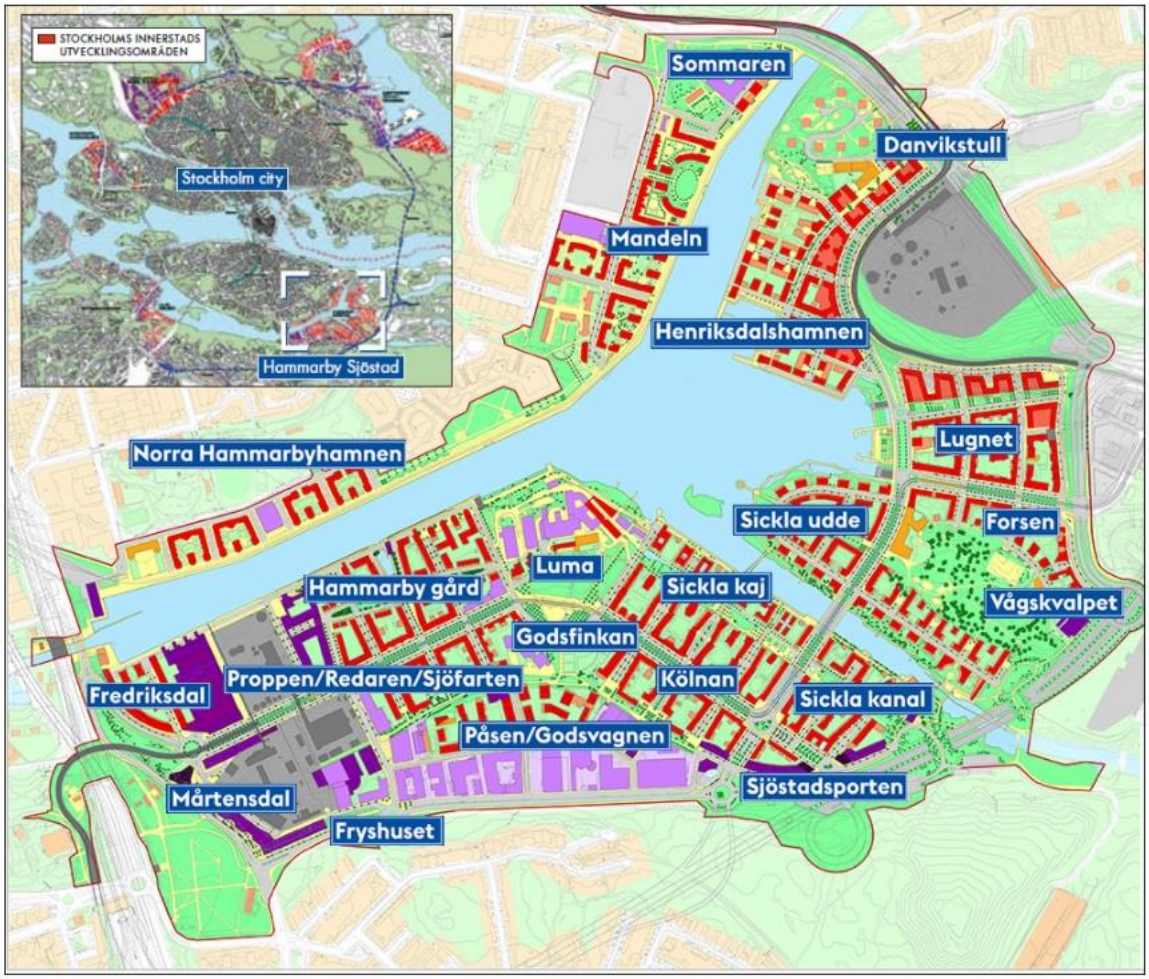


*Figure 3 Plan of Hammarby Sjöstad (Stockholm, 2021b).*

*Figure 4 Hammarby Sjöstad from a nearby hill (Citymark, 2018).*

### *4.2.1 Hammarby sjöstad, vision 1991*

This is the first official document about the Hamarby Sjöstad regeneration which in this thesis is comparable to Stockholm Royal Seaport 2030 Vision.

The Hammarby Sjöstad vision ”Fördjupat översiktplan Hammarby Sjöstad” was published by Stockholm city council in 1991. It is the foundation that all other plans have been based upon, and even though much has been alerted and remodelled in more modern plans the ideas that were set up in the early 90s are the ideas that Hammarby Sjöstad has been developed with. The document introduces the reader to the area and what was once there. The site is described as an industrial site in close proximity to Inner city Stockholm. The main goal of the plan is to redevelop the area into an inner city like, primarily residential neighbourhood that partly serves as an extension of Stockholm inner city. The aim is however not to replicate the structure of the inner city but to build a modern neighbourhood suitable for life in the 21st century. The rich social life of the inner city is aimed for, which demands high density developments. However more greenery is planned for than in the traditional inner city boroughs. (Stockholm, 1991).

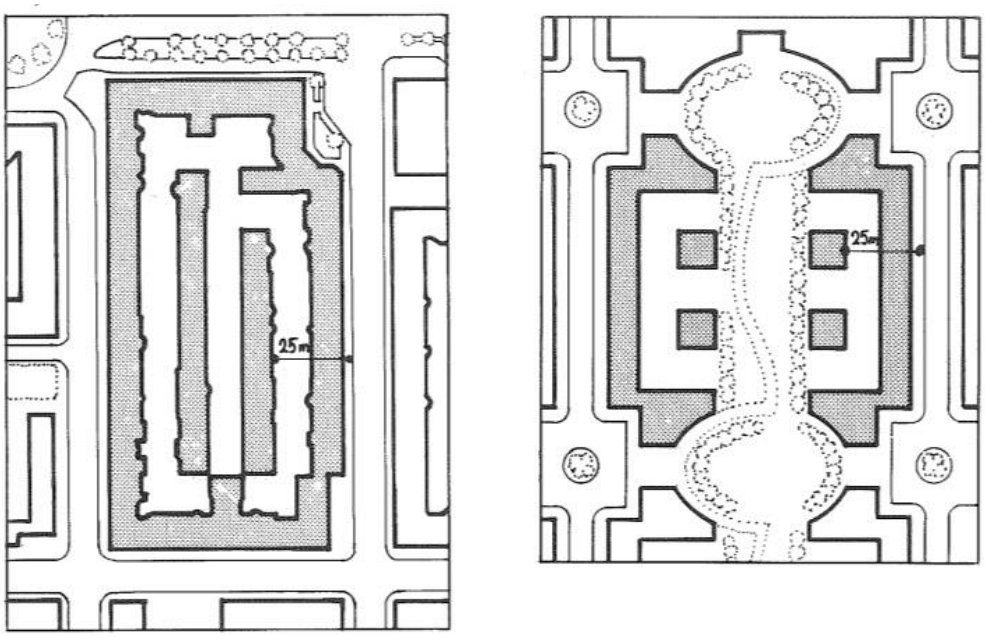


*Figure 5 Average block in the inner city and Hammarby Sjöstad (Stockholm, 1991).*

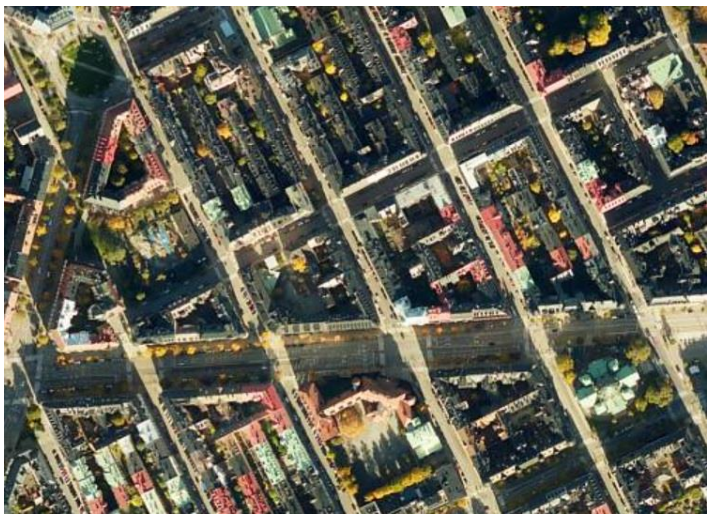

*Figure 6 Urban structure in Vasastan, innercity (Google maps, 2021).*

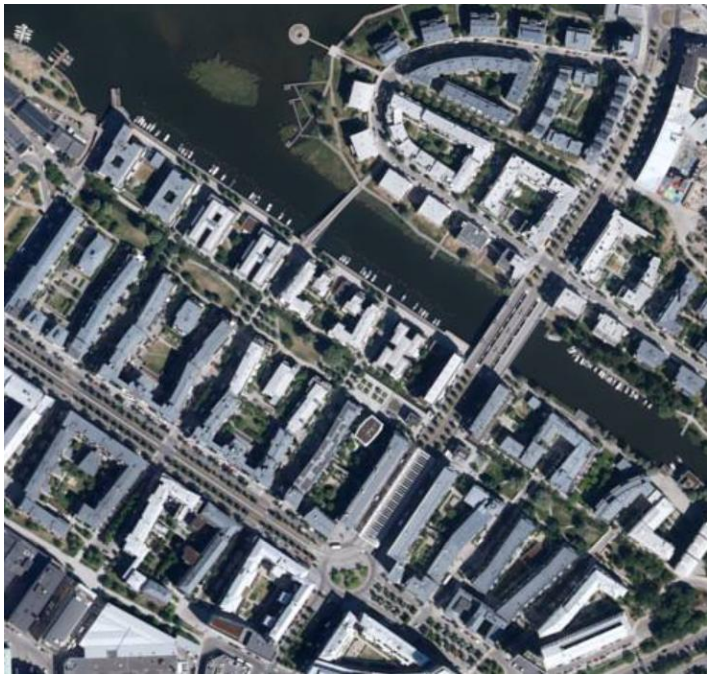

*Figure 7 Urban structure in Hammarby Sjöstad (Google maps, 2021).*

The vision describes how Hammarby Sjöstad will be developed in different sections throughout the coming decades.

