The River City 2050

Three Scenarios for a Sustainable Gothenburg
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For further details the reader is directed to the anthology also produced as a result of the project. The anthology provides a number of in-depth studies related to different aspects and themes of the three scenarios. It can be found at http://www.chalmers.se/gmv

**Summary**

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The City of Gothenburg, like many other industrial cities in Europe, is being challenged to rethink its development and identity in the face of economic globalization, resource constraints and climate change. A particular focus of a new, more sustainable urban development in Gothenburg is the waterfronts of the River Göta Älv, running through the central parts of the city on its way to the sea.

In this report, 17 master students with a diverse academic and national background suggest three very different scenarios of sustainable development of the River City for the coming 40 years. Even though all scenarios envision a city characterized by equity, equality and a high quality of life, they present different answers to the challenges of globalization, resource constraints and climate change.

The student project, and its proposed scenarios contribute to a broader view of the future and the necessary rethinking of sustainable urban development in two important ways. First, the project testifies to the importance of collaboration between universities and different stakeholders in urban development processes. Through a number of reference meetings and presentations, the students have made a sincere effort to integrate the knowledge and expertise of various stakeholders. Second, the three scenarios show that there are different paths to sustainable development. Rather than showing us the future, the students encourage us to think carefully about and jointly discuss the important choices for the future that we are currently faced with.

This student project is relevant both to the vision work for the waterfront areas initiated by the City of Gothenburg during spring 2010 as well as to Mistra Urban Futures with its core value of active transdisciplinary collaboration in order to make a difference.

Henriette Söderberg
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Mistra Urban Futures
Introduction

Founded by King Gustavus Adolphus in 1621, Sweden’s second largest city Gothenburg is a major industrial city. Fishing industries in the 18th century, followed by foreign trade with highly profitable commercial expeditions to Asian countries in 1731, led to the development of the Swedish main harbor for trading towards the west. The industrialization period in the 19th century brought in the shipyard era for Gothenburg, and until the mid of the 20th century Eriksberg, GötaVERken and Lindholmen became three of the world’s biggest shipyards which produced passenger ships and cargo vessels. This situation changed dramatically in 1970s when the shipyards were lost and a large area in central Gothenburg was gradually emptied for all activities. Nowadays, the focus of development shifts to a blend of business, education, residence, culture, and recreation.

The City of Gothenburg and its river banks are crucial for the development of the region and Sweden. The river in Gothenburg connects the western and the eastern part of the country through the two biggest lakes in the country, i.e. Vänern and Vättern, and a number of channels. Along the river lie some of Sweden’s most famous industries, such as Volvo and SKF, as well as the biggest cargo port in Scandinavia. The river splits into two branches in Kungälv, Nordre Älv in the north and Göta Älv in the south. Gothenburg is divided into two parts by the river Göta Älv and they are connected mainly by the three Älvsborgs Bridge, Göta Älv Bridge and Angered Bridge, located in the southwest, center, and northeast, respectively. Along the river bank in the south, the center of the city is composed of a train station, malls, business centers, governmental buildings and
important sightseeing features. The north river bank, on the other hand, shows two distinct ways of land use, in fact, there are a recently-developed area which consists of Lindholmen and Eriksberg and an older one which is the soul of the old Hisingen. The former is mostly used for residence, culture, education and sports while in the later, one can see industries, shipyards and big wide roads built to support the demand of shipping goods. Göta Älv has served as a key transport route for hundreds of years and also been a primary source of drinking water for more than half a million people. Gothenburg and Hisingen are linked by the three bridges already mentioned and the Tingstad Tunnel. The oldest bridge dates from 1939 and the tunnel from 1970. Daily traffic flow varies from 20 000 cars on the Angered Bridge to 120 000 in the Tingstad Tunnel. Some parts of the city, like the Tingstad Tunnel, were not initially designed for the present traffic flow, hence, the city is planning to build a new infrastructure to connect with the north-western part of Sweden and another tunnel under the river.

The access to water in Gothenburg has historically been limited to the residents due to the dominance of the industries and many big roads. During 1970s, the closure of the shipyards was a major blow for Gothenburg. Gradually in the Riverside area, one can see some signs of reorganization but many industries still occupy major central parts nowadays. The western central shore is occupied by 1.7 kilometers of ferry terminals. The southwest of the Älvsborgs Bridge is attractive but expensive to reside in. The southeastern shore closer to the Angered Bridge is a small strip dominated by roads, rails and scattered industrial zones while on the other side of the river, heavy industries and shopping centers are next to the bank and only separated from it by a tiny green area.

Today the Linnéstaden-Majorna District, the biggest district along the river, accommodates some 61 000 inhabitants. Gothenburg currently has a population of 507 300 and in 2025, the city is expected to reach 593 000. It is, therefore, required to have effective infrastructure for not only the industries but also the citizens.

The port of Gothenburg possesses a great deal of strategic importance because of its size and location. It had a capacity of 40 million tons in 2006 and as much as 826 000 containers in 2008. The oil industry with its refineries plays a major role since 60% of the trade through the port comes from it. There is also a fish port where 4 300 ton fish is sold annually. Besides, Volvo whose departments are mostly located on the Hisingen Island is one of the major companies in the region.

The archaeological artifacts and culture heritages are plentiful in the river valley and bear witness to the river’s historical importance. Unfortunately, Gothenburg with oceanic climate and mild temperature gradually has to face many environmental issues, such as air and water pollution, overpopulation, soil erosion, sea level rise, biodiversity loss, and lack of natural resources. To prepare for these future problems, the city needs a reliable technical solution and an effective administrative measure both of which should focus on the river.
Introduction

What Is a Transdisciplinary Case Study?

Case Study is regarded as an appropriate research methodology in the cases where investigated phenomenon is more complex and contextualized (i.e. it is hard to separate it from its context). The more complex and contextualized the objects of research, the more valuable the case study approach is regarded to be.

But the problem of the case as well as the strategy to deal with it is, most of the time, not well-defined. Due to this fact, since the beginning of the case study, it has always been a good idea to follow a structure where the opinions of the working groups and academic knowledge are continuously confronted and complemented by the knowledge of different stakeholders, such as civil servants, policy makers, city planners etc. This way, the solution we have in the end would be more appropriate in the context of the problem.

Through case studies, students would have a chance to work differently from the way they normally do in the lecture-based courses. With this type of learning, they have to combine the research of scholars with the practical ideas coming from stakeholders and argue both of these sources of information.

Why Are We Doing This?

