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Stockholm – from ugly duckling to Europe's first green capital

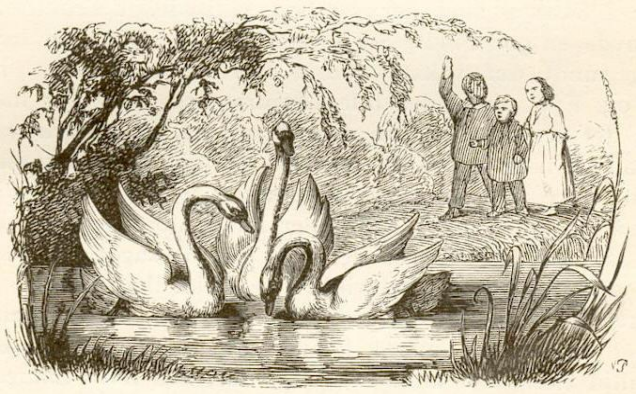
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Abstract: The European Commission named Stockholm Europe's first *Green Capital City* in 2010. Important reasons for the award were: a reduction of CO_2 emissions by 25 percent per capita since 1990 and the establishment of an administrative system integrating environmental aspects in the planning, budgeting and management of all the various activities governed by the city.
This paper describes the main features of the economic, environmental and political development in Stockholm since 1850. The main idea is simply to provide a historical perspective on the city´s environmental policy but we also want to shed light on the extent to which historical decisions and processes exert an influence on current ambitions and measures to strengthen Stockholm´s sustainability. In addition to pointing at the long-lasting influence of earlier infrastructure investments we also indicate the importance of the political pragmatism and social-engineering attitude developed since the 1930´s. However, Stockholm´s recently adopted action plan for reducing the emission of greenhouse gases indicates that this institutional capital might have eroded somewhat. If this is true, Stockholm might face more difficulties in becoming greener than usually expected considering its current ranking as a leading European capital in terms of intellectual capital and rate of innovation.

Keywords: Urban sustainability, Stockholm, history, environment, urban planning
JEL Codes: R50, Q01, Q58

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1. Introduction

”Towns are like electric transformers. They increase tension, accelerate the rhythm of exchange and constantly recharge human life.”

Fernand Braudel, *Civilization and Capitalism*

Urban growth and metropolitan regions are often associated with social imbalances, congestion and pollution. But modern urban research has also shown that metropolitan regions harbor the knowledge, the creative energy and the entrepreneurial spirit needed to introduce new technologies and jobs. In that respect they certainly have the potential to decrease current sustainability gaps.

Stockholm is such an innovation- and knowledge-oriented metropolitan region and was appointed the first “Green Capital of Europe” in 2010. Looking at Stockholm 160 years back the difference is astounding. It was one of the poorest cities in Europe and those living there faced appalling living conditions – the expected lifetime at birth was only 25 years for men and 31 for women. Few if any observers would have characterized Stockholm as a creative and environmentally sound city in 1850.

This paper describes the main features of the economic, social and political development in Stockholm since 1850. The aim is twofold. One is to provide an overview of the historical transformation and indicate possible reasons behind the transformation. The second, and related aim is to shed light on path dependencies i e to what extent historical decisions and processes might exert an influence on current decision-making

The paper is structured into six sections. The first one positions Stockholm from the perspective of contemporary theories of economic geography. The next four sections describe the development of Stockholm during the consecutive periods 1850–1914, 1914–1945, 1945–1970 and 1970–2010. Each section tries to identify the most important economic, social, and political changes from a backward as well as a forward-looking perspective. The last section makes use of the historical exposé to provide some speculative remarks on Stockholm´s future development in terms of sustainability.

2. Stockholm in the Global Urban System

The emerging current understanding of cities is that they are parts of nested networks, being integral parts of large regional landscapes and of the global metabolism that affect the world in a number of ways, several with non-linear consequences (e.g. Batty 2008). On the one hand consumption and lifestyles among groups having relatively high incomes and hence most obvious in the urban areas of industrialized countries, contribute disproportionally to anthropogenic impacts on climate and environment. On the other hand, cities are wonders of opportunity and efficiency, of creative energies and harbor some of humanity’s finest achievements.

People move to cities in order to find jobs, better educational possibilities or for experiencing the larger variety of different kinds of services. Business firms establish and expand there because of various economies of scale phenomena. Transport infrastructure is another structurally important factor; the higher the relative accessibility of a city the more attractive it tends to be. As demonstrated by Andersson (1985) the domestic migration to Stockholm during the 20th century has decreased the initial income advantage of living there. However, at the same time successive infrastructure investments increased Stockholm´s accessibility in relation to other Swedish regions. Due to the increasing accessibility and possibilities to reap the fruits of economies of scale the Stockholm region is still attracting migrants from other parts of the country.

Closeness and accessibility allow households and firms to *share* indivisible facilities and the gains from a many-sided specialization, to achieve a better *matching* between “buyers and sellers” in different markets and to make use of face-to-face contacts for *learning and innovations* (Henderson and Thisse, 2004). Representing the “New Economic Geography” these theories also provide deeper

insights on the interdependencies between land use and accessibility in metropolitan areas. By way of example a recent study, published by the Swedish Ministry of Finance, see Börjesson (2012), suggests that the population density of the neighborhoods closest to the inner part of Stockholm would have been significantly higher had not the city as early as in the 1940´s decided to invest in a subway system. Instead of adding new rings of housing around the inner city new suburbs were established along the new subways lines.

Benefits from agglomeration do not imply that rapid urbanization and increasing number of large urban regions automatically will make mankind better off. City formation imposes costs in the form of congestion, different kinds of pollution, slums, crime etc. and those costs typically rise disproportionally with city size. One example is the heat island effect. Due to loss of vegetable areas and waste-heat emissions cities are significantly warmer than their surrounding rural areas. This makes them more vulnerable during warm weather. According to Stone Jr (2012) more than 70 000 people in Europe died during the 2003 summer heat wave. Cities certainly do not cause heat waves but they amplify them and hence add to the health problems and death toll related to episodes with hot weather.

Additionally, urban growth in itself brings tensions with regard to capacity, e. g. in the form of shortage of housing and water, and these tensions include inequalities in the distribution of wealth and well-being: currently there are about one billion slum dwellers living in large and fast growing cities mainly in developing countries. When the urbanization is rapid it may also cause social problems in countryside areas experiencing population decline.

The “public costs” exemplified indicates that cities need mechanisms and institutions that can be used for closing gaps between private and social benefits and costs and between local, national and global benefits and costs. Lacking such policy instruments some cities will probably grow larger than they should and the phase of urbanization may sometimes be faster than it should, had the social and environmental effects been properly addressed by governments at different levels, by urban stakeholders and by urban citizens. Some countries, including Sweden, have implemented various regional policy measures, such as for example relocation of government agencies to slow down metropolitan growth rates and further growth in smaller cities. However, this kind of policy seems by and large to have had at best marginal effects.

In a global systems perspective, large urban regions distinguish themselves in two aspects. First, they have a higher degree of self sufficiency, which means that interdependencies that are vital for development and sustainability operate in an encircled, “local” territory with – in principle – greater opportunities to design governance systems aiming at improved resource efficiency and reduced social and environmental tensions. Second, large urban regions are characterized by more wealth and thereby they initiate larger than average long-distance flows per capita. A larger share of local interdependencies in urban regions provides an opportunity to reshape and design the entire social fabric in the urban context. The larger share of global interurban long-haul transport constitutes an emission problem which is urban specific. However, it also offers an opportunity, because transport flows between large urban regions can make use of technical solutions that only apply to large-scale flows. The introduction of rapid trains between some large European cities provides an example of this kind of innovations and international agreements needed.

A fundamental feature of metropolitan and other large urban regions is their role of being “novelty factories” for knowledge creation, adoption of innovations, experimental interaction between customers and suppliers, introduction of new life styles, renewal of governance approaches and mobilization of resources for adjustment. They are arenas for face-to-face interactions and other proximity externalities, and basic innovations and technological change often have to be accepted in the urban context before they diffuse across a wider space.

A second basic feature relates to the observation that the contemporary natural environment is “man made” or strongly influenced by actions from the human civilization. In an urban environment this interplay between local ecosystems and constructed resource-handling systems is a predominating feature. Urban system management is challenged by the option to develop a tractable symbiosis of nature and culture in order to avoid “the tragedy of the commons”. Two principal reasons make

this difficult. Any major development project or institutional reform will involve a large number of urban stakeholders with different or conflicting interests, and hence an agreement difficult to achieve. In the Stockholm region representatives from at least some of its 26 municipalities, from the county council and from the national government would be involved. Additionally the politicians wanting to be re-elected would have to seek public acceptance for a decision to support or not support an agreement. The political power game and referendum related to the introduction of congestion pricing provide ample evidence of these difficulties (Hårsman and Quigley 2011).