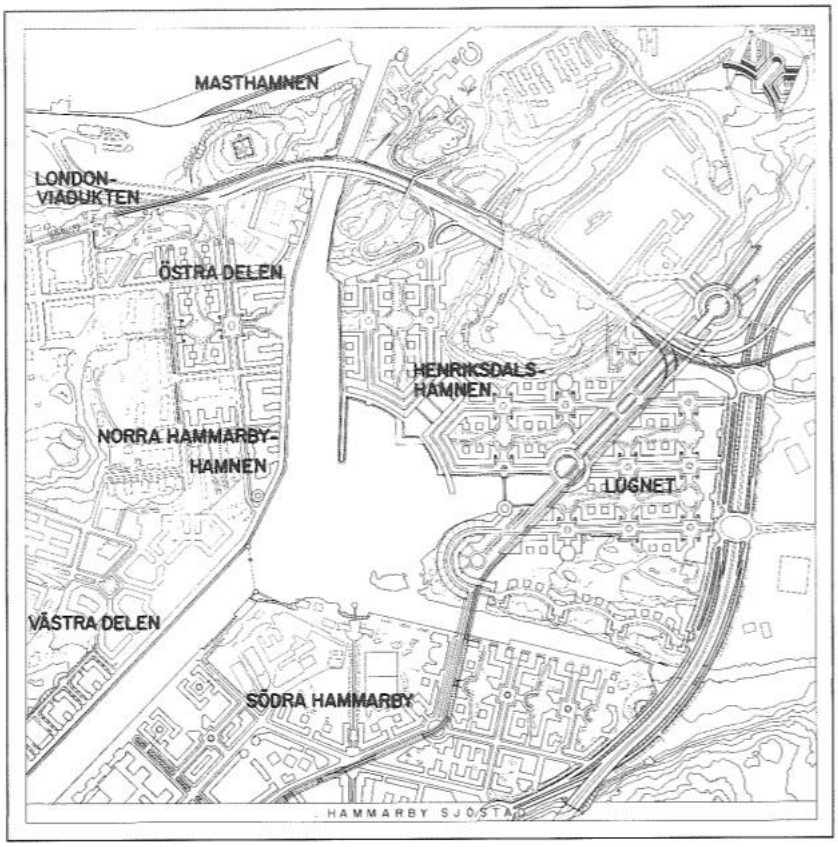


*Figure 8 Original vision for Hammarby Sjöstad (Stockholm, 1991).*

**Motorized vehicles:**

Hammarby Sjöstad is planned to have an inner city character but the traffic system was to be designed for modern traffic patterns according to the vision. The localisation of e.g. housing and utilities were to be located in a way that few conflicts between different traffics arise. The street network is to be divided into local streets, main streets and the main boulevard. Local streets shall not have any through traffic and speed limit is to be low. Local streets shall not be longer than 150 meters. Main streets should be approximately 20 meters wide and house more traffic, a number of public squares are to make traffic pace slow. (Stockholm, 1991).

**Pedestrian and cycle traffic:**

Traffic safety within a residential area is deemed to be very important in the vision. Utilities visited by children must be located in safe spots, this includes schools and nurseries.

In a residential area such as Hammarby Sjöstad traffic safety is very important. The places most visited by children and young should be located so that the children traveling between e.g. school and their home are not exposed any to risk of accidents. Schools and preschools must therefore be located with great regard for road and traffic safety. Within the neighbourhood, there must be a pedestrian network that connects to important nodes such as schools, public transport, workplaces e.tc. The pedestrian network should consist of links through parks, along the quayside and footpaths along local streets with little car

traffic. Intersections between the pedestrian network and the local street network shall not normally be easy to cross. At larger intersections with main streets, some form of separation between cars and pedestrians will usually be required. In addition to the local pedestrian network, a primary network that connects the area to adjacent neighbourhoods is required. Some of these can be laid along the quayside. E.g. a bridge for pedestrian that connects the area to the inner city is recommended.

The primary cycle paths through Hammarby Sjöstad will connect the area with surrounding districts and the inner city. In residential areas, cyclists are to use the same network as pedestrians and the local streets. Bicycle lanes should be added along the main streets. Particularly important is a connection between Hammarby Sjöstad and the inner city. (Stockholm, 1991).

**Public transport:**

The blue line on the Stockholm metro is proposed to be extended in a tunnel from Kungsträdgården in the very central part of the city, towards Sickla in the east through Hammarby Sjöstad in the vision. One station is planned underneath Hammarby Sjöstad where it should be possible to transfer to light rail and busses.

A light rail line through the district is proposed. This is a part of a longer new light rail line planned south of central Stockholm that connects different metro and commuter rail lines. The light rail is planned to have several stations within the area, assuring that the maximum distance to rail transport is always underneath 400 meters.

Busses are planned to run through the district and connect it with the adjacent inner city and other neighbourhoods. (Stockholm, 1991).

### *4.2.2 Hammarby sjöstad Environmental program*

The environmental program for Hammarby Sjöstad was published with the aim of focusing of the environmental issues in the planning and redevelopment of the area. The program would function as a set guideline for future planning and development, but also contribute to a consensus in environmental policy objectives between the city, landowners and developers. As the planning and redevelopment of the district was to span for a long period of time, the environmental program was published mainly to function as an overall guideline which furthermore detailed planning should be based upon.

Hammarby Sjöstad is according to the program to be a cutting edge in ecological and environmentally oriented urban development and be on the on pair with the latest trends for sustainable development in dense urban environments. The area is to be a national and international role model and source of inspiration for ecological planning, construction and housing. The overall transport goal is to reduce the need for transport. (Stockholm, 1999).

**Transports in the environmental programme**

Public transport should in the area should be world leading in terms of attractiveness and user-friendliness. A good public transportation system should be in place when the first people move in and well thought through network of pedestrian and cycle paths should the

reduce the need for motorized transport. Parking spaces should be limited and planned to minimize the need of transport. Different public transport modes such as light rail, busses and ferries should supplement each other. Modern information technology should be used to control traffic and increase the attractiveness of public transport. Streets must be designed so that walking and cycling paths are attractive, easily accessible and safe. A pedestrian and cycle bridge should connect the area with the inner city to encourage walking, cycling and public transport by making bus lines accessible on both sides of the Hammarby Canal.

Street systems should be designed so that traffic in the area is limited, through traffic on the main street is limited and slowed down by its design and preference for the tram. Large parts of the area must be car-free with exceptions and emergency vehicles and disabled transports to make the area pleasant and safe.

Larger car parks should be located on the outskirts of the area to limit car traffic in the district, such traffic should not be led into local streets. The number of parking spaces should be lower than in the inner city. Car sharing and rental organisations should be promoted, given that they use environmentally friendly cars. Environmentally friendly vehicles in general should be given benefits and public service traffic should, if possible, be electric. Measures to reduce noise levels and emissions must be taken by, for example, concentrating disruptive traffic to the main roads. (Stockholm, 1999).

### *4.2.3 Hammarby sjöstad bo02 2002*

The Hammarby Sjöstad bo02 document is both a summary of what has been done and a document that planners are to follow during the rest of the redevelopment of Hammarby Sjöstad.

**Smart land use**

Smart land use in Hammarby Sjöstad includes the remediation, reuse and transformation of poorly utilized land in a central location. By redeveloping this district, thus not constructing a new district further away from the city core an environmental investment is made. This includes reusing resources, optimising land use and the road network and lesser the need of expanding infrastructure and district heating systems.

**Attractive and time efficient transports**

There should be practical alternatives to owning a private car in Hammarby Sjöstad. Car sharing services are prominent and the best parking spots reserved for such leased cars. The light rail through the area is modern and has a planned extension the city core. The area is connected to the inner city by a free ferry.

**Low noise levels**

Great emphasis is put on solutions that reduce noise pollution. The proximity to the inner city and large traffic routes for both boats and motorized vehicles is noticeable in the area. A focus point must therefore be to reduce noise, by limiting traffic on local streets.

**Accessibility for the disabled**

An aim in the redevelopment of the area is that the built environment should not prevent the citizens from managing their everyday lives independently. Everyone should be able to move freely within the district. Pedestrian lanes and public transport should be disable friendly. Disabilities include both mobility and orientation difficulties as well as medical disabilities such as allergies.

**Buildings with space for shops**

Even if the establishment of services is left to the free market, the city has influence over any potential shops, restaurants and cafes through detailed plan regulations. The city's vision is that of a lively neighbourhood, and commercial premises are prerequisite in all ground floors along the main street to create a living urban environment.

**Versatile usability**

Service buildings such as schools, preschools, shops and offices should de designed in a way so that they can meet the needs of the future, needs that may change over time. By planning for versatile usability in premises along the local movement patterns a clarity in the urban environment can be achieved.

**Greenery**

In Stockholm there is a tradition with the interplay between city and nature, including open water surfaces. In Stockholm, the water surfaces constitute an intensely present natural element. An ever-changing element to look at and visually experience. Hammarby Sjöstad's central water surfaces constitute a visual park, In addition. Great efforts have been made in both the planning and construction to preserve the existing vegetation and natural land, to create new parks and to create green street and courtyard spaces. Views do not focus on monumental buildings, instead focus should be of nature, towards water and parks.

**Parks**

There are several parks in Hammarby Sjöstad and the character of these varies. The consistent theme is the proximity to water with parks and quay paths along Hammarby lake and Canal. The second main theme is the preservation of existing natural land and green areas, which are preserved and developed into attractive park environments.

**Art**

Public art is an important part of the development of Hammarby Sjöstad. Art characteristic include large-scale art projects and the ambition to include art early in the design of public spaces. The intention is that the art should enhance the experience of the built environment, but also create landmarks. (Stockholm, 2002).

### *4.2.4 Sustainable Hammarby Sjöstad*

The original vision for Hammarby Sjöstad was published almost 30 years ago and much has changed since, both in the area and in the world. The vision envisioned a relatively dense, mostly residential area with approximately 25 000 inhabitants, today more than that live there, and the district is not fully completed yet. According to former planner, Fryxell (2018) the area grew denser with time and the idea of a dense residential neighbourhood with inner city like characteristics was abandoned for Hammarby Sjöstad to be an integrated inner-city neighbourhood (2018). This is visible in Hammarby Sjöstad today as the older parts are significantly less dense and more *"suburban like"* than the rest of the district.

Connections to the inner-city are as of today still lacking, as the bridge over Hammarby Canal was never built and the tramline never extended to the inner city. The metro extension begun construction in 2019 with an estimated construction time of approximately 8 years. A new station is planned under the canal, thus linking Hammarby Sjöstad with Södermalm in the inner city but only for those willing to pay the metro fee (SL, 2021a).