This case study is the ninth edition since the start back in 2002, when it started as a collaboration between Chalmers and the University of Gothenburg. Today the course is held in English, which makes it possible for students from all over the world to participate. This year, the project aims to contribute to the activities of the new Mistra Research Centre for sustainable urban development. Participants come from different fields, such as economics, global studies and social sciences, which leads to many interesting discussions. During the previous years of transdisciplinary case studies in the Gothenburg region, the City of Gothenburg has provided students with interesting cases, and this year’s is no exception. Working with the area surrounding Göta Älv is both an interesting and a complex task, and a great opportunity for us as students to contribute to the discussion on how Gothenburg is to be developed.

Aim

The area surrounding the Göta Älv in Gothenburg municipality is facing new and complex challenges. Among them are how to turn the industrial character of the waterfronts into a more livable and accessible city and also climate change. Although much emphasis is put on the area today, the clash between economic, social and environmental concerns from different stakeholders may create a tension and unstructured development in the future. To avoid these clashes of interests, there is a need to look ahead and seize the opportunities in the area and let them create a foundation for how the area could be sustainable in the future. Hence, the aim of the River City 2050 project is to show how the area can be developed in order to be sustainable in the future.

By integrating different competences within the project group, the purpose of this report is to present some scenarios about how the area could look like in 2050 to be sustainable. All scenarios has been created to be visionary, thorough and as wide-ranging as possible.

In short, this aim can be summarized in three broad research questions:

- How can the development of the river area be directed in order to be more sustainable in 2050?
- How can the area be sustainably used in terms of transportation, social issues, resource constraints, mitigation, and adaptation?
- How can the river be used to enhance the soul of Gothenburg and its identity as a coastal city?
Geographical Area and Timescale

The area spans from the Angered Bridge in the north, to Långedrag in the south. It is a vast area, but what unites is the focus on the Göta Älv and development connected to it.

The limitation in time is set to 2050 since 40 years is considered to be long enough for greater changes to happen, but still close enough in time to be interesting and engaging for public and private stakeholders.
As introduced in the Brundtland Report in 1987, sustainable development has been acknowledged as one of the most important issues nowadays. Broad consensus regarding how the concept should be defined and the relation between different dimensions needed for a sustainable development is yet to be achieved.

For the sake of our project, we believe that sustainable development is a process based on equity and equality, to create and hand down a society that enhances a good quality of life, in which economic tools alongside with political, social and cultural tools, are used as a means to accomplish this. All actions are confined within the limitations provided by ecological boundaries.

This way of visioning sustainable development has guided our work with three scenarios all of which have to meet the requirement in the definition in order to be sustainable.

When creating the scenarios, a number of conditions which contribute to a good quality of life have been considered, such as a long and healthy life; knowledge level; a decent standard of living; an equal society; good neighborhood cohesion. Furthermore to keep the development of the riverside area within ecological boundaries, we have considered the following; the ecological footprint, carbon footprint, water footprint, eutrophication, biodiversity protection, and air pollution.
Methodology

An important basic element of a transdisciplinary case study is project management. We have followed a project management approach consisting of four parts: preparation, SWOT-analysis, scenario construction and presentation of results.

During the preparation phase, an introduction to the case is lectured to students of different backgrounds and is followed by an excursion. In this excursion, several small groups of 3-5 students visit some assigned areas along the river and the members, from their individual perspectives, gain initial ideas on the subject. After that, many seminars are carried out focusing on the central themes of the project, such as urban sustainable development and climate change.

In the SWOT-analysis stage, we look on the strengths, weaknesses, opportunities and threats (SWOT) to the riverside region and try to collect inputs for the SWOT; different stakeholders are interviewed by phone, via email or even in person.

For the next step, based on the SWOT results, brainstorming is used as an effective way to produce starting point for identifying the three sustainable scenarios for the river area and then those scenarios are improved by new inputs from a reference meeting with the stakeholders.

Lastly, a description for each scenario is written and combined into this short report that you are reading. And after this report, an anthology will be published to all readers who would like to find out more about our work by providing a number of in-depth studies related to different aspects and themes of the three scenarios.

Throughout the project, working groups are reformed frequently, discussions can take place anywhere, even in the dining room, and notes for meetings are shared among all students to guarantee that no single idea is squandered.
Gothenburg has an edge over some other major cities in the world: the water. It provides citizens with fresh water and serves as a means of transportation. The harbor together with exporting industries along the river is indispensable for the economic growth of the city. The road system to some extent also helps the economy run smoothly. Local competence is heartened by the presence of the two famous universities, i.e. Chalmers and University of Gothenburg. Tourists feel interested in this place thanks to the Gothenburg spirit in terms of social attractiveness.

Inefficient use of land in the industrial zone, such as abandoned areas, hinders the development of the city. Inaccessibility to the river prevents people from enjoying the waterfront. Poor connection between two sides, mostly due to insufficient infrastructure, also reduces possibilities for the northern and southern citizens to meet one another. In addition, there is a need for more flexible and long-term governance as well as stronger participation from residents. Air pollution and bad water quality in some parts of the river are environmental problems that must be solved as quickly as possible. The current lifestyle with high emissions of CO2 per capita is obviously unsustainable in times of global warming. As if all the above were not enough, social issues, such as social exclusion and segregation, adds to the problems that need to be solved.

Fortunately in the future, Gothenburg industries will relish prospect of the growing local production of renewable energy and fuel. There is still some space in the city for development, which is good news as well. And it will be even better for the residents if the Million-Project is restarted and sustainably managed. The public transportation can be improved in many ways, for example new modes of transport and upgraded infrastructure, to serve the commuters in a safer, faster and quieter manner. One may mention the possibility of urban agriculture. Why not? If waste management becomes more efficient in the next few years, urban agriculture products will definitely be another good choice for the residents. The knowledge that the city possesses can be used in a more proficient fashion and the Gothenburg spirit needs to be strengthened, both of which can be fulfilled at the same time with one conceivable action, i.e. ecotourism.

Energy dependence, especially petroleum dependence, will be a considerable risk for many companies in the region and for the growth of the city. Because of climate change, biodiversity loss becomes graver, freshwater turns scarcer and landslides tend to occur more regularly. Locating the heavy industries close to residential areas and the river is not a good idea since it will cause severe damage to the nearby citizens when there is chemical leakage or spillage by accident from one of these factories. Finally, something must be done to address the segregation of Gothenburg.