Looking back at Stockholm´s development one point of departure would be to consider cities as the main drivers of income and wealth in Sweden and other countries. Using an opposite view, the global development of technology, trade and commerce can be looked upon as a tide that has lifted Stockholm as well as most other cities in the Western world. The two perspectives indicate the importance of considering the interdependence between city growth, national growth and global growth when trying to understand the long-term development of a specific city such as Stockholm. The fact that Stockholm has increased its percentage share of the Swedish population dramatically and grown more rapidly than most other European cities since 1850 indicates that Stockholm has at least to some extent and during some periods functioned as a Swedish and also European node of growth. But as will be evident from the following sections this is not to deny that most of the growth impulses might have been external.

3. Stockholm 1850 to 1914

An ugly duckling

Industrialization, urbanization and efficient transport infrastructure came late to Sweden. As late as 1850 Sweden's largest city, the capital city of Stockholm had just over 90 000 inhabitants and a constant birth deficit, so only a large influx of immigrants from rural areas prevented the city from shrinking. There were many small-scale craftsmen and some mechanized factories but no large-scale factories. The City lacked water, sewer and gas lines. What waste management existed was hardly hygienic, and health care was substandard. Neither the city's inhabitants nor its own city leaders had much influence over development issues; the Swedish Crown and the Swedish Church held the city in a firm grip. The rules governing commerce and trade were outdated and freedom of trade was limited, though the monopoly of cities on trading organizations and guilds had recently been revoked. For many goods, international trade was still hindered by bans on imports and exports, in stark contrast to free trade-friendly Norway despite the fact that Norway was also ruled by the King of Sweden (until 1905). Stockholm, until then isolated from the outside world during the winter months by harbor ice, could now extend its sailing season thanks to the new steamships. But Sweden's capital city still lacked a railroad link.

When the Danish fairytale writer Hans Christian Andersen visited Stockholm in 1850, he wrote that this beautiful city of wide straits and high hills reminded him of Constantinople. This prompted one commentator to exclaim that the comparison was indeed valid—both cities had the same stench, dirt and poor sanitation—both were ugly ducklings. But Stockholm was actually about to undergo a unique transformation into an international metropolis with a strong focus on the environment, sustainability and quality of life. This chapter focuses on the development of Stockholm since 1850.

Evolution without revolution: pre-WWI

The city was in other words fairly backward in 1850. Environmental historians describing this period, however, note that even though the environment was unhealthy and damaging, most Stockholmers had a small ecological footprint: production, consumption and waste cycled locally.

That would change.

Political evolution

In 1850, Swedes looked with both envy and dread upon the modernization in Western and Central Europe—especially the United Kingdom. They saw in its local economies and cityscapes rising populations, young industries, steam engines, canals and railways, piped water, sewage and gas. They saw cities that produced health care systems and a bountiful supply of food and consumer goods, but also poverty, housing shortages for many industrial workers and their families, growing gaps between rich and poor, political challenges and social unrest. It was a new age—for better or worse.

Even in Sweden, agricultural modernization had increased productivity and profitability, and together with better access to education through public school reform in 1842 led to a larger and healthier population in rural areas, where ninety percent of Swedes still lived in 1850 and eighty percent by century's end. Nevertheless, landless Swedes gradually migrated to the cities, where incomes and public health were also slowly improving, so both urban and rural areas across Sweden experienced population growth due to a surplus of births over deaths. Even during the period of the great exodus between 1850 and 1914 that saw one in five Swedes migrate to North America, the Swedish population grew by 63 percent. Rural areas grew by a third, but the cities five times, and both contributed to nearly a tripling of GDP (at constant prices).

The first stage of Stockholm and Sweden's major transformation was during the 1850's and 1860's. The new liberals were in constant feud with the still strong conservative and protectionist forces, but nevertheless managed to enforce some fundamentally important national, regional and local reforms. In 1862, (more or less) independently governed municipalities and county councils were given direct taxing powers, and by 1866 the parliament had two (more or less) democratically elected chambers replacing the antiquated parliamentary system of four estates: nobles, priests, burghers and landed farmers. Other administrative reforms liberalized commercial and financial markets and instituted civil rights. The ground had thus been laid for the accelerating economic growth that would during the century between 1870 and 1970 increase Swedish GNP per capita eightfold, more than any other country except Japan. The overarching ideology of liberalism reigned: belief in the power of the market's invisible hand. But the liberal government stood ready to reach out its very visible hand when need be in the form of national support or regulation.

Simultaneous developments facilitated this rapid growth. A radical upgrading of the transportation infrastructure came with the introduction of railways. The raw material-based economy gradually transformed into an economy dominated by technology-intensive production. And finally, cities could improve living standards by offering piped water, sewage and waste systems.

Evolving infrastructure and urban densification

Sweden's first industries based on rich resources of iron ore and timber had grown in areas with access to water power, raw materials and shipping ports, none of which Stockholm offered except a harbor. From the mid-1800's, foreign demand increased for iron ore from central Sweden and timber from the north to supply the more industrialized nations' expanding manufacturing and building industries. The mercantilist export and import bans had been replaced first by variable tariffs, then at the beginning of the 1860's by comprehensive free trade — neither of which furthered Stockholm's relative position among Swedish ports. Industrialists used their profits to improve their export opportunities by building private railways between mines, factories and harbors. The Swedish railway age was launched, and this primarily benefitted two cities, one in the north (Gävle), and Gothenburg on the North Sea.

But from the end of the 1850's, policies reflected a new acceptance for state capital imports to invest in the infrastructure of the future: railways, postal and telegraph systems. State-owned, financed by international loans, trunk rail lines linked state-backed, privately financed local railways, setting the stage for a nationwide railway network. Stockholm had its first rail links in the 1860's, and in 1871 these were linked together through the city to a central station near the central business district.

Stockholm's population doubled between 1850 and 1883, tripled by the end of the century and quadrupled by 1913. Much of what is today Stockholm's inner city was built hastily based on models from Berlin and Paris: five storey houses along long corridor streets and in the backyards. Here and there, the compact environment was broken by broad, tree-lined boulevards and esplanades. Park plazas with streets radiating from the center in a star formation reminiscent of the Place d'Etoile in Paris were admired by artists and writers. The radical densification of the city, made necessary by the rapid population growth, was less spectacular. Small but nevertheless expensive apartments dominated the housing market; crowding and abominable sanitary conditions were a scourge. As time went on, however, an increasing share of apartments gained access to water, sewage and gas. The rural character at the outer districts of inner Stockholm, with their low wooden houses, kitchen gardens and tobacco fields were basically wiped out. But many hills remained, and these became "parks for all", starting a tradition of public parks offering recreation, free theater and other activities for all Stockholmers. (Lundewall 2006)

The Swedish Crown had long been the largest landowner within Stockholm's city boundaries and also the most adamant opponent to the City's ambitions to make new land available for housing. With crowding becoming severe in the inner city by the turn of the century, the conservative political parties within the City Council launched a new strategy that would continue for the next eighty years: purchasing land outside the city limits for technical and social institutions as well as new housing and recreational areas.

Already, a few industrial suburbs offering substandard housing had cropped up near railway stations, ports and road crossings at the periphery, and in other areas private developers had begun to build new neighborhoods served by rail for wealthier residents, at a comfortable distance from the crowded city. A metropole was slowly taking shape. In 1913 and 1916 most remaining newly purchased areas of what we now call Stockholm were officially incorporated within City limits.[1]

The built environment in the inner city had become too large for most people to be able to walk (or row) to work. Rowboats were replaced by steam-powered ferries, endlessly long stairs built into the hilly city were replaced by public elevators. Horse-drawn streetcars were introduced and were a short time later electrified and integrated into a wider transit network. Cycling also became popular; in 1914 there were about 80 000 bicycles in Stockholm but only a little over three thousand automobiles and busses and about as many horse-drawn vehicles.

Stockholm Harbor, which had long been the country's most important for both imports and exports, was expanded, but nevertheless lost market share for timber, iron ore and steel to ports in the north and in Gothenburg. In 1850, 40 percent of Sweden's exports passed through Stockholm and 25 percent through Gothenburg. Thirty years later, the value of Sweden's exports had increased significantly but Stockholm's export value share had sunk to 8 percent while Gothenburg's was unchanged. (Hammarström 1970)

As Sweden's capital city, and the nation's wealthiest, Stockholm provided the most important domestic market and was therefore able to defend the position of its harbor as the leading port for imports of consumer goods and production inputs to Sweden. This was especially the case for high value goods, which would successively be strengthened even more, thus favoring the economic development of Stockholm.

Industrial evolution

The repeal just before 1850 of the guilds' monopoly on manufacturing and trade, which had in part aimed at supporting the capital city's production and commerce, but also had protected obsolete structures, set free optimism and new ideas. And when the steam engines of the 1850's and 1860's became Stockholm's most important energy source it could develop into a modern industrial city. The industries then established in the capital city grew quickly to be the largest in Sweden. (Magnusson 2010)

[1] With the exception of Vällingby-Hässelby to the northwest and Sätra-Skärholmen to the southwest, which were added after World War II.

Almost half of the wage-earning population worked within industry or craft trades in 1860, and up until World War I this share decreased only slightly. The expansion of the city increased the number of industrial workers, and the volume and value of their output, dramatically.