The area today is not seen as a natural extension of the inner-city, nor as a traditional suburb but something in between. Hammarby Sjöstad is in, Sweden often seen as one of the most well-known examples of sustainable urban development. However, when the area in the early 1990s began to be planned, it was an at the time highly ordinary planning project, only bigger. The aim was not to plan for the most sustainable district in the country. A few years into the planning process, however, something happened that changed the project focus fundamentally - Stockholm decided to bid for the Olympics 2004. Sydney had won the hosting of the previous Olympics with one of the main arguments that it the games would be more sustainable than before, inspired by this it was decided that a sustainable developed Olympic village would benefit the application. After that the area became popular, both within Sweden and internationally, visitors from more than 168 countries have come to observe the district and decision makers and planners from all over the world are still (in 2018) coming to visit the district, as it still gets a lot of publicity. (Fryxell 2018, 2020).

High environmental goals were set early for the district, the plan was for it to be "twice as good" as anything that had been developed previously. In order to achieve to goal of 20 % commuter car use other means of efficient transport is offered. The light-rail connects the district with several metro stations, several bus routes link the area to the inner-city together with two ferry routes. A carpool system is in place that can be used by both individuals and professionals. (Firley 2014, pages 225 – 235).

The aim of 80 % of commuter traffic to be by public transport, bike or pedestrian was achieved in 2007. (Brandt & Pandis, 2009). A more controversial transport link was the opening of the Southern Link, a 5 km long motorway tunnel that forms a part of the plan for a new ring motorway surrounding central Stockholm, the motorway tunnel project was

also a necessity to develop the largest subdistrict in Hammarby Sjöstad as e.g. noise levels were reduced. (Firley, 2014 pages 225 – 235).

This, along with how some of the mass transit system was not in place and is still not in place today may have affected the travel habits of local residents. Restricted parking was initially introduced in the area, but this changed after pressure from locals to match parking allocation to that of other parts of Stockholm. Cars are still a popular transport mode in Hammarby Sjöstad and some development raised the number of car parking spaces from 0,4 per apartment to 0,7. (Bibri, 2020). In 2007 69% of the residents of Hammarby Sjöstad had their own car (Brandt & Pandis, 2009), a number that correlates with the higher number of car parking spaces.

## 4.3 Stockholm Royal Seaport

**Introduction**

One of the largest urban regeneration projects in Northern Europe is Stockholm Royal Seaport. This is a district located approximately four kilometres north of downtown Stockholm and will be home to more than 30 000 people in 12 000 new apartments and house 35000 workplaces in 2030 when it is fully developed. The district borders both Stockholm inner-city and Stockholm inner green belt, the National city park.

Planning commenced approximate 20 years ago, and development started out ten years ago. Today approximate 3000 homes have been built and more than 5000 new homes have been approved by the zoning board. This leaves about half of the area to be fully planned and approved. The district covers roughly 240 hectares and is aimed to be one of the most sustainable urban regeneration projects globally. According to a municipal decision from 2010 Stockholm Royal Seaport should be an international and national role model for sustainable urban planning. In 2015, during the UN Paris Climate change conference the acquired an award for being the most sustainable urban regeneration project. More than 80 metropolises globally took part in the contest for the award. (Stockholm, 2020a).

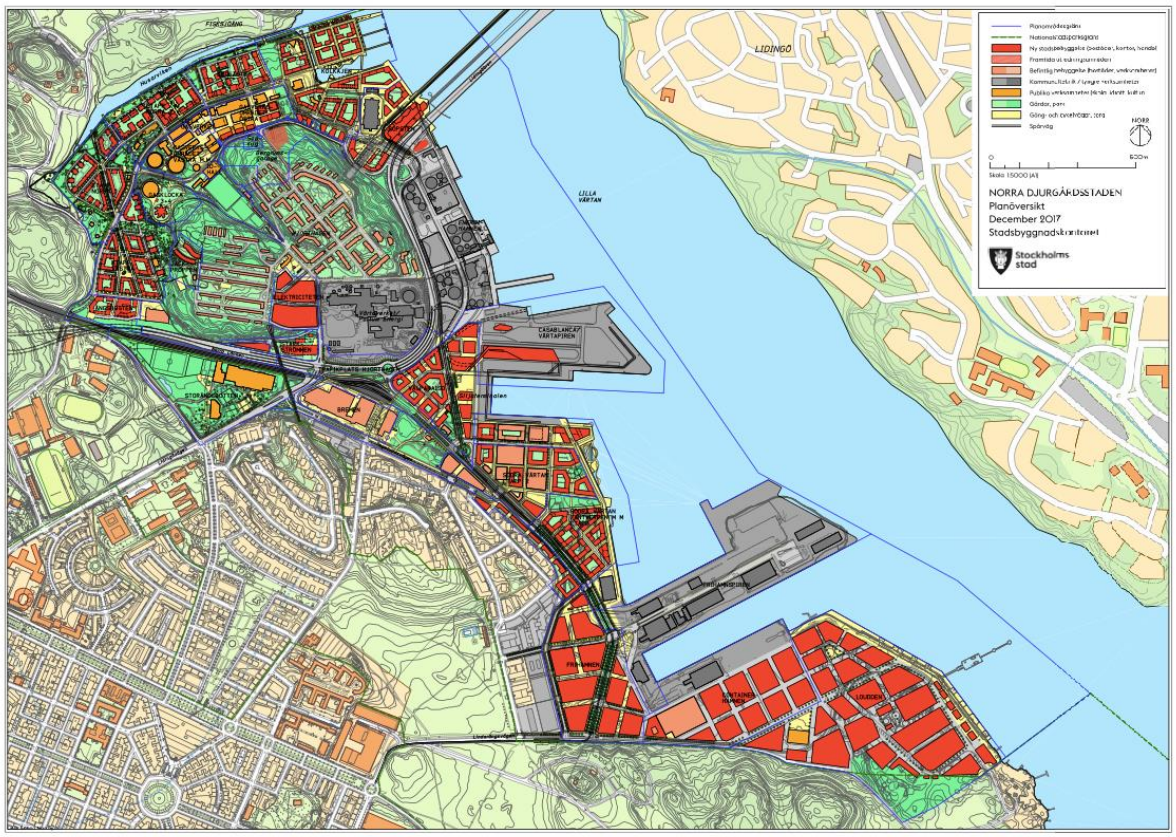


*Figure 9 Plan of Stockholm Royal Seaport (Stockholm, 2021a).*

*Figure 10 Vision for Stockholm Royal Seaport (Stockholm, 2021a).*

According to law Stockholm's municipal comprehensive plan sets out municipal-wide guidelines. The plan is complemented by numerous of municipal-wide strategies, out of which Stockholm mobility strategy is important to this thesis. Stockholm Royal Seaport is an urban regeneration project with its own local plan. The project is split into roughly 40

Detailed development plans. This thesis is set out to analyse the city plan, the mobility plan and relevant local plans.

Identified plans relevant to this thesis are:

- Stockholm City Plan, 2018
- Stockholm Mobility plan, 2012
- Stockholm Royal Seaport – vision, 2009
- Stockholm Royal Seaport Sustainability urban development program, 2017
- Stockholm Royal Seaport Roadmap – the journey has started, 2017

The identified plans and documents together paint a picture of planning how planning for sustainable urban transport has been conducted in Stockholm Royal Seaport during the past 12 years. They show how Stockholm municipality interpret and plan for sustainable urban transport in the seaport and elsewhere.

### *4.3.1 Stockholm City Plan*

Stockholm's current municipal plan describes the Swedish capital as
a captivating metropolis where, according to surveys residents in general are pleased with the life they live. International rankings show that Stockholm is a city with a high standards of living and quality of life. The city is experiencing a rapid growth and estimates show that the population will rise with 30 % the before 2040.

The City plan is on a strategic level to describe how Stockholm ought to steer into a more sustainable future and be used for both the implementation and planning of strategies. The documents are divided into several sections including urban transport, land use and future development. The main mobility goal set up by the plan is to use available space in an efficient manner by transferring the focus of the mobility planning from moving vehicles and instead focus on how to move people. The city aims to be fossil fuel free within 20 years. Four strategies will help the city achieve this goal. They are:

**A growing metropolis**

Stockholm's growth rate is high as the city attracts people from many countries and serves as a economic engine for Sweden. The city aims for high accessibility that will enable people and businesses to thrive.

**A cohesive metropolis**

By being a vibrant, socially cohesive city Stockholm aims to be accessible and safe for all. This is to be achieved through a network of urban spaces and corridors which together with mass transit brings the city and its suburbs together. All areas should have interesting nodes and it shall be easy to transport people and goods between different districts. Stockholm shall be a city where people with various backgrounds can live good daily lives and have no difficulties with encountering each other.

**Well planned public spaces**

Stockholm is a city where different areas have different, unique identities and characteristics. By growing denser local nodes and centers will become more important in the wider urban landscape. Every part of the city shall offer a good quality of life with well thought through, safe, including public spaces where participation and engagement in one's local community is encouraged.

**A climate friendly & resilient metropolis**

Stockholm hopes to be a resilient & climate friendly metropolis by making land use more efficient, resulting in a limited resource consumption and climate impact. To achieve this the city structure must be functional and efficient and be able to cope with e.g. climate change related issues. (Stockholm, 2018 pages 19-28).

### *4.3.2 Stockholm mobility plan*

Stockholm mobility plan covers all of Stockholm and is be followed when planning for and developing the built environment in the city. In order to be competitive compared to motorized vehicles, mass transit, walking and cycling have to be reliable and fast. To achieve this the City of Stockholm is to prioritise bottle necks in the transport system where congestion levels are high. Mass transit should be allocated dedicated lanes where deemed possible and priority at traffic lights. The bicycle plan shall allocate key regional and local commuter routes for cyclists. This will result in space taken from car use to more sustainable modes of transport. (Stockholm, 2012 page 23).

**Public transport**

Different types of mass transit have different important functions in the mass transit system. Commuter rail and metro link different city districts through regional corridors, connecting the inner city with suburbia without interacting with other traffic. Trams and busses may serve more local roles within a district and to adjacent districts and should be dedicated their own lanes where possible. (Stockholm, 2012 page 25).