As mentioned in the methodology, a SWOT analysis was used for identifying aspects of the river area of today. Based on the results of the SWOT analysis, three scenarios were developed and are accounted for in the next section. Below are the summary of the SWOT with respect to key subjects like land and energy use, transport, governance, and social and environmental issues.
The River City 2050

In the following section you will find three scenarios on what a sustainable Gothenburg might look like in 40 years. Our definition of sustainable development guided the construction of the scenarios, but the pathways and solutions to secure sustainability are diverse. There are tradeoffs in every possible future, and by creating three scenarios in favor of one ultimate scenario the readers can make their own evaluation.

Some basic assumptions differ between the scenarios and some are the same in all three scenarios. In 2050 we propose that:
- Fossil oil is no longer available in cost effective amounts and we have not invested in other types of fossil fuels for energy production.
- Climate change has provided Gothenburg with an average higher temperature, increased precipitation and immigration of climate change refugees. The sea level has risen 0.8 meters with a possibility that water levels rises with an additional 0.5 meters during extreme weather conditions.

Facing the River
River Connectivity
Gothenburg Spirit
Creative Entrepreneurship

River Communities
Sense of Neighborhood
Embracing Scarcity
Local Diversity

Global City
Global City
Large Scale Solutions and Conformity
Center of Knowledge

Graphs showing differences between the three scenarios. From left: population, economic growth and energy consumption in the scenarios from now up until 2050.
It is Friday afternoon, the sun is shining and later John is going to meet up with his friends at the new skate park on the other side of the river. Right now he is about to have lunch on the river bank. While sitting at the very end of the dock and splashing his feet in the river, he is enjoying his jute & soya bean salad while looking at the people passing through the glass tunnel connecting two sides of the city. The warm summer wind is blowing in his face and he is wondering if he should take a bio-boat ferry over the river or the cool glass tunnel under the river so that he can see the fish passing over his head. Suddenly a boat is passing, it is one of those new, nearly soundless solar boats and he is thinking of how much fun he is going to have with his friends next week when they are going to watch the annual solar boat race of Gothenburg. But time flies away and suddenly John notices that he is late for the meeting, so he decides to take the bio-boat ferry to the German ferry stop, which got its name by the Old Stena Line ferry that once upon a time went to Germany from there. While crossing the river he looks at the BioShell plant on Hisingen and remembers his grandfather telling him stories about the old way of making gas and fuel from crude oil that was in use until thirty years ago, and that there was a bad smell from the refinery. Now the air is refreshing since it comes from the sea and the BioShell plant does no longer produce this smell. John is thinking whether he should apply for a summer job at the BioShell or do something that is good for his body and social life like jute cultivating. He has heard it is a really good way to meet other young people, since his brother worked there last year and went to the Gothenburg Rock festival together with his colleagues, and also he can get a nice pay and suntan.
In the year of 2050, regarding to new technologies, production is based more on renewable resources with the fact of efficient energy consumption. Nations have enough of necessary goods by substituting traditional resources and minerals with bio materials. The global trade is minimized and the economic focus on a rather local and national production, emphasizing on environmental aspects. Consequently the people are living in an active, healthy and environmentally friendly atmosphere.

Although the sea level has risen, the water is seen as a gift and all efforts are put to use the best out of it since water is one of the most important factors in any sustainable development. Gothenburg tries to incorporate water into the people’s daily life even though the city is defended by higher barrier, trenches and channels. In this scenario, the world population growth which affects Gothenburg is seen as another positive input and by using green building techniques, the residents live in balance with nature. Furthermore, meeting places, participation and job opportunities are focal elements in creating harmony within the society.

**CONCEPT**

This scenario highlights that the closeness to water, which has been a signum of Gothenburg with its fish industry, shipyards and big harbor, has been a privilege for the transport sector and city’s businesses. The downside of this, however, is that roads, refineries and heavy traffic on the river have created not only boundaries between humans and the water, but also lead to an unsustainable exploitation of natural resources. Hence, the purpose of a River City is to bring social aspects into consideration where access to water is given not only to those with economic interests, but rather the river is used to create social sustainability where efficient transport systems, environmentally friendly industries and social meeting places dominate the river sides. Göta Älv is seen as a blue way connecting Gothenburg to the ocean and also working as a crucial regional engine which provides significant benefits for the city and its residents.

Furthermore, the river is incorporated in the everyday life of the people where recreational parks and residential areas are intertwined with small and mid size companies focusing on problem-oriented business with a strong focus on sustainability, especially in the energy and transport sector. The concept of a River City is built on three themes where the access and use of Göta Älv is focal; *River Connectivity, Gothenburg Spirit* and *Creative Entrepreneurship*.

**River Connectivity**

Every corner of the city is closely tied physically and emotionally to the river. The spirit of Göta Älv is manifested in the daily activities of each citizen, and the river promotes an inter-dependent network of people, places and natural resources. Acknowledging social diversity along the river banks, Göta Älv represents a social space and a unique geographical place all linked together by water where people want to embrace, protect and treasure their beloved river.

In order to create greater connectivity different means of transport are carried out on the river. New tram and ferry lines together with the Glass Tunnel connect people physically and play a role to decrease segregation within the city. Solar-powered ferries and low-emission ships are used for conveying passengers and goods. These ships travel all the way to the coastal harbor where goods are exported all around the world while the ferries serve as commuters between the two river banks. Another way to cross the river is to take one of the trams running along the Oscarsleden Circle. On these elevated trams, passengers can find a magnificent view over the river and the newly-dug canals below. These canals work as a tourist attraction and defense from the threat of sea level rise. The Glass Tunnel is another way to reach the other side of the river where people
can walk through. This tunnel is particularly effective when the tram and ferry stations must be closed due to the floods. Inside it children can experience the beauty of the marine life and hopefully nurture their love towards the river.

The emergence of many places of interest just close to Göta Älv, like skate parks and elderly houses, creates an emotional relationship with the river. After school hours, teenagers can spend a good time skating in the parks, relishing the cool breeze blowing from the river. Meanwhile, the elders or retirees can enjoy the spectacular view of the sunset through the window of the elderly house, waiting for their family visit. At Flytande Slott, a floating architecture is used as a meeting place, where entrepreneurs of mid-sized businesses discuss environmental projects in Gothenburg or in Africa or Asia.

Accessibility and connectivity to the water are considered necessary to unify ecological, social and economic value into people's daily life and people who take care of the river show their efforts to a more sustainable life. First, eco-friendly substitute for polluting ships maintains economic growth and preserves the environment at the same time. Second, children living near the river will create their bond with it when they grow up. And last but not least, the meeting places along the river for the young and old ensure that the determination to save nature will last from generation to generation.
Gothenburg Spirit

In close connection to the concept of the ‘River City’ is the spirit of Gothenburg. It is basically defined by cooperation, networking, embracing industrial romance and the closeness to Göta Älv, which take shape in the many meeting places along the river. In this scenario the identity and spirit of Gothenburg are seen as very important stepping-stones towards sustainability, with social issues as the main focus.