At first, industrial output was dominated by consumer goods for local markets: textiles, porcelain, groceries, beer and tobacco, newspapers and books. These were available in a large diversity, produced by small-scale producers, until they were outcompeted by larger companies with steam-driven mass production of both consumer goods and production inputs that could serve national and international markets. As the labor force became more skilled and labor costs increased, Stockholm's firms focused increasingly on finished consumer goods. Textile firms now offered clothing and metal providers became machine producers. Labor- and space-intensive industries were forced out of the inner city by the high cost and increased competition for land, first to the suburbs and then farther afield. When electric motors and combustion engines were introduced, access to locally produced energy ceased to be a geographically limiting location factor. (Hammarström 1970)

Stockholm's industries also began to shift towards more high technology innovation firms capitalizing on Swedish inventions and scientific advances. Many of these are still familiar names: LM Ericsson, Separator, Atlas, AGA, and Nobel[2]. Stockholm's industries also imported knowledge and skills, keeping a close eye on international developments, some supported by contacts with the Technology Institute (*Teknologiska institutet*), now the Royal Institute of Technology (KTH). A city of engineers and entrepreneurs could be glimpsed on the horizon.

The years around the turn of the century 1900 would be one of the most dynamic periods in the industrial history of both Stockholm and indeed the whole of Sweden. The steam age was replaced by the electric age. Sweden became an integral part of the international economy, and economic cycles swept in with greater force over Sweden's borders. Commercial banks, founded as rather humble entities in the 1850's and 1860's, had grown into leading actors in business development. The banks' influence, combined with the national government's economic initiatives and the practice of national agency procurement of the latest technology[3], contributed to a transformation of domestic company clusters into internationally competitive corporations. Many of these still form the backbone of Sweden's manufacturing industry and have set their mark on Swedish society.

If this was a breakthrough age for the banks and industrialists, it was also the period when the labor unions began to develop, and with them, the Social Democratic party, temperance leagues, independent churches and other civil society movements. The formal position-based society that had been abolished by the parliamentary reform in 1866, now became a class-based society comprised of an upper class, a middle class and a new lower class. In the decades to follow, the conflicts among these classes were bitter and resolved only slowly. A new age was approaching.

Industrial Stockholm's combination of population growth, crowding, housing shortages, high rents and higher average income during the "good times" before World War I led to an intensified and rejuvenated real estate construction boom, both in the scarce available land in the inner city, and in the newly incorporated areas. In central areas, existing neighborhoods were expanded based on the same grid principle, but new areas reflected the influence of the English "garden cities" with row houses transformed into free-standing, small single family homes in the Swedish tradition. Building permits were granted to less wealthy Stockholmers willing to build themselves. (Kallstenius 2010, Lundewall, 2006, Andersson 1997, Andersson 2012, Eriksson 1990, Johansson 1987) Stockholm's political parties enjoyed a relative consensus regarding housing policy but with different motives— from securing political loyalty of the new dwellers to making owned homes accessible to families with lower incomes.

[2]Stockholm companies producing telephones, milk separators, drilling equipment, lighthouses and dynamite.

[3] LM Ericsson's interaction with the Swedish Telegraph Administration (*Telegrafverket*) exemplifies this national procurement phenomenon, but the importance of a large and trend-oriented local market should not be forgotten. In 1912, Stockholm had one of the world's highest number of telephones per capita: 205 per thousand in Stockholm, 30 i London and 88 i New York. (Magnusson 2010)

Improvements in sanitation and health

Waste management and recycling freed the city from putrid and infection-spreading open areas, so called ”fly meetings”, near market squares and other public places. The first steps were taken in 1859 with the inception of the Sanitation Administration (Renhållningsverket) to manage the collection of human waste from latrines, which was transported outside the city and converted to saleable fertilizer. By 1900 the City of Stockholm had also taken on responsibility for cleaning the streets of horse manure and other pollutants, ameliorating the most serious sanitation hazards. Nevertheless, comprehensive waste collection would not be a municipal responsibility until 1972.

The first piped water systems from 1861 were built out and eventually all households had access to fresh water, which had previously been prohibitively expensive to all but a few. Stockholm had suffered several cholera outbreaks starting in 1834 but with successively less catastrophic effects; the last epidemic was in 1866. The sewage standard was, however, considerably lower.

A first gas production facility, gas lines and new gaslights starting in 1853 meant that Stockholm was less directly dependent on daylight. Forty years later, gaslights would be electrified, but municipal gas production continued, as an increasing share of households replaced wood-fired cookers with gas cookers. Few households installed gas lamps, however; oil lamps dominated in Stockholm’s homes for a few more decades until the introduction of electric bulbs.

Improvements to hygiene standards contributed to the doubling of life expectancy for men from 25 to 50 years and for women from 37 to 51. Improvements started in the 1850’s and 1860’s, and continuing through the balance of that century, made life better for most Stockholmers.

The environmental cost of modernity

The “ecological footprint” of the city’s inhabitants and industries, which had been small in 1850, was only somewhat larger in 1900. The rapidly expanding population, land area, and industrial development had indeed contributed to more consumption, more waste and more transport trips. On the other hand, much production and consumption still cycled locally, and transportation was still served primarily by horse-drawn carriages. (Pettersson 2008)

With the introduction of gaslights and factory heating with coal or coke from the gasworks, and when steam engines also began to burn fossil fuels, air pollution became a problem, though not on the scale that the automobile would bring. It would be many more years before the majority of households discarded their wood-fired stoves or replaced fireplaces with oil-fired central heating. Electricity was appearing in homes, industry and transport systems, but was not yet widespread. Only later would electricity begin to replace fossil fuel imports—and therefore “exports” of our environmental effects—with domestically produced water power.

The first waterworks used a rather simple filtering system and were located in the vicinity of large sewage outlets into Stockholm’s waterways, but many neglected the danger as Stockholm is surrounded by water and situated where one of Northern Europe’s largest freshwater lakes flows out to sea. Experts argued—in vain—for sewage outlets farther out from the city and for better water and sewage treatment systems. The costs for these systems discouraged policymakers, who instead preferred to encourage individual households to use charcoal filters to provide clean tap water.

Fortunately, this worked fairly well until the Stockholm City Council decided in 1909 to make the installation of water closets more convenient, by allowing them to be directly connected to sewage pipes, without the previously compulsory storage and sludge separation in septic tanks. The installation of indoor toilet became more common—and outflows of raw sewage were a new scourge on the city. Deteriorating water quality soon became noticeable and residents complained as public baths closed and fishing harvests dropped. Still, the first water purification plant would not open until the 1930’s, and it would be long before Stockholm’s sewage was purified mechanically, even longer before purification would be extended over several phases.

A missed opportunity

One environmental activist in the City Council and the national parliament was a professor in water systems architecture at KTH named Gustaf Richert, who supported not only water purification but

also voiced concern over increasing air pollution and proposed laws requiring concessions, control and oversight by a new public authority that could even take its own initiatives to reduce health risks. This eventually came to pass, but only fifty years and many environmental accidents later. Both the national government and Stockholm's leadership had other concerns, inter alia with the outbreak of the first World War, and Richert's proposals were essentially forgotten until Rachel Carson's Silent Spring awakened public opinion. Sweden's Environmental Protection Agency was created in 1967. (Strandh 1985)

A recurring question in urban studies is to what extent development is generated endogenously or exogenously. Stockholm's development, until World War I, was arguably most affected by driving forces at the national level, in turn affected by experiences and lessons learned from other countries. Finance Minister J. A. Gripenstedt (1813-74), who had studied England's industrial districts and who was inspired by the economics of "liberal harmony" personified by Frédéric Bastiat, was Sweden's most foresighted politician in those days. He pushed through liberal reforms to the governance system and commerce law, strategic investments in the railway network and cooperation between the national government and financial markets. He also facilitated national capital imports to finance the building of railways and the inception of commercial banks. Another leading figure was his friend the banker A.O. Wallenberg (1816-86), who laid the groundwork for cooperation between banks and industry that has since characterized Swedish industrial structure. (Ohlsson 1994, Magnusson 2010)

4. A peaceful era of sowing seeds 1914–1945

Many of the seeds of today's Stockholm and Sweden were sown in the latter half of the 19th century and around the turn of the century. However, the period called the "democratic breakthrough" in 1920-1921 was equally important. All grown men and women were given the right to vote and hold public office at the national and local levels. In Stockholm, the municipal governance system was reformed, simplifying earlier complicated and lengthy protocols, the City Council was given decision authority, the Central Board (stadskollegiet) became the new governing body and six City Councilmen were assigned key areas responsibility and associated committees. (Larsson 1977)

Neutral in two World Wars

The 20th century brought two world wars, several civil wars, revolutions, occupations and dictatorships to Europe. Only Sweden, Switzerland and a few other small states were spared.

Sweden's neighbors Denmark and Norway were also neutral during World War I but were occupied by Nazi Germany during World War II. Finland was in the hands of the Russian Czar during the first war, declared its independency after the Russian revolution 1917, but had during the second war to fight twice with the Soviet Union. The country managed to keep its freedom but lost large parts of its area.