**Cycling**

The possibility to travel safe, fast and reliable by bike increases the total capacity of the road network whilst cyclism is a flexible way to travel, less affected by e.g. rush hour congestion. The mobility plan aims for Stockholm to be a world class cycling city with a well-functioning, safe bicycle network. Important factors to achieve this include reserving space for cycle lanes, create good regional commuting corridors with limitations for motorized vehicles. In locations where dedicated space for cyclists are not possible other safety measures are needed, e.g. low speeds for motorized vehicles. Secure, weather proof bicycle parking adjacent to public transport may further increase cycling and the use of mass transit. (Stockholm, 2012 page 27).

**Business users**

A well functioning business sector is utterly important to achieve a high quality of life in Stockholm. An effective transport system is essential, and the road and street network are a fundamental requisite for a flourishing business sector and local economy. By promoting sustainable space efficient transport options for passenger journeys freight transport is benefited. This enables favourable conditions for the business sector and increase regional accessibility. Freight issues shall therefor be addressed at early stages of planning and e.g. parking spaces may be replaced with space for loading/unloading goods. (Stockholm, 2012 page 29).

**Accessibility**

**Journey time reability**

By promoting a transport system where one regardless of transportation mode can rely on arriving on time freedom of travel options increase. Stockholm's vision establishes how significant a high quality, efficient, accessible transportation system is in a growing city. Travel time reability can be improved by an increase of transport capacity where needed and, in certain cases a slowed demand. This can be achieved by measures such as the congestion tax, traffic signals and parking fees/limitations. (Stockholm, 2012 page 31-33).

**Bus speeds**

People who choose to do their journeys with public transport should be able to expect attractive and reliable trips. This will increase the attractiveness and popularity of mass public transportation and reserve road space for essential journeys and commercialised traffic.

The city's aim is that Stockholm, on a global level will be one of the metropolitan regions in the world whose citizens use mass transit the most. With such increase in public transport users, it is important to prioritize street access for e.g. busses and trams. Lines that belong to the rapid transit network should be permitted to drive at higher speeds in dedicated lanes with signal priority at traffic lights. An optimal distance between stops/stations is needed to keep a high speed and good opportunities for e.g. fast boarding. (Stockholm, 2012 page 35).

**Parking**

Available parking space is critical for car users as it enables them to arrive at their destination. If parking space is always available, it increases the need of cars in a city. Traffic can be reduced by limiting parking spaces. According to the mobility plan there is no lack of parking spaces in Stockholm. The average car in Stockholm spends more than 95 percent of its time standing still, parked. To ensure parking space availability market adjusted pricing is needed where demand is high. Stockholm's streets shall not be filled with parking spaces and underground parking is required to cater for the parking need. This is expensive, an underground parking lot costs approximately 600 000 (6000 Euro) Swedish kroners to construct which results in relatively high prices for users. (Stockholm, 2012 page 37).

**Road users satisfaction**

Many aspects of transportation and travel cannot be measured with objective data. How each citizen perceives the quality of his or her journey is non quantitative data. All cities suffer from traffic delays and disruptions, this requires an understanding of what citizens can expect in terms of urban transport and satisfactory information provided when disruptions happen. The city's vision is that accessibility in Stockholm will increase, along it the people's perception of how good the accessibility is. Broad publicity campaigns that explain what strategies the city have and what each individual traveller can expect in the rapidly growing city will be needed.

The aim is for citizens to understand the need of some individual behaviour changes, how everyone can contribute to ensuring that the transportation system can offer journeys of high quality. This requires information both before and during travel disruptions, enabling citizens to make the right travel decisions. (Stockholm, 2012 page 39).

**Attractivness**

**Walking**

As Stockholm grows its density increases and a variety of new environments with a wide range of services emerge all over the city. In the more of the citizens needs can be fulfilled by short journeys on foot, this will increase the freedom of choice for each individual. Street environments in this kind of urban environment needs to be attractive and pleasant for pedestrians to promote this type of mobility. Pedestrian traffic in combination with mass transit is an efficient, high capacity method of using available space.

Therefore, pedestrian traffic is important for a well connected, highly accessible city.

The city therefor must, in certain spaces make more space available for pedestrians at the expense of other modes of transport. Pedestrian flows need priority at traffic lights and reduced speed limits may be required to improve pedestrian's safety, comfort and accessibility. (Stockholm, 2012 page 41-42).

**Public Realm**

The public realm is a living space, a meeting place and show window for Stockholm's citizens and is ought to reflect the city's aim of being attractive for its citizens and visitors. The vision of a socially connected urban landscape can be promoted and implemented by careful planning of the built environment. Public places in every neighbourhood enables a diverse group of people to meet spontaneously and informally. The local administrations must therefore have an awareness of how the locations can function as a social space and not just for transport. Factors to determine if a specific place is functional or not are complex and many but include noise, design, and traffic disruptions .(Stockholm, 2012 page 43).

**Sustainability**

**Vehicle kilometres travelled**

Traffic in the future is to function better than what it does at present. Major investments are aimed to keep the regional and local infrastructure at pace with the population growth. However, space is limited, especially in the central parts of Stockholm. If traffic in the future is to function better than it currently does the number of motorized vehicles in peak hours through central Stockholm cannot increase. It is up to other modes of transport to enable higher levels of travel. This is important to achieve local environmental goals.

To achieve a vibrant urban environment traffic flow must be efficient and demanded growth of motorised traffic suppressed in central and semi central areas. Alternatives to motorised vehicles must be efficient, numerous and attractive. More measures needed to reduce motorized traffic growth include taking capacity from vehicular traffic and putting a higher price on motorised traffic by using congestion and parking fees. (Stockholm, 2012 page 49).

**Stockholmers satisfaction**

Traffic is a substantial part of every city. If well planned and designed road traffic may contribute to increased security and accessibility without a severe negative impact on the local urban environment. The vision promotes high living standards throughout Stockholm and a well planned transport system must work to reduce any local environmental problems. Means for this vary, depending heavily on local circumstances. Traffic must, however, always be adapted to local requirements regarding speed and use of street space. (Stockholm, 2012 page 51).

### *4.3.3 Vision 2030*

The original vision for Stockholm Royal Seaport was published in 2009 by Stockholm municipality with the name “Stockholm Royal Seaport 2030”. This document is the groundwork that later plans, and strategies are built upon and many of the ideas in the vison have later been remodelled or scraped. The vision sets ambitious goals for the regeneration of the seaport. The document describes how globalisation is a force will make new possibilities and opportunities emerge for Stockholm. It is therefore essential that the Swedish capital is able to connect but also to compete with various other metropolitan regions on a global scale. For this reason, there is a need to regenerate Stockholm Royal Seaport into a district that can offer very good conditions for businesses to flourish and people to live in. The location, a few kilometres north of the central station is being described as one of the best in the entire metropolitan region in proximity to business centers, shopping centers, nature and open water. The municipally aims for Stockholm Royal Seaport to be world leading in regards of sustainability and work as a showcase of Swedish sustainability work and design for domestic and international visitors. Many of the high environmental ambitions are drawn from examples for the Hammarby Sjöstad regeneration project.

The aim is that by 2030 Stockholm should be a leading city regarding climate adaptation. The city was described as a global leader in green energy and technology before 2009 and aims to reinforce this position. By investing in modern technology and innovative solutions the seaport is to work as a showcase for e.g. urban planning and development but also design.

The document´s aim is to transform the area into a vivid part of the city characterised by a diversity of lifestyles and architecture. Urban design and planning are to help residents and visitors to make sustainable lifestyle choices. The area should house a variety of amenities for social and work life to support urbanity.

By 2020 the vision aims that co2 per capita shall not exceed 1.5 tonnes in the district, this can be compared to the Swedish per capita average of almost 5 tonnes in 2009. In order to be resilient, there area is to be adapted to climate change and aims to be fossil fuel free by 2030. This is 20 years ahead of the Stockholm wide target at the time. To reach such ambitious goals, planners and developers were to focus on e.g. sustainable efficient transport and modern lifestyle-issues. The district is to be denser than other recently developed areas in Stockholm, in order to be able to sustain a vibrant urban big city lifestyle.

The area is therefore planned to be included in the future inner city and seen as a part of the vibrant, dense urban core. The construction of up to two new highway tunnels is to enhance to districts connectivity with the rest of the metropolitan region and allow for through traffic to the port not to pass on the local street network. Large public transport investments are planned, including a tramline linking the development with the central Stockholm. The waterways are to be used and public transport on water to be developed, thus linking the district with other coastal locations in Stockholm. Foot- and cycle paths are to link the area with surrounding urban, suburban, and green areas. (Stockholm, 2009 pages 6-22).

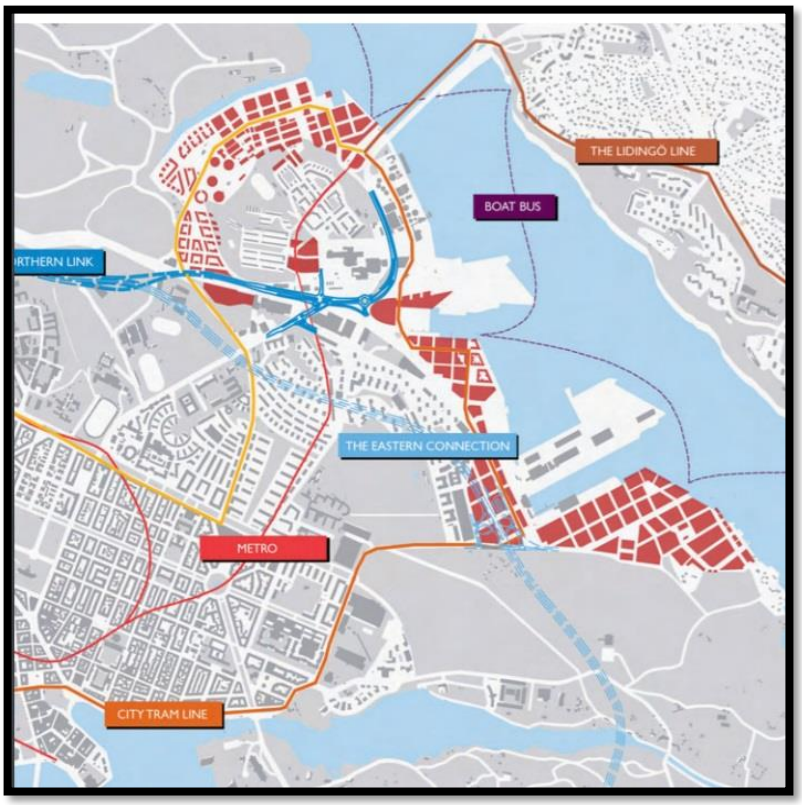


*Figure 11 Proposed transportation system in Eastern Stockholm which includes 2 highway tunnels. (Stockholm, 2009).*

### *4.3.4 Roadmap - The journey has begun*

The documents portray how Stockholm is to turn into an eco profiled city & Stockholm Royal Seaport, into a leader in sustainable planning & development. Goals incorporated in the plan include restricting emissions and greenhouse outflows by 3 measures, energy effectiveness, fuel replacement, & social changes.