To create more meeting places, almost the whole of both quay sides are built as stairs leading down to the river. They function both as a defense-wall for occasionally higher water levels due to climate change and as a place for people to sit down, hang out and network in the sunshine to connect the people with the river. By Röda Sten, the extended culture center has proven to be a great success where people of all ages perform on the open stage, play music on the lawn and ride their boards in the skate park.

The feeling of the harbor, hard work and industrial romance are equally substantial in shaping the spirit of Gothenburg. These are kept and revitalized by reusing the old storehouses and the continuous boat traffic on the river. In some of the old houses information centers are created where citizens meet to participate and affect decisions concerning their city. These information centers also work as platforms for a democracy based on a ‘negotiated consensus’, where clashes of interest are dealt with on a give-and-take basis. This goes along with the sense of cooperation and solidarity that has been a hallmark for Gothenburg and this identity is captured on an individual scale where collective ideals do not stand in contrast to the self-fulfillment of each resident.

In order to make it possible for every person to live out their ambitions, the issues of health care and education are of great importance. The lifestyle of 2050 implies a healthy and active way of life with bike paths leading everywhere and sports being a natural part of the city life. Chalmers and the University of Gothenburg are the world-leading institutions in research on sustainability and marine technology, and the ship industry has an advantage of recruiting personnel locally from the city where the new master courses in shipping have started. This development is made possible by a clear vision and direct investments in these fields from the schools themselves and the government.

Tourists are gathered in Gothenburg to explore the open, friendly and accepting spirit of the city, and dining fish caught from the river, the canals or the sea. The sense of solidarity and trust is evident for all visitors, which stems from numerous interactions between people and their mutual cooperation. The original old, happy men ‘Goa Gubbar’ are long gone, yet their spirit lives on in the present Gothenburgers and continue to delight visitors.

The river is no longer a barrier disconnecting south from north, rather it is a unifying element in the city. It helps people knitting new ties of friendship and is seen as paramount for building a sustainable society where everyone feels integrated. Music, plays and books attract people to the city and spread the industrial romance-feeling across Sweden. Large historical buildings are re-used for cultural activities, and working as plant schools for ideas implemented by the creative industry in the city. Putting new buildings side-by-side with the old ones gives a well-functioning mixed city where up-and-coming businesses use the cheaper old houses to get things started, and people can choose to live either in new fancy houses, which costs a bit more, or to live in the more affordable older houses. Through a good mixture of residential and businesses, the wealthy and the less affluent, the old and the young, immigrants and natives, the inclusive and vibrant spirit of Gothenburg is created.
The concept of ‘River City’ is a manifestation of its creativity and duly influenced by the entrepreneurial activities. It conceives the identity for a sustainable city followed by creative culture where people take initiatives and make contribution to the place.

The area has its landmark set by the air turbines and, small but massive scale windmills around Arendal. Like windmills, an air turbine produces energy more efficiently than a regular windmill does. While floating in the air, it has more flexibility that enables to continue operation even in strong wind. Furthermore, as an innovative solution to generate electricity, from Eriksberg to Arendal watermills under the water surface are installed, yet still making possible for the ships and boats to move over the surface easily. Watermills that look similar to windmills are another notable use of the water. Apart from this renewable energy solution, the area accommodates small scale ‘jute’ cultivation along with sustainable production facilities located nearby Angered Bridge. Jute is a plant, rich in vegetable fibers and suitable in a wide range of areas. The plant is likely to be the best alternative for plastics, such as shopping bags, and other ‘jutable’ products. This labor intensive industry of jute gives rise to job opportunities by employing a great number of people. While the factory imports a certain portion of raw jute, it uses river water for manufacturing activities and irrigation in sustainable way. In addition to the use of jute, the area extensively makes use of wood supplied from the forests surrounding Gothenburg to produce passive houses, wooden boats and furniture. A good forest management makes sure that this activity contributes to mitigating global warming, since the forest acts as carbon sinks.

However, the ‘culture industry’ is what distinguishes Gothenburg from other cities where movies, music, art and theatre are the hearts of its culture. Voices of the spirit being represented by the old buildings, scenic beauty of the river and the industrial romance mentioned earlier, bring about a harmony together with places for social interaction along the river. It is in this creative culture where people are open and tolerant to each other that one feels complete, encouraged and nurtures what one wants to do with his or her life.

Technology which enriches life is developed and managed by the city’s entrepreneurs in order to achieve a sound economy that takes care of the society and environment. One small, yet powerful, initiative is the ‘bicing’ which is a community bicycle program that offers public transport solution within the area in a climate-friendly way. In this program, people acquire membership and use the bikes under some conditions such as hourly or monthly rates. The same solution is used for cars in car-pooling programs, within which energy efficient, silent and affordable cars running on bio-fuels are in operation.

Gothenburg in 2050 is a new source of different kinds of renewable energy that makes a path towards greater opportunities for citizens by taking on ventures. This is all reflected upon peoples’ sheer creativity, which in the end is the essence of creative entrepreneurship.
The River City 2050: Facing the River Scenario

Facing The River: Sea level rise strategies
- Defend
- Defend-Attack
- Retreat

Map showing how sea-level rise is handled in this scenario.

Time-line showing progress in the scenario (below).

Facing The River

Socio-economic projects
1. Wind and Water Power (25% of the city electricity)
2. Information Centers
3. Elderly houses
4. Circle line Trams with canals

Environmental project
- Cleaning the river
- Launch of Glass Tunnel
- No oil

Agro-economic projects
1. Jute cultivation
2. Plastic facing out

Socio-industry projects
1. Moving Stena part
2. Water Stairs
3. Skate Park
4. 20,000 Bicing