Throughout both wars, Sweden was cut off from its most important trading partners, Great Britain and the United States[4], and its foreign trade was temporarily reoriented towards the German market. Sweden exported raw materials such as iron ore and other products that ostensibly preserved Sweden's neutral status and were not essential to the country's own defense or in the production of consumer products. Both Sweden's import and export volumes shrank as a large share of domestic industry reorganized so as to be able to replace imports with domestically produced good; other firms slowed production as labor was rerouted to the country's defense services. Gender segregation decreased in the marketplace as many male jobs were assumed by women. Though not offered the same salaries or conditions, these were nonetheless important first steps to gender equality.

[4] Great Britain had long been an important trading partner for Sweden; trade with the USA increased primarily after World War I.

The outbreak of war in 1914 broke the positive economic cycle that Sweden had enjoyed since 1910, and even up to the years just after the end of WWII, the development of both agricultural and industrial productivity and profitability was weaker than it had been at the turn of the century 1900. Neutral Sweden was not spared the hardships of the economic crises between the two world wars, which delayed the recovery of trade and goods production. By 1920 Sweden was almost paralyzed, though the crises of the 1930's were handled more effectively, and became less devastating.

Diversification and modernization of the industrial city

Stockholm continued its rapid population growth: the city population passed 400 000 during the First World War and 500 000 during the Second. Simultaneously, the surrounding county grew from 230 000 to over 300 000. Almost half of Sweden's population growth between the two World Wars accrued to the Stockholm area.

As noted earlier Stockholm had begun to purchase and incorporate neighboring parishes in order to build housing for the growing population. And though the First World War halted this progress, thus creating a housing crisis for the poorest, planning continued so that building could recommence directly after the war. (Johansson 1987) Garden cities and multi-family housing were built on municipal land, as well as tram lines linking them to the inner city. As before, most multifamily housing was built by private developers but was increasingly often purchased by foundations and cooperatives and eventually by municipally owned housing companies, who raised technical and sanitary standards. Kitchens with gas or electric ranges, and private bathrooms became more common, though by international standards the apartments still lacked many amenities.

Suburban commuter rail lines and buses allowed labor and housing markets to grow across municipal boundaries and a metropolitan region was now a reality for Stockholm's citizens, but not for the national and municipal leaders. The City of Stockholm was neither part of the nationally governed regional County administration nor the democratically elected regional County council[5]. Many proposals to reform this administrative anomaly were proposed, but failed until the 1960's.

Industry was still a powerful force in the reshaping of Swedish society. Sweden's transformation from an agrarian society to an urbanized country based on industrial and service sectors, which had begun in the 19th century, continued unabated. By the 1930's the number of farm workers was already lower than the number working in the industrial and building sectors, and a few years later lower than the number working in service sectors as well. Still, about sixty percent of the Swedish population lived in rural areas, and it would be ten years after the end of the Second World War until the urban population had a majority.

The car and the airplane became popular, but mostly for commercial or government purposes rather than for private consumption. Horse-drawn carriages disappeared from Stockholm's streets and electrified trams, commuter rail, buses and bicycles were the dominant modes of travel. Automobile ownership increased slowly but steadily nonetheless; by 1939 there were twenty thousand vehicles, one for every twenty-three people. (Dufwa 1985) The private automobile was more of a status symbol than an icon of personal freedom for working people.

Even though Stockholm was considered a major industrial city, services such as trade and communications had by World War I already begun to employ a larger share of workers; by the end of WWII, more than twice as many. Perhaps the most visible change in Stockholm's industrial character was that small and mid-sized industries, producing relatively unsophisticated goods, were replaced by larger, specialized and knowledge-intensive industries. This transformation would continue, even amplified after the last war.

[5] Several other larger cities were also unincorporated in county councils, as they were considered large enough to handle key county functions such as health care on their own. Stockholm was unique in that it was also subject to its own "Local Administrative Board"—the local arm of the national government—because the Swedish Crown historically preferred to maintain a stronger hold on the capital city than on other municipalities. The municipal government of Stockholm generally considered this unequal treatment to be to its detriment.

The Social Democratic Party assumes control

Politically, democratic reforms marked the dawn of a long era of left-led dominance of the Stockholm City Hall. From 1920 to 1950, the Social Democratic Party held the City's leading political post, that of Vice-Mayor of Finance. Although the most prominent figures within the Social Democratic Party dominated Stockholm's leadership for many decades, the majority held by the Social Democratic Party varied considerably. Up until the 1980's the largest parties shared the commissioner posts and the ruling of the City, thereafter the opposition commissioners have no administrative responsibility.

The Social Democratic Party's dominance was at first not as strong at the national level as it was in Stockholm; although the party was Sweden's largest between 1917 and 2006, and led the national government for shorter periods before 1930 and then almost continuously thereafter; 1932–1976, 1982–1991 and 1994–2006, often with a single party majority but sometimes in multi-party coalitions.

The first major challenge was the Great Depression, when mass unemployment gave rise to a spate of new initiatives with Swedish economic and political doctrine following a Keynesian approach even before Keynes published his *General Theory*[6]. New institutions and labor market laws were added, employer and labor associations signed agreements that regulated negotiations and disputes. This was the breakthrough for the so-called "Swedish model" [7], principles guiding the division of power and responsibility between labor market and State actors. Employers and unions would negotiate wages and other employment conditions independently, and the government and parliament created laws and regulations, often in close consultation with them. This construction proved successful and was applied in other contexts: for the best result, let those most affected solve their problems together.

Even though Depression-era Stockholm fared better than many cities, unemployment increased dramatically, and the City invested in new tram tunnels, bridges and other types of relief work to provide jobs. The central business district, which had developed in a neighborhood with a street network from the 17th century and buildings from the 18th and 19th centuries, was in urgent need of renovation. An international competition gave inspiration to continued planning, but the outbreak of World War II forced Stockholm to delay its investments. Nevertheless, in 1941 the City Council made a radical decision for a city of still moderate size: to build a comprehensive subway network as the backbone of a future metropolitan public transit system that would serve the city and its suburbs.

This was a bold move, not only because it anticipated a development trajectory wherein the subway would play a central role in the transportation system, but also because the City of Stockholm shouldered the entire financial responsiblity for such a large strategic investment. (Larsson 1977. Gullberg 2001)

Splits in the environmental balance

The approximately thirty years between the outbreak of WWI and the end of WWII were a time of enormous pressure for all of humanity, and though less dramatic for those living in neutral Sweden and Stockholm, they did not go unaffected. The wealthiest regions in North America, Europe and Australia, and industrial nations such as Japan increased their use and misuse of ecological resources dramatically. Mobilization and armaments for the wars squandered all types of resources: human, capital, and environmental.

The rapid population growth and improvements to the living standard in Stockholm gave rise to debates regarding whether the capital city was the engine of development for Sweden, or drain on its resources. This debate would be raised often during the post-war period, but at this time was focused more on spatial socioeconomic and population balance than on environmental effects. Stockholm county had positive in-migration and low birth rates, with many young people arriving

[6] John Maynard Keynes, *The General Theory of Employment, Interest and Money*. UK: Palgrave Macmillan, 1936.

[7] Or the *Nordic model*; the Nordic countries have similar approaches and policies.

from neighboring regions: from 1920 to 1940 Stockholm county's *share* of Sweden's population rose by almost 25 percent while that of surrounding areas dropped. (Scheele 1991, Snickars & Axelsson 1984) This was not particularly problematic when rural households were migrating to Stockholm seeking better opportunities, but when other cities began to lose population to Stockholm, it was decried as unnatural, that migrants had fallen victim to the seductions of big cities.

Wartime closures were barely noticed in the ever rising curves describing the consumption of food, drink, consumer goods, transportation and energy—not to mention the production of waste. Certainly, for a large share of the population maintaining life's necessities was a challenge, but the public authorities mastered the art of rationing and developed effective systems that arguably even improved public health.

With the exception of the war years, Stockholm led the country in its increases in personal consumption, imported from other parts of Sweden and to some extent from abroad. Not only food and drink was imported; the capital city was far from self-sufficient in most areas and, thus, exported more of its environmental effects than earlier.

The first sewage treatment plant was opened during the 1930's and more would follow. The sanitation process was still rather crude and rising consumption rates led to deteriorating water quality. Radical improvements would, however, not be undertaken until the 1960's. (Pettersson 2008)

Electricity use had also risen dramatically across the country, and Stockholm doubled its consumption every decade; gaslights had been electrified, and many households had replaced their gas ranges and started to buy electric appliances; the refrigerator replaced the icebox, electric bulbs shone in every room and the radio was always on. Stockholm's first electric power facility was operational in 1892, but lacked a smokestack scrubber and was decommissioned after only nine years. Instead, a large electric power plant was built next to the gasworks in the harbor area, which could receive deliveries of feedstock fuels. This plant was built out and modernized successively, as demand increased and technology improved (Hallerdt 1992)

Thanks to Sweden's hydroelectric resources and successively more technologically advanced and geographically built out power grid, Stockholm began to abandon the use of imported coal. The city bought water rights and built power plants and transmission lines. Just after the end of WWI, City owned hydroelectric power was available to Stockholm's consumers, and this pattern of acquisitions and expansions continued for several decades to meet steadily increasing demand.