Emissions related to transport represent roughly 25 % of the all out emissions in the area. however, they are a critical issue since these outflows don't know any geographical limits and are reliant on non-renewable energy sources. To decrease traffic emissions, unique necessities, such as environmental zones & expense decrease for electric vehicles can be applied & parking limitations and incentives to utilize mass transit.

The planning of the regenerated district is to be founded on a reversed traffic hierarchy of importance. This can be executed with a moderate or a progressive methodology.

A progressive methodology gives pedestrians, & cyclists admittance to all roads with a street network that takes into account high speed commuting and streets safe for children. Public transportation & mass transit is set to be the primary transport network with its dedicated space in dedicated lanes & not many intersections to limit traffic disturbances, it is to be considered fast and prioritised. The Conservative methodology gives non-mechanized traffic adequate space & mass transit share the available space with other modes of traffic. Personal cars will not be fully restricted, however there will be restrictions.

**Mobility management**

Mobility management tries to impact each individual's decision into a more sustainable direction. Companies and organizations in the district are urged to elevate mobility management to those working there, smart phone applications and travel planners consolidating all modes of transportation will be accessible to everybody, and real time journey information is to be available in public spots. (Stockholm 2017b, pages 22-35, 69).

### *4.3.5 Sustainable urban development program*

The Sustainable Urban Development Program depicts Stockholm Royal Seaport as a high density, multifunctional, contemporary urban district. The area is to be developed for an inclusive modern lifestyle where it is easy to be climate smart and resource efficient. The document depicts how the seaport is to be developed with high aspirations regarding sustainable development, including economical, environmental and social issues. It is not intended to replace the 2009 vision and doesn't involve matters such as e.g., land-use planning but instead functions as a complement for further planning in the seaport. The program is to be applied to different levels of planning to guarantee that the city's high sustainability aspirations are saturated throughout the redevelopment of the area.

**Sustainable strategies:**

The Sustainable urban program consists of five strategies, everyone with several sub-strategies. The relevant strategies for sustainable urban transport are:

**Vibrant District**

The vibrant district is a strategy with the focus on the needs, necessities and preferences of the residents. The aim is that the district should be and feel including to all people with an urban landscape that feels well populated, energizing and safe at all times. Sub-strategies to achieve the vibrant city strategy can be summed up as:

- Linking the district to the current inner city, as a natural part of its dense urban structure without physical or social barriers.
- Flexible planning that is characterised by long term goals aimed for optimising land use in a multi functional way.
- Flexible utilization of flows between nodes to strengthen the diversity of the area and make for a vibrant neighbourhood.
- Plan for well designed and thouththrough nodes with specific or general content to create local interest points.
- Plan for spectacular nodes and destinations that attract people from other districts.
- Planning for well designs public spaces that can cater for a variety of needs. Use expert knowledge about e.g., local microclimates, important nodes, traffic flows e.tc, to establish a protected and welcoming climate.
- A mix of styles and functions of buildings for the neighbourhood to cater different needs e.g., housing, retail, business and other services.
- A clear differentiation between, private, semi-private, and public spots.
- Design of buildings and spaces that adds to the general impressions of the built environment. Details shall be visible from a pedestrians perspective, primarily

designed to be seen in a moderate pace. Ground floors are to be varied, dynamic and open. Art shall in various ways enrichen the overall experience of the area.

**Accessibility and proximity**

The planning of a district significantly affects travel patterns in the area and its surroundings. Stockholm Royal Seaport is to be regenerated into a dense neighbourhood with mixed functions. The traffic hierarchy shall be clear and prioritise pedestrians and cyclists followed by mass transit. It should be easy to orientate yourself in the area and spaces shall be planned and designed for moderate paced traffic. This strategy can also be summed up as:

- Linking the district into the surrounding metropolitan fabric to make non motorized journeys simpler. This physical requires barriers to be overcome at important locations.
- Adopting local conditions to non motorised vehicles, thus preparing for sustainable transportation. Pedestrian and cycle lanes are to be wide and given priority. Certain streets may be virtually free of motorized vehicles.
- Public transportation is to be frequent, reliable and connect the area its surroundings. This will make mass transit the backbone of the transport system.
- By planning for nodes where essential functions are concentrated density may be promoted and the area easy to sustain with public transportation.
- Public transportation is to be provided from early stages of the development of the district to aid sustainable journey patterns throughout the area.

**Climate responsibility & resource effectiveness**

Stockholm Royal Seaports goal is to be a fossil fuel free district with a high level of resource efficiency. The regeneration of the seaport is aimed to reduce the seaports environmental and climate impact by innovative design and thinking. This includes e.g. efficient use of land, not only by building a dense environment but also by the coordination of the important functions in the area.

**Let nature do its work**

Stockholm Royal Seaport is, despite its central location surrounded by open water and green areas. This is a resource that can contribute to a higher quality of living, better health and function as recreational and aesthetic values in the district. Green areas and surfaces may have positive impacts on e.g. people's ability to be concentrated and handle stress. The regeneration shall strengthen important ecological relationships as well as clean water, air and reduce harmful noise. Parks are to be well designed and function as comfortable green lungs.

**Participation & consultation**

The planning-process when regenerating Stockholm Royal Seaport shall be open and give influence to local citizens. It shall also work to increase awareness and knowledge of sustainability matters and how it comes that certain developments are developed the way

they are. This can be made through open meetings, social media and traditional media campaigns and aims to encourage dialogue with the civil society. Hopefully the experience from such process will help increasing awareness of sustainability in the district. (Stockholm, 2017a pages 24-44).

### *4.3.6 Transport and sustainability in Stockholm Royal Seaport*

According to a survey from 2016 public transport is the most common transportation mode for residents in Stockholm Royal Seaport, an average winter day 40% of the residents use public transport, a number that is slightly lower during the summer months. In summer 44 % of the residents say that they walk or use a bike for their daily commute. 61% of the households in Stockholm Royal Seaport state that they are car owners and 5 % members in a car pool. Most people state that they primarily use their car for leisure, such as travelling to and from second homes on the countryside and shopping trips. 31% of the car owners use their car to get to/from work. 80% of car owners rent private parking and do not rely on curb parking. Approximately 90% of the household's state that they have access to a bike. (Sweco, 2016).

According to transport planner Jenny Simonsson, sustainable transport is a high priority issue. Virtually all actors who participate in the work with Stockholm Royal Seaport is involved, both administrations working for the municipality and construction companies. Every year, a sustainability report is produced for Stockholm Royal Seaport. In the beginning, the work was very much about developing guidelines and requirement. Now there is more emphasis to work with the development of these so that they are at the forefront and do not become obsolete compared to the rest of the city. There are many challenges with this, one is that the planning process for an area takes a long time and during the process guidelines requirements change. Some processes are difficult to change during the process. For this reason, it takes a long time before one can evaluate planning process changes. (Simonsson, 2020). Other changes may be political, in the early planning phases it was seen as important that a well-developed public transport should be in place when the first residents moved in to Stockholm Royal Seaport, this to set sustainable mobility patterns and not make residents used to car dependency. A light rail was supposed to connect the area with the inner city from 2012, as of 2021 the light rail has been postponed and the parts of the districts that have been redeveloped rely on bus traffic as public transportation. (SL, 2021b). The northern connection, a highway tunnel that is a part of the future inner highway ring around central Stockholm opened in 2015 connecting the Seaport with the citywide highway network.

## 5 Data analysis and results

This thesis set out to explore how ideas of sustainable urban transport may shape contemporary urban redevelopment, with a specific focus on Hammarby Sjöstad and Stockholm Royal Seaport. The results do indicate that sustainable urban development has been prioritised throughout most of the redevelopment of these two areas, as ambitious goals have been set up for both projects and both projects have won several awards for their work regarding sustainability. Through the system with overarching comprehensive municipal-wide plans to local and supralocal detailed plans, Stockholm municipality has in both cases been able to steer the urban regeneration in a mostly sustainable way.

Several of the aims & goals found in the plans for Hammarby Sjöstad Stockholm Royal Seaport are mostly aligned to the scientific data and research regarding sustainable urban transport. The following part chapter 5 compares Hammarby Sjöstad and Stockholm Royal Seaport with some of identified critical scientific research about sustainable urban transport.

Sustainable urban transport is a wide topic and this chapter will be divided into 4 sections, each section about a mode of transport. Focus will be on Hutton´s key points in relation to that mode of transport but other research will be included as well to complement Hutton's key points. Two key points are not about a specific mode of transport, they will be analysed individually in relation to the planning in the two districts. Micro mobility will not be analysed as it is a new concept not in the plans, and one of the ideas with micro mobility is that it can use current transport systems, e.g. bike lanes or local streets.

### 5.1 Motorized Vehicles

Motorized vehicles have been the backbone of transport during the 20$^{th}$ and 21$^{st}$ century. By limiting car access, one is promoting other modes of transport, minimising noise, pollution and congestion issues in cities.

2 of Hutton's key points for a sustainable transport system are primarily about motorized vehicles:

- **Develop park and ride.**

Hutton (2013) argues that cars are useful in low density areas but not in high density areas, by planning for car parks adjacent to public transport in the outskirts of cities some journeys may be made easier.

- **Non residential parking**

Hutton (2013) argues that densely developed neighbourhoods may sometimes suffer from a lack of parking spaces. Solutions to this can be a highly accessibly public transport system or indoor parking facilities.