Timeline showing progress in the scenario (below).
The sun begins to settle as Olivia slowly bikes home from a late evening lecture. Around her, birds are gracefully creating scenery that is sparkling with life; pigeons are pecking the ground for pieces of food, ducks stroll past to get down to the river, and seagulls are flying playfully in the clear blue sky. The bike-way along the river is surrounded by trees aligned in a near perfect fringe. A freight boat connecting the fish harbor at the sea to the agricultural fields around Angered is sailing side-by-side with Olivia, giving her company on her ride from Nya Varvet to Gamlestaden. Slowly, the boat proceeds to easily pass under a low pedestrian bridge that connects the riversides, before sailing past clam farms and a park of statues protruding out of the water. While biking through the different neighborhoods, sounds of laughter can be heard coming from the restaurants and from children playing and running along the pedestrian pathways neatly aligned with freshly lawn grass surrounding the neighborhood blocks. Each residential and commercial block is surrounded by narrow streets and high buildings with gardens on the roof tops and on the balconies. When biking in between the neighborhoods, Olivia passes windmills and crosses vegetable gardens and green narrow belts that provide a habitat for some vegetation and animals. The mosaic in which she takes part, with bikers, pedestrians, and roller skaters making way between green built centers next to the river, creates a vibrant social and biological diversity that together makes up a sustainable riverside community.
Gothenburg is part of a post-carbon world where fossil fuels are no longer in use since they are increasingly rare and expensive, and also because their usage is widely seen as undesirable owing to the contribution to climate change. Even though numerous of other alternatives and renewable sources of energy have been developed, they are not even together close to providing such abundance of energy as the fossil fuels once did. Moreover, the disparities that existed between rich and poor countries in the 2010s have been acknowledged as morally unacceptable and distribution is focused on justice. People in Sweden together with many others, particularly in the developed world, have chosen to live with fewer resources.

Consequently, the way of life in Gothenburg has changed. Economic growth has been altered as the main goal of citizen’s activity, with a shrinking economy as a result. Population has slightly increased due to natality and migration, but at the same time consumption of energy and goods has decreased significantly. International trade is carried out to a limited extent. The society that once seemed increasingly globalised has chosen to turn more local, with small-scale solutions being the recipe for success.

**Concept**

The River Communities scenario is built on the basis of a more self-reliant and an independent society which lives within ecological boundaries, and is less vulnerable to global uncertainties. The foundation of Gothenburg in 2050 is the numerous neighborhoods which, even though being diverse, together make up a city that strives for self-reliance. To embrace scarcity, creativity and knowledge are used within ecological boundaries to achieve a good quality of life for the citizens. Different focuses within the neighborhoods provide a local diversity that enhances community building and a certain extent of individual freedom. However, since the neighborhoods are dependent on one another to get life necessities, Gothenburg still provides the umbrella under which its citizens live.

**Sense of Neighborhood**

The foundation of the Gothenburg River Communities in 2050 is the different neighborhoods that together provide a multicultural and diverse mosaic. People within these neighborhoods, live a participative, inclusive, productive, creative, and simple yet modern life with access to basic needs like school and healthcare services. All neighborhoods are organized under the administrative umbrella of the North and the South districts located along the river side. The neighborhoods and the districts hold a decentralized authority from the municipality to encourage local economic activity, foster local knowledge, provide basic provision, and fostering multicultural activity within the neighborhoods. High levels of social trust is derived from active voluntarism as well as impartial and transparent governmental institutions in a welfare state framework.

The neighborhood areas all share three major characteristics. First, the neighborhoods are dense, integrated, and have several public squares which are vital for social networking. Second, the buildings are connected one another by low pedestrian bridges that enable citizens to move easily from one place to another. In addition, combining the bridges and public squares improves accessibility to social places within the area. Third, the roads, which were previously designed to accommodate a vast amount of motorized transport, have been narrowed and transformed into more walking and cycling friendly paths. Hard asphalt and concrete structures have been turned into open spaces for recreation and meeting places which enhance community building through social interaction. Removal of car parking lots has opened up a lot of areas for other activities.

Since the neighborhoods are dense, as a result of life without fossil fuels, walking and cycling are the fastest and most efficient modes of transport here. The infrastructure supports
Maps showing land-use (top) and how to handle higher sea-levels (bottom) in the River Communities scenario.

non-motorized transport such as walking, cycling, jogging and skating, with only a few exceptions. This system creates a safer environment by reducing threats of serious accidents which were once life threatening. Small vehicles powered by biogas and electricity are used in order to meet minimized social needs for motorized vehicles. The vehicles are used for maintaining the basic functions of society, such as emergency and waste management. In addition, small vehicles are shared within the neighborhoods in case of emergencies and other necessary travels. A solar powered rickshaw, for instance, which is a three-wheel pedicab powered by electricity, is utilized in this manner. Connection between the neighborhoods along the river is associated with trams, trains and bicycles. The major roads in the districts (E45, 155 and E6) have been transformed into tram lines and bicycle paths to enable cyclists to pass through the districts. Bike pools are set up in work places, public squares and streets to encourage biking. In addition, public bikes are available to anyone along with a large number of public bike stands located all over the city. People can hire those bikes by paying a deposit, after that they can simply leave the bikes at any bike stands around the city to receive a refund. The Stenaline Cargo and Denmark terminals have been moved, and the Stena Germanica terminal now serves both routes from Germany and Denmark meanwhile the Stena Cargo is placed in the Scandia Harbor. Furthermore, the Stena ferries are now smaller since motorized vehicles use is reduced in Gothenburg and the ferries do not carry motorized vehicles anymore.

The River Communities still keep connection with the other cities in Sweden and the rest of the world by means of trains and ships. However, the possibility of using these modes of transport is limited due to energy prioritizing.
Embracing Scarcity

Life of citizens in the River communities is not based on the multiplication of wants. Instead, creative and diverse productivity as well as ecological awareness is the means by which lower consumption and a more self reliant lifestyle can be enhanced. In this scenario, self reliance implies to strive for local production of primary needs but there is also a room for limited trade within the ecological boundaries. The society has a high environmental awareness derived from societal socialization and integration of ecology into education system. The ethical values of equality and participation, together with indigenous and global knowledge from different cultures are the basis to which the society is built upon. This gives the communities capacity to cope with challenges of scarcity, climate change and other social concerns. People are involved, taking responsibility and collaborating non-competitively where cooperation to tackle scarcity became an incentive. These social aspects make scarcity an interesting opportunity. The area is self-sufficient in terms of energy, and only renewable sources are used.

There is a small-scale energy production which is efficiently used to meet the needs of the society. Energy production is a combination of biogas, wind and solar power. Biogas converted from biomass through gasification plant is an important energy source in the River Communities. Since biogas is produced from renewable sources this does not contribute to increasing emissions of carbon dioxide as fossil fuels do. Smaller wind mills and solar panels are erected on many of the buildings, especially where more energy consuming businesses are located. In larger agricultural areas and other less populated areas, bigger wind mills are located. Personal Energy Generator (PEG) is also a small-scale energy producing device which is additionally used by all citizens to recharge small electronic devices like cell phones and MP3s. The PEG is put in a back-pack, by the belt or put as a bracelet. It collects kinetic energy and modifies it into usable power.