As noted above, Stockholmers did not begin to purchase large numbers of private cars until the late 1940's, so the automobile culture was not yet considered to be an environmental threat. The streetcar network had good coverage of the inner city, and many suburbs also had tram links with the urban core. There were also diesel-powered buses serving Stockholm and other suburbs. In sum, the per capita environmental impact from transport was arguably moderate.

The local and regional environment improved during this period due to the continued drift from local manufacturing to the service sector, which also led to a reduction in heavy transports for goods handling in the capital city area. From an economic perspective—and perhaps from a global environmental perspective as well—the continued concentration of power, management and development of Swedish business in Stockholm was even more important. The shift of power from industry to the large commercial banks that had begun at the end of the 19th century continued.

The period 1914-1945 was marked by change. The bitter class conflict gave way to peaceful conflict resolution between actors in the labor market and the evolutionary social democratic welfare state policy. The groundwork had been laid for a Swedish industrial society focused on technological development, large scale production and an export orientation. Stockholm developed in a similar vein, politically and industrially, and pursued urban development with modernism as the social and aesthetic beacon. (Andersson 2009, Eriksson 2001) Stockholm's development was still heavily dependent on national driving forces and international role models, but there were already signs of the city's potential for endogenous growth.

5. Reaping harvests after 1945

Sweden renews 1945–1970[8]

Joy in Stockholm at the news of Germany's unconditional surrender in May 1945 was as exultant as in neighboring countries that had been occupied during the war. Optimism for a peaceful future was intensely felt across the population, as well as the urge to abandon rationing and consume again. This was stimulated by everything new on the market: American fashion and automobiles, coca-cola and hamburgers, plastic and penicillin. The government and many leading economists, however, feared that the great depression after WWI could be repeated if cautionary measures were not taken.

The victorious Allied forces had also prepared to speed up the wheels of economic development and avoid the famine and other horrors that had followed WWI. Payment and credit systems would be stabilized by Bretton Woods, the World Bank and IMF, global trade would be stimulated through tariff reductions and free trade agreements in GATT and the Marshall Plan would rebuild Europe.

The result was rapid economic growth in the entire Western world—the Soviet Bloc remained outside—and the Swedish government, instead of facing recession, was now forced to take strong anti-inflationary measures. Wartime restrictions, bans and rationing was extended and expanded to dampen demand for inputs to industry and consumer goods to citizens. This produced a confusing and unpopular network of bilateral trade agreements and domestic regulations that would prove unsustainable and were eventually phased out, even though some parts would remain for decades; regulation of the construction industry continued until 1958 and regulation of the rental market has never been fully revoked.

From 1950 until 1965, the top year for Swedish industry when it employed one million workers, industry increased its productivity, profitability and energy consumption. The industrial growth rate was still high in the late 1960's, but from 1970 it was only half as large. This golden age reflected not only global developmental trends, but also Sweden's definitive transformation from a relatively underproductive agricultural and forestry economy to a highly productive economy based on manufacturing and services.

Swedes became healthier and lived longer. In 1945, the life expectancy for men was 66 and for women 71; in 1970 men could expect to live 70 years and women 77. Swedes were also materially wealthier and income disparities shrank. Total consumption doubled between 1950 and 1970, but note that over half of this growth was due to tax-financed public consumption that was not always esteemed by citizens: health care, nursing and schools but also public administration, defense and prisons.

From 1950 to 1970 GDP doubled (at constant prices) but municipal expenditures tripled, from twelve percent of GDP in 1950 to eighteen in 1970. Municipalities were strengthened in two ways. Two amalgamations drastically reduced their number from 2 300 to 290, and the scope of municipal responsibility increased dramatically. Stockholm county now comprises 26 municipalities—the city of Stockholm by far the largest, with forty percent of the county's population.

During these two decades, many small farms in Sweden's sparsely populated areas closed and farmers and workers migrated to cities and towns across the country to work in industry and the public sector. The cities and larger towns were building modern, sanitary apartments as part of the "million homes program" and there were in particular better opportunities for working women. Some of this migration went to the largest cities, but not as much as many feared.

Sweden, formerly a net emigration country, was now a destination for immigrants as industry attracted labor from Finland, Poland and Southern Europe. This was new for Sweden; the country

[8] Much of this section is based on the chapters *Den sociala kapitalismen* (Social capitalism) and *Den svenska modellen* (the Swedish model) in Lars Magnusson's: *Sveriges ekonomiska historia (Sweden's economic history)*, Stockholm 2010

had welcomed refugees during wartime, of which most were already assimilated, as would the new waves of immigrants that arrived in the 1940's and 1950's. Industrial towns became more ethnically diverse. Swedes in general became more tolerant of other cultures and lifestyles and started to travel abroad more often. By the end of this period, however, labor immigration was reduced by national policies. Instead, a wave of refugees and their families from outside Europe began to migrate to Sweden, making the word multicultural a living part of the Swedish language and culture: a badge of honor for many, a negatively charged for others.

Renewing Stockholm: 1945 to the 1970's

The transformation of Stockholm from being an important base for Swedish industry, to being almost exclusively dominated by private and public services, continued unabated. The inner city environment was particularly affected as manufacturing moved out, changed in character, or disappeared. The few industries that remained there were in graphic services, groceries, handicrafts and specialized manufacturing of prototypes for demonstrations. Within industrial corporations, management and development functions became increasingly separated from production and logistics and preferred localization in the Stockholm region, presumably the inner city. As a consequence the area became even more attractive for all sorts of business service and consultancy agencies. Stockholm was on the verge of becoming a global metropolis. (Hall 1998, Magnusson 2010)

Urban development planning was enjoying a renaissance and found new forms: master plans and regional plans. Large cities were the frontline of development; Stockholm incorporated new outer city areas in both the northwest and southwest. Stockholm's Master Plan of 1952 outlined the guidelines for transit-oriented urban development with newly built model districts laid out like a string of pearls along subway corridors. One of these districts, Vällingby, became internationally famous. (Sax 1998) The Master Plan was not formally adopted but nevertheless laid the foundation for planning and urban development for decades to come.

Stockholm built as never before—or since! In the urban core, the central business district underwent a radical redevelopment close to the Stockholm Central Station, where several subway lines linked to the commuter, regional and national trains. Stockholm's modern amenities were to be easily accessed from the modern new districts at the periphery. Building the subway lines began in 1944 and would last fifty years. It was also the start of a large-scale urban redevelopment that would last twenty years. (Sidenbladh 1985, Gullberg 2001) The greatest changes—demolitions, provisional solutions, new buildings—worried residents' patience. A growing number demanded that these radical projects be halted and called for a return to a more cautious approach to refurbishing the city. City leaders gave in to public opinion, and planning in the 1970's reflected a new paradigm favoring preservation and traffic calming. This implied also considerably less strain on municipal coffers.

Simultaneously, Stockholm's population growth began to slow and change in character. Higher household incomes resulted in new lifestyle choices; a growing number chose larger domiciles closer to green areas, commuting to the inner city from the suburbs. As traffic increased, the city population shrank; by 1980, Stockholm had 647 000 residents, 160 000 fewer than its peak population in 1960. In the meantime, the metropolitan population outside of Stockholm more than doubled, from 358 000 to 740 000.

In 1963, a century after county councils had been established in Sweden, Stockholm's Vice-Mayor for Finance proposed that the city apply to join the Stockholm County Council and coordinate the planning for the entire metropolitan region, including land use, public transit and public health care. In 1971 the new enlarged County Council became operational, three years earlier the County Administrative Board had swallowed the former Local Administrative Board of Stockholm. (Wijkmark 2002)

One responsibility for the County Council was the intraregional redistribution of tax income and the provision of expansion loans to fund the building of new housing estates in less wealthy municipalities, but this was eventually phased out.

The provision of housing continued to be a primary municipal responsibility in the region and had been ratcheted up to avoid renewed housing shortages. As urban population declined, the region was suddenly faced with a glut of public housing apartments that would fill with tenants only slowly—some with refugee immigrants from outside Europe—which led to ethnic segregation, weakening municipal revenues and increasing critique of the million homes program.[9]

Household relocation and commuting moved farther and farther afield. Coordinating regional planning was a natural response to this phenomenon, as population growth was now less in the urban core and more in the surrounding region. An Outline Regional Plan from 1966 anticipated that Stockholmers' recreation area, and before long also the labor and housing region, would spill over the borders of Stockholm County. (Wijkmark 2002)

This outline plan was based on expectations of strong regional population growth and a significant increase in living standards; therefore it included more housing areas and transportation infra-structure—both railway and roads—than had previous plans. The plan provoked strong criticism, not least from environmental interests, and was (like Stockholm's Master Plan 1952) never formally approved. Most of its ambitions would not be realized, particularly new road projects, for example an eastern orbital link and a western bypass of the urban core. Many proposed housing areas have been reconceived as nature reserves, downsized or postponed. On the other hand, proposals in the plan for significant improvements such as the development of large scale regional sewage and waste treatment facilities were in fact implemented during the 1960's and in the decades that followed, and these have been important in establishing Stockholm's reputation as an environmental role model. Nowadays, most waste is recycled or combusted to produce energy, and construction waste has been used to make man-made hills for winter sports. Stockholm's water is now so clean that it is suitable for fishing and bathing almost everywhere. (Ingo 2002)

Dreams of an endless supply of energy

The correlation between living standard, comfort and energy use is well established. Stockholm experienced this at the end of the 19th century with the introduction of electric lighting. Thereafter electricity use in Sweden doubled every eleven years—even more rapidly in Stockholm—and production facilities were built out rapidly. In the mid-1960's, hydroelectric power provided most of the electricity used in the country; the rest was imported, and already cheap and easily handled oil had almost outcompeted coal and coke. Still, Sweden's total fossil fuel use was significant, and air pollution from transportation and smokestacks was on the rise.