    - **Hammarby Sjöstad**

Hammarby is connected to Stockholm motorway system by the underground southern link, this makes the district easy accessible by car, large car parks should be located in the

outskirts of the district, however, there is also no direct rail traffic from Hammarby Sjöstad to central Stockholm.

The number of parking spaces in Hammarby Sjöstad was initially 0.4 per apartment, later 0.7 per apartment were constructed which equals the number of cars in the district. The environmental program mentions that curb parking is to be limited and the total number of parking spaces should be lower than in the inner city.

Local streets shall not have any through traffic and speed limit is to be low. Local streets shall not be longer than 150 meters. Main streets should be approximately 20 meters wide and house more traffic, a number of public squares are to make traffic pace slow. This is to reduce traffic and noise issues by the design of the street network.

- **Stockholm Royal Seaport**

Stockholm Royal Seaport is connected to the Stockholm motorway system by the underground northern link, this makes the district easily accessible by car. Large parking garages can be found adjacent to the highway, and in the harbour. Curb parking is to be limited.

The traffic hierarchy in the district is to be clear and prioritise pedestrians & cyclists followed by mass transit, thus deprioritising motorized vehicles. The area should be planned and designed for moderate paced traffic, primarily by non motorized vehicles. Local conditions may differ throughout the district and must be adopted to sustainable transport where possible. Pedestrian and cycle lanes are to be wide and given priority. Some streets may be virtually free of motorized vehicles. The municipality's climate strategy includes an ambitious goal of being fossil free by the year 2040 (Stockholm, 2018, p.19-28).

## 5.2 Public Transport

Mass transit is the backbone in most sustainable transport systems as they are space and energy efficient. To compete with private motorized vehicles services should be safe, efficient, with frequent departures and stops located within 500 meters of nodes/homes.

2 of Hutton's key points are about public transport, these are:

- **Foster local support for public transport**

Hutton (2013) argues that there is a relationship between the density of neighbourhoods and what type of transport that serves them as public transport is strongest in high density neighbourhoods.

- **Research the nature of adequate, acceptable public transport**

Hutton (2013) argues that If public transport is seen as inadequate car will be the default mode of transport for the majority of the public.

- **Hammarby Sjöstad**

The environmental program sets high expatiations for public transport use in Hammarby Sjöstad, 80% of work journeys are to be made by public transport. A light rail, busses and ferries serve the district, however, the metro station has been severely delayed. Planning documents from the 1990s and early 2000s stress the importance with a direct rail link to the inner city, today as of 2021 there is no direct link as the light tail was never extended to the inner city and the metro is scheduled to open in 2028. The only current links with the inner city are ferries and busses. Busses and light rail have frequent stops, assuring that nowhere is further than a short walk from mass transit in Hammarby Sjöstad.

All three researched plans state the importance of public transport in the district however, public transport is to be in place when people can move in and car use is to be limited by parking restrictions and car pools are to be promoted.

- **Stockholm Royal Seaport**

In Stockholm Royal seaport Public transportation is to be frequent, reliable and connect the area to the surrounding city. This will make mass transit the backbone of the transport system. Public transport is to be provided from early stages of the development of the district to aid sustainable journey patterns throughout the area. The original aim was to have a light rail to the district in 2012, that was later postponed to 2020 and all planning for the new light rail has currently been put on hold.

Mobility management in the area tries to impact individuals and companies' decision of transportation to a more sustainable one. Companies in the area are urged to elevate mobility management to those working there. The plans also state the importance of smart phone applications and travel planners consolidating all modes of transport will be accessible to everybody, and real time journey information is to be set in up in public spots.

The planning of the Royal Seaport is also to be founded on a reversed traffic hierarchy of importance giving priority to other modes of transport than cars such as bikes, pedestrians and public transport. This is to make these modes of transport as efficient as possible. Public transport is to be the backbone of the transport system with its own space in dedicated lanes and few intersections to limit traffic disturbances. The city aims to connect districts with each other by using urban corridors together with mass transit.

## 5.3 Walkability

Most journeys include at least 2 walkable parts. High levels of walkability in an area increase levels of safety and increase liveliness of a neighbourhood. Most people prefer to walk less than 1 kilometre on well lit, easily accessed, safe, well connected streets.

Two of Hutton's key points are about walkability:

- **Encourage and facilitate walking**

Hutton (2013) argues that High levels of walkability increase the possible use of both public transport, cycling, and to some extent automobilism.

- **Create public transport priority areas**

Hutton (2013) argues that by prioritising public transport one can fundamentally enhance the publics opinion about mass transit as well as its capacity, accessibility and efficiently. This includes mass transit lanes and prioritisation at traffic lights.

- **Hammarby Sjöstad**

The pedestrian network is to consist of links through parks, along the quayside and footpaths along local streets with little car traffic. The district should contain a pedestrian network that connect nodes and link important places. This can be along quaysides and with footpaths along streets with little car traffic. Intersections between the pedestrian network and the local street network shall not normally be easy to cross. At larger intersections with main streets, some form of separation between cars and pedestrians will usually require. In addition to the local pedestrian network, a primary network that connects the area to adjacent neighbourhoods is required. Some of these can be laid along the quayside. E.g. a bridge for pedestrian that connects the area to the inner city was recommended. This bridge was never built.

Public transport according to the vision and the environmental programme to be given priority. The light rail was constructed in the early phases of the redevelopment and busses connect the area to the surrounding areas together with ferries.

- **Stockholm Royal Seaport**

According to the analysed plans the planning of the Royal Seaport is to be founded on a reversed traffic hierarchy of importance which prioritises pedestrians first. It is to be important to adopt local conditions to non motorised vehicles, thus preparing for sustainable transportation. Pedestrian and cycle lanes are to be wide and given priority. Some streets may be virtually free of motorized vehicles in the district.

By planning for nodes where essential functions are concentrated density may be promoted and the area easy to sustain with public transportation. Public transport should be efficient and reliable with stops throughout the area.

The mobility plan states high levels of walkability increase the freedom of choice and mobility and should therefore be prioritised through e.g. reversed traffic hierarchies and well planned urban environments. The sustainable urban program aims to link the district to the current inner city, as a natural part of its dense urban structure without physical or social barriers. Other goals from the sustainable urban development plan include the Flexible utilization of flows between nodes to, plan for well designed and thought through nodes and Linking the district into the surrounding metropolitan fabric to make non motorized journeys simpler.

## 5.4 Bicycles

By prioritising bikes in all stages of planning e.g. plan for safe bike parking adjacent to mass transit, plan for an increased amount of safe bike lanes, plan for rental bicycles schemes safer bicycle environments can be achieved. For journey no longer than 5 kilometres it is a reliable mode of transport that, in urban are often able to compete with motorised vehicles in terms of speed and time duration. One of Hutton's key points are about bicycles:

- **Facilitate cycling**

Hutton (2013) argues that Cycling has a useful role to play in a sustainable transport system as it does not generate emissions or noise, use a small amount of space and is relatively quiet.

- **Hammarby Sjöstad**

The environmental programme states that cycle paths should connect Hammarby Sjöstad to surrounding areas, bicycle lanes should be added to main streets and shared space be offered on local streets. This shall result it a well thought through network of cycle paths should the reduce the need for motorized transport, the plans stress the importance of a bridge to Södermalm which was never built.

- **Stockholm Royal Seaport**

The planning of the Royal Seaport is to be founded on a reversed traffic hierarchy of importance which gives cyclists admittance to all roads, cyclists should be prioritised throughout the area. Important factors to achieve this according to the mobility plan includes reserving space for cycle lanes, create good regional commuting corridors with limitations for motorized vehicles. In locations where dedicated space for cyclists are not possible other safety measures are needed, e.g. low speeds for motorized vehicles. Secure, weatherproof bicycle parking adjacent to public transport may further increase cycling and the use of mass transit.

The area is also according to the sustainable urban programme to be linked to the surrounding city as a natural part of the dense urban environment without physical barriers making it easier to cycle.

Cyclism is a seen as way to travel safe, fast and reliable. By promoting biking, one increases the total capacity of the road network as cyclist is a flexible way to travel, less affected by e.g. rush hour congestion.

## 5.5 Other

Hutton's last points to push for sustainable urban transport are:

- **Set criteria for desirable densities**.

Hutton (2013) argues that dense neighbourhoods reduce the need for motorized transport as distances between homes, nodes and mass transit are reduced.

- **Hammarby Sjöstad**

Hammarby Sjöstad was originally planned to be an inner city like district, with 25 000 inhabitants. Over time the area grew denser and is now planned to house 35 000 inhabitants when completely finished and function not only as an inner city like district but as a prolonged part of the inner-city that together with other projects such as Söderstaden and Liljeholmskajen aims to extends Stockholm Inner city southwards (Fryxell 2018).

- **Stockholm Royal Seapoert**

The vision from 2009 states how Stockholm Royal Seaport is to be a part of Stockholm's inner city, a vibrant urban core. The Sustainable Urban Development Program depicts Stockholm Royal Seaport as a high density, multifunctional, contemporary urban district. Linking the district to the current inner city, as a natural part of its dense urban structure without physical or social barriers.

- **Make spatially selective policy**
  Hutton (2013) argues that cities must adopt transport policies to match sufficient levels of density, parking and public transportation. Policies that only favour one transportation mode will likely fail.

- **Hammarby Sjöstad**

With the aim of being twice as good, the environmental programme and the District vision aims for a dense neighbourhood with good public transport. The main goal according to the vision was to redevelop the area into an inner city like, primarily residential neighbourhood that partly serves as an extension of Stockholm inner city. The was not to replicate the structure of the inner city but to build a modern neighbourhood suitable for life in the 21st century. The rich social life of the inner city was aimed for, which demands high density developments. This includes most types of transport modes. To not only focus on public transport a highway-tunnel is also planned, this will connect the area with the metropolitan highway network and make other parts of Stockholm more accessible to each other.

- **Stockholm Royal Seaport**

In the original vision Stockholm Royal Seaport is described as a unique opportunity to develop a district in one of the city's prime locations close to business and shopping centres as well as nature and open surfaces of water. The urban ambitions are high, drawing on examples gained from e.g. previous regeneration in Hammarby Sjöstad. The vision aims for

district to be included in Stockholm's inner city, a vibrant, dense urban core. The district is set to offer a large range of amenities, including cafes, bars, restaurants, shops, gyms, conference centres, cultural venues, and hotels to support urban life which shall be reachable by most transport modes.