Most buildings are rebuilt or modified, into passive and plus energy houses. Passive houses have minimal heat loss because they are well insulated. They derive most of their heating from energy already existing sources from human and household machines. Passive houses pay their own costs after a few years since the need for supplied energy is very low. Plus energy houses are passive houses that produce energy through solar panels, small-scale windmills or other energy efficient solutions. These houses produce more energy than they require, and surplus energy can be used for other buildings as well. Plus energy houses are made from natural building materials and emitting zero CO₂. Every apartment and premises are equipped with electricity meters which makes it possible to control the electricity consumption. To achieve a low consumption of electricity, each household and business is offered an incentive of lower rents, whenever they use less electricity. Considering the high temperatures, especially during summer, district cooling is used to create better indoor climate. Instead of utilizing electricity for district cooling, water from the river is used as coolant to avoid the use of refrigerants which is environmentally hazardous. The concept of independent housing which is self-sufficient is modified for a larger building in the neighborhood. This housing relies on a close system in terms of energy, water and waste management. Energy is produced from solar, river water and biogas. Rain water is harvested as a source of drinking water, tap water and rooftop gardening irrigation.

Cradle-to-cradle model is a guiding principle regarding production and consumption. All products are part of a cyclical system in which they are recycled or reused many times after delivering their initial purpose or services. Every company has a responsibility to design products that eventually ends up as organic waste or can be reused. In agriculture the cyclical system comprises the decomposition of organic waste from households and business to make fertilizers. Every building has built-in compost pits and the neighborhoods have a number of recycling stations for products and a vacuum sewage system that collects organic waste from outside the households.

The neighborhoods have a system for lending tools and electrical equipment. They also have specific days when they exchange goods...
for goods such as clothes, furniture and other household items. To further work on creative recycling, small businesses have special designers who transform old furniture and clothes into new ones. The community diet consists largely of vegetables, with vegetable protein exceeding animal protein. Soil in the area that is used as an agricultural centre has been restored after many years of industrial activity.

Limitation of available space within the city area for agriculture calls for rooftop organic subsistence and commercial crop production by restaurant owners, institutions, commercial and residential buildings. Mixed farming of vegetables, orchards, trees and fish ponds makes use of locally generated treated sewage and domestic organic waste from households to enrich and fertilize soil. Pest control is biologically maintained by intercropping that is cultivating two or more types of crops on a single piece of land. Large food storage facilities to secure food shortages, especially during winter season are placed in every neighborhood. For urban greenhouse the neighborhood adopt plantagon greenhouse concept for vertical building urban agriculture. Greenhouse hydroponic plants, which require little space, are cultivated all year round. Cold frames are also used to make some agriculture possible during winter. Meat products from neighboring towns and countries are imported as supplements for animal protein since the river area does not offer ideal climate and space to rear animals. However, small scale poultry farming integrated into the agriculture system provides use of organic feeds for the poultry. Mussel cultivation contributes to a more self-reliant food supply whereby, mussels that are not used for human consumption are utilized as chicken feed or fertilizer. The mussels also help cleaning the water from nutrients like phosphorus and nitrogen therefore reduce the risk of eutrophication. However, it is still possible to import seasonal products from close surrounding regions to keep cultural diversity of foods.

Sustainable consumption is practiced by the use of local complementary currency. The currency systems are: Local Exchange Trading Schemes (LETS), time banks and green loyalty points. The LETS aims to rebuild local economy through exchange of goods between members without using cash, but using local credits instead (cashless exchange). Time banks promote volunteering, civic engagement and mutual self help by rewarding unpaid work in the neighborhoods such as volunteering works. These make the neighborhoods more reliant on themselves. Green loyalty points encourage sustainable consumer behavior, rewards by points and credits act like a reward card. The points are earned, for example, when someone separates their waste for recycling; uses public transport; shops locally; purchases green or recycle products, and the points can be redeemed for greener products; local product; public transport passes; or tickets for cultural events. Hence, through combination of these systems consumption behavior tends to shift towards more environmentally friendly and more locally oriented.

Local Diversity

In this society there are various businesses and cultures. The businesses consist of cooperatives, private enterprises which are small and medium in size, as well as publicly owned companies. People work in different sectors like agriculture, service such as bike mending, health care, education, etc. Urban agricultures and energy production largely contribute to the economy. This is reflected in the widespread rooftop farming, hydrophonic green houses in each neighborhood. Furthermore, fish ponds become uniqueness in Backa and sea food production is a distinctive neighborhood activity in Älvsborg. Other neighborhoods like Lindholmen and Eriksberg have more public meeting places for sports like canoeing. Meanwhile Klippan neighborhood has more cultural activity in line with their building heritages. As much as possible, the conditions of the ground and the surroundings guide the particular focus in each neighborhood, implying that land is used within the ecological boundaries.

Communities actively collaborate with thriving education institution such as the in-
The River City 2050: River Communities Scenario

stitute of sustainable development located in the previous AMF4 area and the Lindholmen educational town. They make it possible for communities around them to apply for local and global forms of new technologies to meet local needs. For example windmill technologies are implemented in neighborhood level. Other modern yet localized technologies of food and energy production are spread out in different neighborhoods, giving each one of them a distinct sense of local diversity.

To complement each district’s distinct characteristics, creating better connectivity of both river sides is of great importance. Small ships are the means of transporting goods and people. In this way connection between upstream and downstream as well as both sides is improved. The districts along the river are actively interconnected to enable exchange of goods and the pedestrian and cycle bridge that crosses the river enables people to reach the other side of the river. Additionally, there are restaurants that serve a wide variety of food from different cultures which represent the multiculturalism.

Göta Älv gives a large influence on the river communities, not merely as a great way of connecting the agricultural areas around Angered with the rest of the city, but also as a means for cooling, drinking water, and irrigation. It is also a habitat for fish, mussel farming, and other aquatic animals. The riverside is also used because of its recreational value, bringing water into the heart of the city and the people. Creative use has been emphasized, with a park of statues, small bridges and floating ornaments built in the river. Other recreational resorts like beaches are built in the west of Älvsborg Bridge.