Increasing the use of electric power seemed in this perspective to be a solution to the negative consequences of imported fossil fuel, and electric power producers forecast dramatic increases in demand. A large share of Swedish industry including the steel and paper pulp industries was, and remains, a large net consumer of electricity. Electricity demand also increased to power railroads and streetcars, not to mention the steadily growing household demand. New uses for electricity were being introduced every decade, and they came to the cities first.

Electric power plants in Stockholm had also become more efficient and more profitable, by providing not only electric power but also district heating to all new housing areas on municipally owned land, indeed almost all new development within city limits. This provided building owners with a more environmentally friendly, cleaner alternative to individual oil burners—not to mention freeing up the space they took. The big news was nuclear power, which many saw as an unlimited resource. In his speech *Atoms for peace* before the United Nations in 1953, US President Dwight D. Eisenhower had proposed the establishment of the International Atomic Energy Agency and offered all countries willing to submit to its control access to material and knowledge about the peaceful utilization of nuclear power. Sweden and Swedish industry were early adopters, not least in Stockholm, where test reactors were built on the KTH campus and in Vällingby's counterpart on the southern edge of the city, Farsta, which would be fully supported by nuclear electricity and heat for

[9] A 1965 national government decision to build one million rental apartment units over a ten year period.

eleven years. Both reactors have now been decommissioned and nuclear power is a controversial energy source to say the least, due to its serious risks and difficulties managing nuclear waste. (Hallerdt 1992)

A symbol of progress and freedom becomes an environmental villain

Looking back, the doubling of Swedish consumption in the space of two decades was not only positive. New durable consumer goods—automobiles, refrigerators, freezers, recreational boats, televisions and much more made life richer and more comfortable, but also had both public and private economic consequences. Above all the automobile demanded large investments in streets and roads, petrol import, refining and distribution, service stations and junkyards, as well as additional police, ambulances, and accident response teams. For the Swedish automobile industry and importers of cars and petroleum, this was a golden age.

Most still considered the car a symbol of freedom, especially for men. Even if most decried the congestion and accidents that increased automobile use entailed, they were not equally well aware of environmental threats from emissions and particulates. And few had any idea that pollutants affected areas beyond the immediate vicinity. Combined with the increasing use of oil heating in houses and facilities, automobile use began to threaten the Earth's climate. Today this is common knowledge, but then it was understood only by experts—and they were often met with skepticism.

Despite Sweden's large surface area, long distances and large transportation demands, neither the road nor railways networks were particularly well developed or of a world class standard outside of the major road and rail corridors: trunk routes, highways and European motorways. Following the major extensions between 1857 and WWI, there were few large investments in new railways, maintenance was substandard and service on many lines was discontinued. This negative spiral accelerated after WWII, as focus turned to developing highways. Stockholm had a better local and regional public transit system in terms of capacity and access than other Swedish regions, accounting for almost half of trips to the urban core and half of the entire country's transit trips. Meanwhile, the road network was extended, but could not keep pace with the expanding car culture.

Still, notwithstanding the speed and flexibility offered by the car compared to the more restricted transit network, a wave of public opinion in the 1970's voiced criticism over the rapidly developing automobile fleet and new roads, more so than in many large Western cities. A partial explanation may be that local transportation policy in Stockholm had in the 1950's and 1960's focused on expanding both railways and motorways, but had not, like Denmark, simultaneously invested in infrastructure for walking and bicycle trips. There is essentially no mention of bicycle infrastructure in Stockholm's planning and background strategy reports before 1973, nor are cycles given much mention in central planning documents. Stockholm still lacks a cohesive and safe cycle lane network, even in the inner city. This may be why current debate tends to one-eyedly pit car use against cycling. Differences in transport mode share by gender and class haven't made it easier to formulate and implement a more balanced transportation policy.

When the Stockholm City Council decided in 1941 to base public transport on a subway system, Stockholm was in no way an automobile-dominated city. Most of the twenty thousand cars registered in Stockholm before WWII had been decomissioned because of the war. Most believed that Sweden and Stockholm after the war would follow America's example and begin to use cars more often, but few realized the extent to which private automobiles would soon dominate Swedish cities. In hindsight, though the subway in Stockholm was built to serve social and economic rather than environment and climate goals, we can be grateful for the City's foresight and willingness of that generation to shoulder the entire investment costs in the subway system.

In the first decades after WWII, Stockholm, its firms and households were in the process of emancipating themselves from national dependence. The spatial pattern of the region's built environment also showed signs of transforming from a mono-centric to a poly-centric metropolitan form, even if Stockholm was still the region's undisputed core. The industrial city gave way to the city of private and public services with an increasingly evident focus on leadership functions, R&D and

innovation. Stockholm had its own networks of cooperation and competition with metropolitan regions abroad. For the first time, Stockholm could be described as a network society with at least some endogenously generated growth.

City politics were no longer dominated by a single party but rather by several strong political actors. Higher living standards and educational levels were reflected in more sophisticated citizen and consumer demands and a culture of individualism.

6. The past forty years

A growth crisis from 1970 …

In the years around 1970, new concerns arose as youth across the Western world protested the blind faith of the previous generation in its infallibility and its refusal to take responsibility for serious global problems: environmental destruction, poverty, famine and oppression. As a consequence of these concerns, Sweden took new initiatives in several areas including the "one percent goal" for foreign aid [10], and a more vigorous critical opposition to oppression and colonialist wars. The Swedish government also encouraged the United Nations to announce an international environmental protection conference, which was held in Stockholm in 1972 and resulted in the Stockholm Declaration on the need to protect the global environment and the creation of the United Nations Environment Program (UNEP). These policy successes gave Stockholm a—perhaps not wholly deserved—reputation as a role model in environmental policy: it was as much of a "wake-up call" in Stockholm as in many other cities. Stockholm's environmental reputation may be better motivated today, when Stockholm has an active and broad environmental movement, and when most cities, not least Stockholm, have given environment and climate issues a central role in local policy.

The capital city and region's rapid economic and population growth in the 1950's and 1960's also provoked a reaction from national politicians, but too late and arguably misguided. A number of regional investment policies aimed at dampening growth in Stockholm, seen as draining potential from struggling regions in the rest of Sweden. This policy initially had positive effects for prioritized regions; in the 1970's, new universities and colleges were established as supportive anchors for regional development, and major national administrations, agencies and military complexes were relocated to areas outside of Stockholm. An unanticipated side effect of this policy was that the private sector share of employment in the Stockholm region, already high relative to the rest of Sweden, increased even more and strengthened its potential for economic expansion.

Sweden's ambitious international engagement could not mask growing domestic problems. During the three last decades of the 20th century major key export industries collapsed: shipyards, iron ore, steel. And domestic industries began to fail in the 1960's: textiles and clothing, leather and shoes, and rubber. This had negative consequences for many parts of Sweden, but not for Stockholm. Instead, Stockholm suffered from the effects of population decline; the construction industry and its subcontractors lagged and municipal budget revenues dipped.

At the same time, positive changes were evident in the labor market, especially in cities and most of all in the largest metropolitan regions. Family and gender equality policies made advances towards the emancipation of women through individual tax declaration reforms and the development of a comprehensive subsidized child care system. These gave working women previously unimaginable opportunities to find jobs in the labor market and earn their own incomes. The share of women aged 16-65 who were gainfully employed rose from 58 percent 1970 to 80 percent 1990.

But the famous successes of Social Democratic party's national economic policy, previously able to simultaneously achieve a high growth rate, full employment, stable prices and a balance of payments, no longer worked as it had before. For the first time in forty years, Sweden elected a

[10] Sweden's international aid should amount to at least one percent of her GDI.

national government led by a party other than the Social Democrats, and many county councils and municipalities followed suit. A new constitution in 1974 replaced the two chamber governance system with a single chamber parliament, and common election days to parliament, county and municipal councils were instituted. Ever since, Sweden's politics have been more like those in other parts of the West: shifting political majorities in power. Both right-wing and left-wing winds sweep the country, and public opinion has a more immediate impact on policymaking.

The national government elected in 1976, and its followers, were forced to devaluate the currency several times to retain Sweden's competitive position and high standards, but the domestic economy was too small to face the effects of international crisis: fourfold oil price shocks, economic warfare between East and West, nuclear power plant accidents in the US and Soviet Union, and local wars.

But all was not bleak. Despite the oil crisis, Sweden had inexpensive energy for its households and industries thanks to its nuclear and hydroelectric capacity. In sector after sector, the march to oil independence was on—and on its way to a new dependence, on nuclear power! Hydroelectric capacity could not be increased much more without harming fragile ecological areas and natural values such as untouched rivers and mountain lakes, and there seemed to be no other large scale alternative that did not harm air quality or other environmental areas.