The vibrant sustainable urban programme describes the district is a strategy with the focus on the needs, necessities and preferences of the residents. The aim is that the district should be and feel including to everyone with an urban landscape that feels well populated, energizing and safe at all times.

To not only focus on public transport a highway-tunnel is also planned, this will connect the area with the metropolitan highway network and make other parts of Stockholm more accessible to each other as well as help with delivering goods to the port.

### *5.6 Conclusion of chapter 5*

The planning of the redevelopment of Stockholm Royal Seaport began when large parts of Hammarby Sjöstad had already been developed. Hammarby Sjöstad was then an award winning district which was renowned for its work with sustainability issues. Much of the experience gained from the Hammarby Sjöstad project was used in the planning for Stockholm Royal Seaport and it is therefore logical that the plans for Hammarby Sjöstad and Stockholm Royal Seaport share many similarities, despite being written in different decades. However, there are some crucial differences between Hammarby Sjöstad and Stockholm Royal Seaport.

Mobility management is one difference; in Stockholm Royal Seaport more soft measures were taken to inform citizens about how and why to travel sustainable, this was not mentioned in plans for Hammarby Sjöstad. Hammarby Sjöstad was planned to be a residential district with inner city like characteristics, Stockholm Royal Seaport was planned with the aim the be a part of the inner city. This is achieved e.g. by planning for a higher density in Stockholm Royal Seaport, something that may benefit e.g. public transportation. A third difference is the explicit reversed traffic hierarchy in Stockholm Royal Seaport which states that pedestrians should always be prioritized, followed by cyclists, public transport and last motorized vehicles. This was not explicitly mentioned in plans for Hammarby Sjöstad.

Both cases follow the analysed research for sustainable urban transport and the analysed documents in general follow the available research. However, in the case of Stockholm Royal Seaport the documents go more in depth about sustainable urban transport and it is broken down into more parts and updated more regularly.

Planning in both districts stress the importance of walkable, dense neighbourhoods safe for pedestrians and cyclists, well connected to the rest of the city by all modes of transport. In the planning for both districts a direct rail connection to the city center was seen as important, in Hammarby Sjöstad this was to be a metro extension and light rail, in Stockholm Royal Seaport a light rail connection. As of 2021 no one of these rail connections have been built, the light rail to Stockholm Royal Seaport has been put on hold, the light rail

connection to central Stockholm from Hammarby Sjöstad has been scraped and the metro connection is planned to open in 2028. This shows how difficult it can be to realise large scale plans over time with issues such as budget constraints and political will changing over time.

Despite both districts overarching aiming for a low car use both districts have been connected to the Stockholm highway-network through tunnels. These tunnels are aimed to reduce traffic on the streets, reduce noise, through traffic, and make the districts more accessible, as well as being part of a greater planned highway-tunnel-ring around central Stockholm which will benefit the entire region. However, they will also enable an increase of car use, both in the two researched district and in the Stockholm region as whole. Highway tunnels are very expensive to plan and construct. As the taxpayer's money and infrastructural budgets are not indefinite, this money could have been used to e.g. develop the metro and light-rail system to further enhance and support sustainable urban transport. However, no city is car free and e.g. Hutton argues that car infrastructure is important together with other transport modes. Highway tunnels may get heavy traffic off the local streets and e.g. make room for buses whilst increasing total mobility in a metropolitan region. The highway tunnels are likely seen as regional infrastructure and not local infrastructure as they connect different parts of the Stockholm region with each other and may be vital for e.g. freight.

# 6 Conclusion

## 6.1 Conclusion

### *6.1.1 What is sustainable urban transport and why/how is it encouraged in contemporary urban regeneration?*

Sustainable urban transport is a broad topic with no exact definition but can in the light of this thesis be summed up primarily as the vision of how it should be simple for citizens to live their daily lives without the need of privately owned motorized vehicles.

Urban areas and urban regenerations should be primarily planned for pedestrians and strive for comfort, needs and safety. Prioritising pedestrians, cyclists and public transport over cars enhances sustainability as these modes of traffic barley generate any emissions and use much less space. Well functioning, sustainable urban transport is positive for public health since it reduces noise pollution and reduces physical inactivity. This can lead several advantages for factors such as general well-being, global climate, and regional and local environment.

Sustainable urban transport, which aims to increase the number of journeys made by foot, by bike and with mass transit within a city by planning for, and prioritising such transportation modes to develop a richer urban landscape which is more accessible and attainable for bigger share of the population than any traditional car dependent urban landscapes. By promoting sustainable urban transport and plan primarily for non-motorised vehicles during urban regenerations, cities can provide better opportunities for all people living or visiting their territory to live healthier, hopefully happier lives. Areas with a wide diversity of sustainable transport options are often in general more accessible and inviting for wider, more diverse groups of people. This can have a positive effect for the local urbanity and life in such districts.

Urban regenerations offer unique possibilities for planner to re-shape the transport system in an area, thus also mobility and people's ideas about mobility. This makes transportation issues important during such large projects, as it will affect urban transport for a very long time to come.

### *6.1.2 How have the ideas of sustainable urban transport on different levels influenced the regeneration of Hammarby Sjöstad and later Stockholm Royal Seaport?*

Stockholm municipality has actively supported and promoted sustainable urban transport development through-out the process of regeneration of Hammarby Sjöstad and Stockholm Royal Seaport. In the case with Hammarby Sjöstad ideas of sustainable development were present in the original plan and grew stronger after the city's Olympic bid. District-wide plans, that are based on municipal or even national strategies are subsequently refined in supralocal detailed development plans. Ambitious goals in the more wide-spanning comprehensive plans are reformulated into action points in the more local plans. This way Stockholm municipality has the power and ability to plan for two districts that encourages sustainable lifestyles. The Swedish planning and building code give municipalities absolute control of planning and development within their territory through detailed development

plans, thus handing them the power to plan regenerations according to their vision/ideas of sustainable and liveable areas.

In general Stockholm municipality have been able to plan for two districts with a sustainable urban transport system. Pedestrians, cylists and public transportation are prioritised and throughout the plans. The planned sustainable transport options are many and overall follow scientific advice. However not all planned goals have been fulfilled, the development of a light rail system in Stockholm Royal Seaport has been put on hold, the light rail never connected Hammarby Sjöstad to central Stockholm, the metro to Hammarby Sjöstad has been severely delayed and the pedestrian bridge which was to connect the district with central Stockholm was never built. Highway-tunnels have been built at a great cost. However, sustainable urban transport includes all modes of transport, including motorised vehicles. It is possible that these highway-tunnels increase mobility for goods and services as well as connecting different parts of Stockholm with each other. They may therefore be justified even within the concept of sustainable urban transport as no sustainable transport system can be completely car free, and they show how complex issues regarding sustainable urban transport can be.

### *6.1.3 How can urban regeneration contribute to and push for sustainable urban transport patterns as seen in the examples of Hammarby Sjöstad and later Stockholm Royal Seaport?*

Large scale urban regenerations such as those seen in Hammarby Sjöstad and Stockholm Royal Seaport offer unique opportunities for cities to develop a sustainable transport system. Hammarby Sjöstad and Stockholm Royal Seaport are two dense urban regenerations where there has, for different reasons been a political will to develop a sustainable district. The two districts have to some degree been world leading in sustainability matters and both have won awards for their work with sustainable urban transport. This have resulted in districts where car dependency is relatively low, and it is easy for citizens to make sustainable transport choices. Car ownership is relatively low in both areas and cars are, to a large part primarily used for longer leisure trips to destinations outside central Stockholm. As the new areas are designed to last, this will likely mean that, through todays standards the transport system in the two regenerated districts will be relatively sustainable for the foreseeable future.

On a broader scale the urban regeneration projects may to some extent work as blueprints for other project in Sweden and internationally where one can learn from these two projects. They may work as a source of inspirations and inspire planners in both other cities and other districts of Stockholm to push sustainable transport development even further in coming regeneration projects.

## 6.2 Research limitations

The thesis has a number of possible research limitations. The age of some secondary might in some cases be old/outdated; this data is from previous years and it is possible that progress in the field have been missed.

Due to covid-19 the interviews were conducted digitally through e-mail, this made it more difficult to ask follow-up questions and was time consuming. It is also possible that

nonverbal clues were missed as face to face interviews are more than just words. Body language, pauses, and tone are examples of nonverbal communication that e-mail interviews lack. There is also a risk that e-mail interviews give light weigh responses as interviewees may get tired, and/or feel that writing long answers are too time consuming. Another limitation is that an interview from a previous project was reused, the main topic of this interview was liveability, not sustainability.

During normal circumstances observations could have greatly benefited the thesis as they could have given a greater understanding of what transportation looks like in the two districts. However, as the research was conducted during the Covid-19 pandemic at a time when the Swedish and local governments strongly advised against all non-essential travel, especially by public transport resulting in e.g. many work places and schools being closed observations would not have been generalisable to normal conditions. Observations would also have been unethical and risky as they would have required time spent in the public transportation system, and other places where it is difficult to maintain social distancing.

### 6.3 Further Research

This thesis focuses on municipal, public planning for sustainable transport. Future work could investigate how sustainable urban transport is pushed for by the private actors, e.g., by architects, urban designers and developers.