Geographical diversity begets different strategies in coping with the risk of sea level rise. The river communities adopt a combination of three strategies: attack, defend, and retreat. Communities in Arendal and Älvsborg adopt a retreat-defend strategy, by withdrawing in appropriate distance while transforming the land use for ponds, parks or agriculture. Meanwhile the area around Scania Harbour and the refinery fortified themselves with higher walls. In between the Älvsborg Bridge and Göta Älv Bridge an attack-defend measure is taken up by using cascading walls, reclamation parks, and other public meeting places with unique design throughout every neighborhood. In the north east area of the Göta Älv bridge, retreat-defend measures are followed to mitigate stronger streams from the north. For example, water management facilities, agricultural farms, and fish ponds are established. Tree planting along the river banks improves soil structure and provides a buffer for strong winds and rising water levels. Sloping river banks are protected from landslides and soil erosion. The trees act as carbon sinks, preserve biodiversity including birds, butterflies and other insects, improve the aesthetic value of the city and allow air circulation within the city.

River Communities

- Oil price increasing
- Agriculture centre open at Angered area
- “Month of the future”
- Green belt & agricultural area established

1. Decrease in car use
2. Passive and plus energy houses increase
3. Project of dense neighborhood
4. Project of narrowing roads

2010 2015 2020 2025 2030 2035 2040 2045 2050

Local complementary currency project

Time-line showing progress in the scenario (below).

- Environmentally friendly lifestyle
  1. Use of PEG
Peter’s gaze followed a duck slowly fighting against the current in Göta Alv while making its way upstream, and from the bench on which he laid sprawled he had a clear view of a large part of the river. Had it been half a century earlier, one would probably have marveled at the shining superstructures of the four bridges spanning the river. However, Peter paid little attention to the marvelous structures, he had more pressing matters at hand. Right now he envied the duck; it didn’t have one of India’s most famed professors about to put its knowledge in applied environmental physics to the test via holo-link Comcast system in ten minutes. Had this happened in the past, Peter would not be so calm. His current location on the bench outside one of the large university buildings is located close to the base of Älvsborgs Bridge on the south side of the river, and the holo-link lab in which he needs to be in shortly is on the opposite side of the river where Frihamnen is today. A few minutes past and then reality came rushing in on Peter as he snapped out of his daydreaming and started moving with determination. He swiftly traversed a short distance inland and lunged into a pod car which instantly started to glide northbound in an almost eerie silence. He commanded it to stop a few hundred meters further north where he rushed out towards a giant arch that spanned the river. There he entered one of the shuttles that instantly took off and landed him on the other side. Now time was of the essence and Peter knew there was no technology to stop time. Fortunately, the complex spread on the south side had in-house power transport which helped Peter clear the last hundred meters to the holo-link lab in a matter of second. Once inside he found himself face to face with the professor hologram and the young boy instantly knew that from this moment on there would be no help from any fantastic invention. It was all on him now.
Gothenburg is a part of a global world, trade and exchange occur on a large global scale. The economy of Sweden and Gothenburg is strong through educated leadership and excellence in high tech industries such as green technology. Resources such as energy are abundant thanks to breakthroughs in alternatives to fossil fuels and ingenious energy solutions. Even though mineral accessibility has declined in general worldwide, there are no scarcity of materials in this global city because of advances in technology along with cheap energy and the high rate of cradle to cradle production. Through increased trade and globalization, the world is more peaceful than in the early 21st century. The population of the world and Gothenburg is larger than before, but locally the strong economy and good governance have enabled Gothenburg’s population to grow fast.

Sustainability is a part of the citizens’ everyday life, however the change in life style is achieved through better innovation rather than individual initiatives and efforts.

Climate change is an essential issue and acknowledged at both local and global level. Global cooperation is a key in order to solve the climate change, and at the local scale, such as in Gothenburg, a defend strategy based on advanced know-how is used to limit the effect of sea level rise.

**Concept**

The “global city” is a metropolis where quality of life is secured through large scale solutions on all levels and where a strong economy is driven by a knowledge-based city exporting green technology and science to the world. In the central river area, the presence of a knowledge center creates strong synergies with learning institutions and industries.

**Global City**

Gothenburg is a global city that possesses a powerful economy and deals with sustainability issues on a large scale. The environmental, social and political problems of the world are managed on an international level. Export of green technology and knowledge to the world has brought innovation and changes in daily life and significantly contributed to economic development.

Gothenburg as a port city has also developed into a state-of-the-art sea-based transportation hub and the sea freight plays a large part in connecting the whole city to the world. The Port of Gothenburg is expanded so that shipping containers are transported more through railways rather than roads. Transportation of import and export goods through the port, one of the most essential parts of the Swedish economy, is the main usage of the river. However, most of the goods are unloaded right in the port, and for those cargoes going upstream Göta Ålv to Vänern, they are reloaded to smaller ships in the port. Importing of goods is crucial to the city since local resources are not sufficient. The city is connected to Europe through high-speed trains, and Gothenburg serves as the center of south west Sweden. Commute within the region is chiefly on railroads.

The city has a mixture of different cultures and backgrounds. People come from all over the world for education, business and leisure. There are international meeting places for summits. With the knowledge center at the heart of the city, Gothenburg seems to be an attractive and popular location for businessmen and scientists in the fields it is renowned for. It also becomes a jewel among other sustainable cities around the world, looking fascinating in the tourists’ eyes.

In the IT-intense global city, the job opportunities are not clearly connected to the area itself. Employers and employees can be situated in different parts of the world, but the global cities, such as Gothenburg, work as nodes for job opportunities.
Making use of the technology development, adopting the global governance and facing the threat of climate change and resource constraints, the city adapts itself to a state in which it is not hard for people to choose a sustainable lifestyle. The change has been introduced through a top-down approach, thereby guiding the citizens to adjust to the new system. Less effort has been put to raise awareness among people, and more has been made to reconstruct the city metabolism. To secure the construction and efficiency of such a system, the municipality, in cooperation with the private sectors, has chosen to apply large scale solutions in many parts.

One of the severe problems caused by sea level rise is the intrusion of saline water up the river. To cope with it, a pipeline between Lake Vänern and Gothenburg is constructed to provide the city with fresh water whenever in need, and at the same time, to eliminate flooding in the area around the lake.

The city is highly dependent on electricity as the source of clean energy produced from different renewable resources. The extensive cooperation with neighboring countries brings electricity to the citizens by a cost-effective means (i.e. a high-voltage transmission line). A wide area (e.g. Sahara desert) with a huge amount of renewable energy resources, such as wind, solar or hydro power, will be used to ensure that at any time, supply can meet demand. And this way, the cost of green energy is reduced. Despite continuous electricity supply, efficiency is an essence in the city metabolism. Residential and commercial buildings are passively heated,
and new active houses are connected to a smart grid where consumers can sell their excess energy back to the grid. Bio-gas is produced out of municipal sewage sludge, food waste collected through sewage system, and residues from urban agriculture and forest trimming. This provides the city with low-carbon-footprint fuel for vehicles, district heating and cooling, and soil conditioners for city parks. Global legislation has ensured that local and import products should be reconstructed without difficulty. The law creates a strong market for recycled materials and incentives for the city to become more efficient in terms of waste management.