The oil crisis, combined with concern of oil dependency, hastened a transition to direct electric heating of single-family homes. Electricity was clean, comfortable and—at least locally—pollution free. In the Stockholm region, this phenomenon was particularly widespread during the 1970's. Stockholm used more hydroelectric energy than ever, but use of fossil fuels was still considerable as decision-makers awaited the construction of a nuclear power facility in the region or access to hot water from existing reactors. But neither of these situations came to pass, because a public referendum in 1980 led to a policy aiming at eventually phasing out nuclear power. The country still remained oil dependent, even if this dependence was now disguised as clean electricity.

…and rejuvenation

Despite foreign crises that affected Sweden, and despite the public referendum against nuclear power and flare-ups of ideological conflicts regarding socialization of industry, Sweden maintained the critical capacity for peaceful cooperation across party blocs and labor market actors it had developed in the 1930's. Consensus reforms in the 1990's focused on the taxation system and the budget process. Sweden's public finances were thus more stable by the turn of the century than they had been in 1970. And they still are.

Another legacy of strength was, ironically, the dual structure of Sweden's industry and exports: partly based on and located near raw materials from most regions in the country except that of Stockholm, and partly on service and knowledge intensive products from Stockholm and other main city regions. Sweden proved that it despite its smallness could keep pace with—and even lead—the rapid technological advances in areas such as information technology and life sciences, and utilize a long tradition in Swedish industry of focus on innovation and technological development.

In Sweden's larger cities, these transformations were manifested on such a large scale that they could be described as Schumpeterian creative destruction[11] that forced out traditional manufacturing but ushered in a new technology age. Åke E. Andersson describes this period as Sweden's *fourth logistical revolution*[12], wherein the driving forces of knowledge, creativity and communication would first transform the largest metropolitan regions and eventually spread throughout the country. In Sweden's second and third largest cities, Gothenburg and Malmo, large centrally located shipyards were razed to make room for new types of industry, services and housing. And in greater Stockholm, arose in the industrial area in the newest urban district, Kista, a profile previously unknown to Sweden: it developed into an ICT and electronics cluster.

[11] Joseph A. Schumpeter: *Capitalism, Socialism and Democracy* 1942

[12] Åke E. Andersson: *Kreativitet – StorStadens Framtid (Creativity – the Future of Big Cities)* Stockholm 1985

Kista surprised both urban planners and politicians, who had anticipated a typical subway transit-serviced urban district but got instead two companies within the Ericsson group as the first investors in 1976, followed by IBM and then a host of other firms with similar profiles, one after the other. The snowball had begun to roll and Sweden's first high technology cluster was appearing.

The City's reactions to these phenomena were reflected in two industrial and labor policy programs in 1976 and 1982. The first was focused on stimulants and support to counteract the disappearance of manufacturing firms from Stockholm. Universities and research institutes were hardly looked upon as partners in this program, but in the second program they had assumed a position as important actors in local and regional innovation systems. Electronics and other types of micro-technology were named as particularly promising sectors.

At around the same time—and coordinated with the City's policy—Stockholm County Council assumed a greater responsibility for strategic development in the region. In particular, they actively supported public health and clinical medical research at the university hospital in the southern part of the county. This strategy served several goals simultaneously: to further strategically important industrial sectors, to develop the region's leading medical teaching hospital and medical school, to create life science research institutes as well as a new teaching and research institute including the humanities, social sciences and natural sciences in the same area. (Wijkmark 2002)

At first, many of the City and County initiatives seemed to be conflicting, but eventually the degree of cooperation deepened and broadened, including several of the region's institutes for higher education and other municipalities. In its 1982 program, Stockholm noted that a rich and diverse industrial base throughout the region was in the City's interest, and also that cooperation with other municipalities was improving.

The background to both programs was concern over the future of the city and the region. In 1976, manufacturing sectors were faltering and many private companies had serious profitability problems. On the other hand, the high share of women in the labor force was a positive sign.

By 1982 population and economic indicators once again began to point upwards. Growth in Sweden's largest and densest region, with its rich supply of skilled labor, advanced consumption profile and good access to knowledge-oriented jobs, has been strong ever since. The region is considered powerful and competitive. Several indices of Stockholm's competitive position in Europe and within the OECD shows a region holding its own, and underscores success factors including high rates of entrepreneurship, a high rate of innovation and renewal, and significant public and private investments in research and development. No other Swedish region has such a diverse industrial base; as might be expected, Sweden's second and third largest regions follow, but the industrial base in the rest of the country is far less diverse. Stockholm is home to a significantly higher share of total labor force in the knowledge industries; the share of the workforce in ICT is twice that in other Swedish labor market regions. (Johansson and Strömquist 2002)

Stockholm's labor market development prospects are better across the board than in the rest of Sweden, and the region's share of GDP has risen faster than its share of the population. All in all, the region has fared generally better than other Swedish regions in the face of economic downturns and has a proven economic resilience.

A cosmopolitan capital

The ICT cluster in Kista is often described as a symbol for the renewal of Stockholm's economy, but perhaps it rather reflects accelerating globalization of information, economies and societies—and Stockholm's entry into the circle of internationally recognized metropolitan regions. (Linzie 2002)

In part due to Sweden's liberal immigration policies for political refugees, the population of the Stockholm region had become more diverse and daily life more cosmopolitan. Stockholmers travelled abroad and received foreign visitors more often. Growing tourism made its mark on the urban environment: giant cruising ferries docked at Stockholm's harbors, domestic hotel chains were integrated in international hotel chains. Pizzerias, pubs and hamburger joints sprang up and stores switched the Swedish language signs for "Sale" (REA) for the internationally recognized "SALE."

Entertainment life glittered, business life was more globalized, and English became the spoken language in many companies and universities.

Stockholm's traditional role as the central node in Sweden's road and railway network extended to cover airlines, telecommunications and data traffic; Arlanda became a major national and international airport serving over two thirds of Sweden's air travellers, of which 80 percent had an origin or destination in the Stockholm region.

Politics also underwent renewal: both the City and the County were determined to develop based on a wider array of perspectives, to act within European and international arenas, formulate visions and goals for the future, promote Stockholm and compete globally.

A new national Planning and Building Act 1987 mandates long term, comprehensive municipal physical plans. For the first time since 1952, Stockholm renewed its master plan and has updated it regularly ever since. These later plans have a common focus on densification of the inner city and the near periphery in order to better utilize centrally located land, improve the preconditions for public transit and cycling, and counteract sprawl and private car dependence. (Ingo 2002) In each new planning process, it is ever more evident that such ambitions are part and parcel of an active environment and climate policy approach to physical planning—even if plans offer, in practice, less room than earlier for the traditional idea that today's Stockholmers should leave to coming generations a "green city" in the strictest sense of the word. This new planning paradigm has also given form to new showcase neighborhoods like that of Vällingby in the 1952 Master Plan[13] but better suited to current sustainability goals.

The aspect of city planning policy that aroused the most difficult conflicts and impasses—in Stockholm as well as Sweden's other two metropolitan regions—was the development of the transportation system. In 1990 the national government commissioned three experienced and respected negotiators to facilitate discussions within each metropolitan region regarding a sustainable transport investment program that could harmonize needs for environmental protection with that of industry's transportation needs. In Stockholm, former chief of Bank of Sweden Bengt Dennis was given the responsibility to oversee this process, and after many rounds the three largest political parties agreed on what would come to be called the Dennis Package of transport investments covering the period 1991-2005. Most of these transport projects have since been implemented, but some strategic connecting links are still missing.

Industrial policy was far less controversial. There was a general consensus that Stockholm should strive to be a diverse, international metropolitan region—a society characterized by *Knowledge, Competence, Creativity and Communications* (see Andersson 1985). 2007, the City Council adopted a 2030 vision for a growing, innovative region of world class and Stockholm began marketing itself as *The Capital of Scandinavia*, and the County as aiming at becoming *Europe's most attractive metropolitan region*. Realistic or not, these slogans reflect ambitions that require well constructed policies for both the city and the region to ensure a good living environment for residents, businesses and visitors.

Since the renaissance of economic and population growth, most has been positive for the capital city region. Stockholm continues to annually grow by some 16 000 in the city plus another 20 000 in the outer parts of the region, and the pace of growth is, so far, stable. Stockholm has a surplus of births over deaths as well as a surplus of both domestic and foreign in-migration over out-migration. (For many years foreign net-migration has been almost half of the total net migration both for the city and the region. As it is rather sensitive to changing circumstances and politics both in Sweden and abroad, this fact could serve as a memento for those who make projections and plans.)

Perhaps even more important for Stockholm's future is the continued geographical extension of the labor and housing market regions to include large parts of adjacent regions. Transport infrastructure expansions have reduced commuting times, and more people commute, over longer distances. By international standards, the capital region is still relatively sparsely populated in large

[13] Södra Hammarbyhamnen and Norra Djurgårdsstaden (Royal Seaport Stockholm)

parts of its area, but for Sweden's late-to-urbanize population, open areas and access to nature is valued highly.