# 7 Bibliography


- Antrop, M. (2004). Landscape change & the urbanization process in Europe. *Landscape &Urban Planning*, 67(1), pages 9–26.
- Badland, H., Giles Corti, B., & Koohsari, M. (2013) 'ReDesigning the built environment to support physical activity: Bringing public health back into urban design & planning', *Cities*, 35, pages. 294–298.
- Banister, D and Hickman, R (2014) '*Transport, climate change &the city*' pages 6-7,320 Abingdon, Oxon: Routledge
- Banister, D Hall, P & Hickman, R., (2013) 'Planning more for sustainable mobility', *Journal of Transport Geography*, 33, pages. 210–219.
- Banister, D. (2005) *Unsustainable Transport: City transport in the new century*. Routhledge: Abingdon.
- Banister, D., 2002. Transport-planning, *Routledge* second edition.
- Bibri, K. (2020), Smart Eco-City Strategies and Solutions for Sustainability: The Cases of Royal Seaport, Stockholm, and Western Harbor, Malmö, Sweden. *Urban science*. [Online] 4 (1)
- Boverket. (2018), *Planning Process*. Available at: https://www.boverket.se/en/start/building-in-sweden/developer/planning-process/ (2021-01-06)
- Bowen, G.A. (2009). "Document analysis as a qualitative research method." In: Qualitative Research Journal, 9(2), pages. 27–40.
- Brandt,N, Pandis,S. (2009), *Utvärdering av Hammarby Sjöstads miljöprofilering - vilka erfarenheter ska tas med till nya stadsutvecklingsprojekt i Stockholm? https://vaxer.stockholm/globalassets/projekt/sodermalm-sdo/hammarby-sjostad/utvardering-av-hammarby-sjostads-miljoprofilering-kth.pdf (2021-01-06)*
- Britannica. (2021), *Sweden* https://www.britannica.com/place/Sweden (2021-01-06)
- Bruun, E, Kenworthy, J and Schiller, P. (2010), *An introduction to sustainable transportation:policy, planning, and implementation*, London/Washington:Earthscan.
- Bryman, A. (2012), Social Research Methods. Oxford University Press.
- C40. (2021), *Why cities.* https://www.c40.org/why_cities (2021-01-06)
- Carey, S. (2018), *Urban transportation: planning & management*, Clanrye International. New York

- Citymark. (2018), *Skanska säljer project i Hammarby Sjöstad* https://citymark.today/skanska-saljer-projekt-i-hammarby-sjostad-127517/nyhet.html (2021-01-06)
- CNBC. (2020), *Biden will rejoin the Paris Climate Accord. Here's what happens next.* https://www.cnbc.com/2020/11/20/biden-to-rejoin-paris-climate-accord-heres-what-happens-next-.html (2021-01-06)
- Crawford, J. 2000, *Car free cities*, Utrecht: International Books.
- Dagens Nyheter. (2020), *SL har tappat 64 procent av sina resenärer. https://www.dn.se/sthlm/sl-har-tappat-64-procent-av-sina-resenarer/*
- Denscombe, M. (2017) *Good Research Guide: for Small scale Social Research Projects*. The McGraw-Hill Companies, Inc.
- *DW*.(2020), Coronavirus:What are the lockdown measures across Europe? , https://www.dw.com/en/coronavirus-what-are-the-lockdown-measures-across-europe/a-52905137. (2021-01-06)
- European Commision. (2021a),Causes of *climate change*. https://ec.europa.eu/clima/change/causes_en/. (2021-01-06)
- European Commision. (2021b),*Climate change consequences*. https://ec.europa.eu/clima/change/consequences_en. (2021-01-06)
- European Commission, (2016). "*Science for Environment Policy*": European Commission DG Environment News Alert Service,The University of the West of England, Bristol.
- Fejes, A. & Thornberg, R. (2015), Handbok i kvalitativ analys. 2. ed., Stockholm: Liber
- Firley, G. (2013), *The Urban Masterplanning Handbook*. New York: John Wiley and Sons, Incorporated.
- Fryxell. 2018, Interview with a former urban planner in Stockholm, 2018
- Fryxell. 2020, Interview with a former urban planner in Stockholm, 2020
- Garrison, W and Ward. (2000),*Tomorrows transportation:changing cities, economies, &lives*. Boston, Mass:Artech House
- GaWC. (2020), *The world according to GaWC: 2020*. https://www.lboro.ac.uk/gawc/world2020t.html (2021-01-06).
- Gehl, J. (2010), Cities for people. 2nd edition. Island press, 2010.

- Giles-Corti, B. (2016), 'City planning&population health :a global challenge', *The Lancet*, 388(10062), pages. 2912–2924.
- Google maps (2021) https://www.google.com/maps (2021-01-06)
- Gross, M. (2016), 'A planet with two billion cars', *Current Biology*, Volume 26, Issue 8, Pages R307-R310.
- Gunn, D. (2017), Designing healthy communities:creating evidence on metrics for built environment features associated with walkable neighbourhood activity centres. *International Journal Of Behavioral Nutrition & Physical Activity*, 13-14, pages. 2017, Volume.14.
- Haskell, W. L., Lee, I-M., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A., ... Bauman, A. (2007), Physical activity & public health: Updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. Circulation, 116(9), pages 1081-1093.
- Hellspong, L. (2001), Metoder för brukstextanalys, Studentlitteratur, Lund.
- Hutton, B. (2013), *Planning sustainable transport*. First edition. New York: Routledge.
- International transport forum. (2019), *ITF Transport Outlook 2019*, OECD Publishing, Paris, https://doi.org/10.1787/transp_outlook-en-2019-en.
- Kvale, Steinar (2008). Doing Interviews from Qualitative Research Kit. 1446226832:
- Litman, T (2003) 'Economic Value of Walkability', *Transportation Research Record*, 1828(1), pages 3–11.
- McQueen, M. (2020), 'Transportation Transformation: Is Micromobility Making a Macro Impact on Sustainability?', *Journal of Planning Literature*. doi: 10.1177/0885412220972696.
- Moodys. (2020), *Sweden.* https://www.moodys.com/credit-ratings/Sweden-Government-of-credit-rating-730900. (2021.01.06)
- Nieuwenhuijsen MJ & Khreis. (2016), 'Car free cities: Pathway to healthy urban living', *Environment International*, 94, pages. 251–262.
- Novus. (2020), *Coronastatus0423*. https://novus.se/coronastatus-0423/ 2021-01-06
- O'Leary, Z. (2014), *The essential guide to doing your research project*. California: Sage
- Ourworldindata. (2021), *Emissions by sector* https://ourworldindata.org/emissions-by-sector (2021-01-06)

- Richards, B. (2001), *Future transport in cities*. SponPress.
- Simonsson, 2020. Interview with a transport planner in Stockholm, 2020
- SL. (2021a), *Hammarby kanal.* https://nyatunnelbanan.se/sv/hammarby-kanal (2021-01-06).
- SL. (2021b), *Spårväg city.* https://www.sll.se/sparvagcity (2021-01-06).
- Statistiska centralbyrån. (2020), *Folkmängden i riket, län & kommuner 30 september 2020*. https://www.scb.se/hitta-statistik/statistik-efter-amne/befolkning/befolkningens-sammansattning/befolkningsstatistik/pong/tabell-och-diagram/kvartals--och-halvarsstatistik--kommun-lan-och-riket/-kvartal-3-2020/ (2021.01.06)
- Stockholm. (1991), *Hammarby Sjöstad Fördjupning av Översiktsplan.* https://vaxer.stockholm/globalassets/projekt/sodermalm-sdo/hammarby-sjostad/hammarby-sjostad-oversiktsplan.pdf (2021-01-06)
- Stockholm. (1999), *Hammarby Sjöstad Miljöprogram. https://vaxer.stockholm/globalassets/projekt/sodermalm-sdo/hammarby-sjostad/miljoprogram-1999.pdf (2021-01-06)*
- Stockholm. (2002), *Hammarby Sjöstad Bostad02.* https://vaxer.stockholm/globalassets/projekt/sodermalm-sdo/hammarby-sjostad/bo02_boken.pdf (2021-01-06)
- Stockholm. (2009), *Norra Djurgårdsstaden Vision.* https://en.calameo.com/read/000191762a5ff60748f09 (2021-01-06)
- Stockholm. (2012), *Urban Mobility Strategy.* https://international.stockholm.se/globalassets/ovriga-bilder-och-filer/urban-mobility-strategy.pdf. (2021.01.06)
- Stockholm. (2017a), *Program för Norra Djurågrdsstaden.* https://vaxer.stockholm/globalassets/omraden/-stadsutvecklingsomraden/ostermalm-norra-djurgardsstaden/informationsmaterial/broschyr-och-dokument/program_for_hallbar_stadsutveckling_uppslag.pdf (2021-01-06)
- Stockholm. (2017b), *Road map.* https://vaxer.stockholm/globalassets/omraden/-stadsutvecklingsomraden/ostermalm-norra-djurgardsstaden/royal-seaport/a-sustainable-urban-district/road-map/srs_roadmap_20170927.pdf (2021-01-06)

- Stockholm. (2018), *Översiktsplan för Stockholms stad.* https://vaxer.stockholm/globalassets/tema/oversiktsplanen/uppdatering-av-op/godkannade-op/oversiktsplan-for-stockholms-stad-godkannandehandling-2020-10-03.pdf (2021-01-06)
- Stockholm. (2020a), *Norra Djurgårdsstaden.* https://vaxer.stockholm/omraden/norra-djurgardsstaden/ (2021-01-06)
- Stockholm. (2020b), *Stadsutvecklingsområde Hammarby Sjöstad.* https://vaxer.stockholm/omraden/stadsutvecklingsomrade-hammarby-sjostad/ (2021-01-06)
- Sweco. (2016), *Norra Djurgårdsstaden Kännedom och attityder bland nyinflyttade och boende i Hjorthagen och Gärdet 2016.* https://vaxer.stockholm/globalassets/omraden/-stadsutvecklingsomraden/ostermalm-norra-djurgardsstaden/informationsmaterial/broschyr-och-dokument/boendeundersokning-nds-2016-slutrapport.pdf (2021-01-06).
- Telia. (2020), Telia Covid19 Mobilitetsanalys:. https://www.telia.se/privat/aktuellt/hemma-i-folknatet/covid-19-mobilitetsanalys (2021-01-06)
- Triad3. (2016), An Introduction to Document Analysis. https://lled500.trubox.ca/2016/244. (2021-01-06).
- UN. (1987), *Brundtland report*
- UN. (2021a), *Agenda21.* https://sustainabledevelopment.un.org/outcomedocuments/agenda21 (2021-01-06)
- UN. (2021b), *Paris agreement.* https://unfccc.int/process-and-meetings/the-paris-agreement/what-is-the-paris-agreement (2021-01-06)
- USA. (2019), *On the U.S. Withdrawal from the Paris agreement*. https://www.state.gov/on-the-u-s-withdrawal-from-the-paris-agreement/ (2021-01-06)
- WHO. (2018), Global status report on road safety 2018. https://www.who.int/violence_injury_prevention/road_safety_status/2018/en/. (2021-01-06)

- WHO. (2021), *Air pollution.* https://www.who.int/airpollution/ambient/en/ (2021-01-06)
- Worldbank. (2021), *GDP European union* https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=EU&most_recent_value_desc=true (2021-01-06)