Simultaneously, cooperation among the County Administrative Boards, County Councils and municipalities has expanded to cover a range of issues affecting most of East-Central Sweden. The capital city region's many networks are quite literally knitting together and municipal and county borders are becoming less relevant with every passing year.

The sustainable capital

No other policy area has been so expansive in Stockholm over the past decades as environmental policy. This reflects not only better knowledge regarding environmental challenges and climate change threats, but also the fact that environmental issues affect us all: individuals, households and companies, municipalities, regions, countries and supranational organizations. Political parties, public authorities, scientists, civil society organizations, lobbyists and the media are all touched by these issues.

Awareness of threats to environmental sustainability has grown successively in Sweden as in other countries. After Rachel Carson's *Silent Spring* (1962) set alarm bells ringing with warnings of the spread of toxins[14],environmental issues were raised in area after area: new crisis reports, new environmental catastrophes, new research, new policy, new laws, et cetera. Goals and budgets for environment and public health authorities multiplied, and focus shifted from specific sectors to understanding the functional links and effects of complex systems.

The 1972 Stockholm Conference had shone the light on Stockholm and had inspired municipal and regional authorities to increase their activities related to environmental protection. Like in most parts of the world the phrase "sustainable development" from 1987 Brundtland report *Our Common Future* became common goods, and the 1992 *Agenda 21* from the Rio Conference was even more influential at the local and regional scales. New concepts were introduced and new branches of environmental policy developed, of which climate policy, underscoring the interdependence of all peoples and nations, would seem to be of paramount importance.

The City and County of Stockholm have environmental programs focusing on goals for their own activities and the ways in which public awareness and conduct can be affected by information and programs produced by public authorities. In the transport and energy sectors, much has been done but much remains if this active and successful metropolitan region, with such a high material living standard, is to meet ambitious national sustainability goals.

Stockholm has recently decided to link environmental programs to the city's economic planning. This has resulted in a common policy for sustainable urban development: social, economic and ecological. Stockholm has also entered into common agreements with other capital cities such as the *Covenant of Mayors 2007*, wherein signatory cities pledge to work for a more rapid reduction of greenhouse gases than mandated by the European Union (twenty percent from 1990 to 2020). According to Stockholm's current action plan for climate and energy, already implemented and planned initiatives should be sufficient for the city to reach its emission targets for 2015.

The City's direct involvement in one of the most important areas for environment and climate policy, namely energy provision, was through privatization partially phased out in 1991 and completely by 2001. Thereby the City lost its previous opportunities to control the production and distribution of gas, electricity and district heating and therefore could no longer steer choices between renewable and fossil feed-stocks or use pricing policies to affect consumption and its societal level effects. The environmental importance and complexity of the energy system remind of that of another complex system: public transit, which still is publicly controlled through Stockholm County Council.

[14] In Sweden, Hans Palmstierna's book *Plundring, svält, förgiftning* (*Looting, famine and poisoning*,1968) was almost as influential.

Growing car traffic—and concerns about the environment and the climate—prompted the Swedish government in 2002 to finance a six month, full scale trial of a congestion charging system [15], set up as a special national tax with a charge cordon around Stockholm's inner city in combination with temporary expansions in transit services. After the trial, residents were invited to vote in a local referendum on a proposal to make the trial permanent. Local political parties were split regarding this new element of Swedish taxation policy, which had already been successfully implemented in the shape of traditional tolls or time-differentiated congestion charges in i Singapore, London and several of Norway's larger cities. The road charging trial in Stockholm was launched in 2006 and made permanent in 2007 after having passed the local referendum. Stockholm's political parties and the national government have since agreed to keep the congestion charges (or rather congestion taxes), even if they are divided regarding the use of revenues: to improve roads—benefitting those who pay the taxes—or public transit, which provides an alternative to automobile use. (Isaksson 2008)

The European Commission named Stockholm Europe's first *Green Capital City* in 2010 for having

- established an integrated administrative system guaranteeing environmental aspects to be considered in budget, operational planning, reporting and supervision
- reduced emissions of CO_2 by 25 percent per capita since 1990
- confirmed the goal to be fossil-free in 2050.

The award can be seen as a "good grade" not only to the City itself but also to city and county residents, organizations, and companies. Everyone's participation has contributed to the goals achieved and continued engagement is needed to meet future goals. Inspired by the positive international attention, Stockholm's political leaders have established a new goal: that the city will remain Europe's environmental capital even after 2010.

That is a challenge.

7. Looking back and looking forward

From 1850 to 2010 the population of Stockholm grew from 93 000 to 847 000 and close to 1.6 million was added in the surrounding, successively expanding commuting region. The corresponding share of Swedes living in the Stockholm (commuting) region increased from around three to slightly more than 25 percent. This development represents a higher growth rate than the average among European urban regions – in terms of contiguous built up area Stockholm's population rank is currently 30 as compared to around 45 in 1850. Investments in the transport infrastructure help explain the rapid and sustained growth. The railway investments In Sweden during the last half of the 19th century increased the accessibility of Stockholm and later investments conserved and strengthened Stockholm's role as a central node in the Swedish transport and communication network. Later on, economies of scale, growth of the service industries and an increasing knowledge orientation would seem to be more important explanatory factors.

Looking back 160 years, Stockholm´s economic growth might seem more impressive than recent achievements in reducing greenhouse gas emissions and improving the local environment. However, an observer from 1950 might have come to the opposite conclusion. By then successive investments in the water and sewage systems, in garbage handling and in better housing had contributed to a dramatic increase in life expectancy – from 25 to 67 years for men and from 31 to 72 for women.

[15] 10 Swedish Crowns (SEK), about USD 1,50, were charged for off-peak travel across the cordon boundary in both directions, and up to 20 SEK for peak-hour travel, with a maximum charge of 60 SEK to any user in a day. Charges were not imposed in the evenings, on weekends, or on public holidays, and some vehicles were exempt from charges altogether (for example taxis, emergency vehicles and environmentally classified cars).

A political scientist would perhaps be more impressed by the establishment of a modern system of governance and by the social engineering and pragmatism characterizing much local and national policy since the Social Democratic party started dominating the political arena some eighty years back. The reformation of Stockholm´s public administration in the 1920´s, municipal reforms in 1952 and 1970, the transfer of responsibilities from the municipal tier to the county, initiated in 1963 and operational in 1971, as well as the congestion charging system in 2007 are striking examples of this pragmatism. The political scientist might even argue that the long practice of applying a problem solving attitude and looking for "solutions" that can be accepted across party lines can now be considered as an important institutional capital – a capital that helps feed the political process with new knowledge and reduce the risk of political deadlocks – and that this might help make Stockholm still greener.

However, Stockholm´s recently adopted action plan for reducing the emission of greenhouse gases indicates that this institutional capital might have eroded somewhat. Though ambitious in most respects, the plan adopts a rather narrow perspective by only considering the emission of greenhouse gases produced within the city border. According to recent studies by the Swedish Environment Protection Agency (2012) and the Stockholm Environment Institute (2012) this definition seriously underestimates the total emissions of greenhouse gases caused by households and firms in Stockholm.

The lack of a discussion of the urban heat island effect (see page 2) is another serious drawback. Considering the seemingly rather successful results of city and regional planning since the 1940´s one would have expected a discussion of possibilities to counteract loss of vegetable areas and waste-heat emissions. Since the concentration of green house gases in the atmosphere will go on increasing for many years irrespective of international and national agreements on reducing current levels of emissions, Stockholm's action plan should also have discussed how Stockholm and the surrounding municipalities can increase their adaptive capacity in order to prevent potential damages that might be caused by recurring heat waves and other kinds of extreme weather, or by rising sea levels. As argued by Kahn (2010), the future competitiveness of many cities will lie in their ability to adapt to a warmer climate.

From a social engineering perspective it seems even more serious that the plan lacks estimates of the costs for implementing the various measures suggested. To ask for the costs does not imply a downgrading of current environmental threats. It simply reflects the fact that any society´s resources are limited – the more resources used for environmental purposes the less will be available for other important expenditures like schools or care of the elderly. Cost estimates are needed to ensure that a reasonable part of the total budget is used for combat climate change and also to improve the environment in other ways. They are also needed to guarantee an efficient use of this part of the budget. As it is now, it is for example impossible to know if the measures suggested to reduce car traffic result in as much greenhouse gas reduction per unit spent as those proposed to make housing more energy efficient. Anyone adopting a social engineering perspective would also be negatively surprised to find no discussion concerning the need for research and innovations to reduce emissions and improve the environment.

Up till around 1950 Stockholm´s growth seems mainly to have been driven by national and international developments. Since then, its role as a national knowledge center has become successively more evident and growth has partly become self-generating. Furthermore, according to international comparisons across cities and urban regions (see Mälardalsrådet 2012) Stockholm has recently evolved into one of the leading European metropolitan regions in terms of intellectual capital and rate of innovation. This should give rise to a more optimistic view concerning the environment. Combining innovative capacity, the diversity of its industries and political pragmatism the Stockholm region might, paraphrasing Braudel, become a global "electric transformer" inspiring urban sustainability measures across the world.

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