Population growth is another important issue; therefore, sufficient food supply must be secured. Winter is a disadvantage for large scale agriculture. Hence, commodities like fruits, vegetables, coffee, tea etc. are imported from four corners of the world since more crops can be naturally grown in the open air rather than inside the heated greenhouses. Trade deals with suppliers also guarantee that the eco-efficiency criteria are applied for all import food and that the level of CO2 emissions and eutrophication is under control. To some extent, local food production takes place in municipally- and privately-owned modern organic agriculture skyscrapers in Ringön. Here, inhabitants can rent or buy a space to cultivate and this place also serves as a meeting place.

The urban lifestyle is transformed towards conformity since people have standardized housings, transport, energy system and similar opportunities, all of which are the consequences of the large scale solutions. The options in consumption are confined in comparison to those in 2010 (e.g. meat products). The society is more conformed to other global cities, due to the presence of multinational companies and organizations, the intense use of IT and the sharing of information. Old infrastructure and buildings are used where they support the development; however, along river, efficiency and growth are of a higher priority than the cultural heritage. The knowledge center, a part of the river bank, as well as the rest of the area, contains all kinds of activities. The mix of residential, business, social and commercial interests create a living and secure urban environment throughout the day. Municipal and private housing are all available in the same street together with student housings, thus mixing people with different economic strengths. The good economic situation allows people to work only thirty hours a week. More time is used for socializing and engaging in the development of the society, which are highly encouraged in a city where cooperation and exchange between different actors are the driving forces.

Planners focus on how to let people swiftly travel around the city regardless of where they live. To accomplish this, the city prioritizes the development of a public transport system that will be used by all citizens. With the abundance of electricity, the metro lines, crossing the river at the Älvsborg Bridge and the reconstructed Marieholm Bridge, can be used for connecting different parts of the city. Housings are contiguous to public transport hub so that people can facilely reach the city center, and transportation system is developed into several zones surrounding the city center. There is no economic hindrance for people to travel, and it is also easier and quicker to commute by public transportation than by car in the central zones. The city center eventually turns into a pleasant car-free area, allowing bikers and pedestrians to enjoy the color of trees and flowers along the street and on the rooftops. Electric or hybrid car-pools are still provided but within a restricted number, and certainly, outside the car-free zones. There is a taxi system which consumes just a small amount of energy.

The new infrastructure on the central shorelines is secured with a wall and, at some sections, elevated to face the challenges of a 0.8-meter rise in sea level. The elevation at many sites is designed as stairways towards the river. This way, people still can access to the water as the sea level gradually rises. Some specific buildings also function as walls themselves with the possibility for people to walk along the front.
Knowledge is the soul of the city. It has driven the development of the city core along the river. The river shores of Gothenburg have developed into a high technology hub with a cluster of industries in green technology and any other future industries of which Sweden has a competitive advantage. Business offices are blended with university buildings, such as University of Gothenburg and Chalmers. The city becomes a host for many renowned technology conferences and the river vicinity a pioneer example of sustainable solutions.

The clustering of knowledge intense activities creates a synergy effect because information and innovations can be effectively collaborated between many kinds of actors. Even though distance matters less in this scenario, there will still be no perfect substitute for an arm-length business deal. By clustering up industries, it is also easy to achieve synergy effects when infrastructure both for IT and energy is planned. Through the establishments of many of the world leaders in their fields, it is a natural choice for companies starting up in similar businesses to place headquarters or some part of their organization in proximity to the most prominent players. Close ties to research and an innovative climate also attract businesses and the government has created infrastructure and incentives for businesses to locate here. In order to sustain an industry that is leading in knowledge intensive businesses, it is of vital importance that the universities continues to evolve and secure the close tie to business and industry.

The municipality and government have played important roles in creating the platform on which this knowledge city can grow. There is a strong cooperation between the municipality and industry sector to utilize the benefit for both.

Even though knowledge is the main export product of the city, and the major part of the heavy industries connected to technology are outsourced to other countries, many industries are present in Gothenburg today. The population growth leads to an expansion of the city’s border. Closer to the Angered Bridge, the river has broadened since 2010 and walls made from sediment from the river protect the industries next to the shore. These industries are mainly for refining raw materials and yielding locally-produced goods. Because of the inefficiency in long distance transporting of goods that can be produced locally, these industries are common.

In the global Gothenburg, the river is no longer a barrier between the two shores. The central riversides are connected with a shuttle arch between Lilla Bommen and the main building of the knowledge center at Frihamnen. A medium-height bridge connects the Lindholmen Pier and Masthugget Quay as a part of the circular transport route. The medium height possible for the low cargo ships headed toward Vänern to pass, and at the same time, for people to pleasantly cross the river on foot or by bicycle.
The River City 2050: Global City Scenario

Global City: Sea level rise strategies
- Attack
- Defend
- Retreat
- Attack - Defend
- Defend - Retreat

Map showing how sea-level rise is handled in this scenario.

Time-line showing progress in the scenario (below).

Global City

- Marieholm Bridge & Älvsborg Bridge reconstruction for metro way 2016 - 2020
  First circular Metro starts at 2020

- New bridge at Lindholmen 2015 - 2030

- Metro & new tram line 2020 - 2030

- Urban agriculture project 2035-2040

- World economic center Göteborg 2030-2050

- Attack & defend sea level rise strategies
  - Defend - building walls 2011-2040
  - Attack - developing elevated area 2020

- Biogas station & food waste pipeline 2015 - 2020

- "Arch" project
  Horizontal capsule lift between both sides of the river 2037-2040

2010 2015 2020 2025 2030 2035 2040 2045 2050
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Page 6: Emma Josefson
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The River City 2050 project is a continuation of the yearly case study collaboration between the University of Gothenburg and Chalmers since 2002. This year, seventeen students have been working with creating three scenarios, aiming for showing how the area surrounding the river Göta Älv in the municipality of Gothenburg can be developed in order to be sustainable in the future.

Through a transdisciplinary approach we have sought to provide short yet thorough insights into the social, environmental and economic processes that affect the study area. Our intention is to contribute to the discussion on how Gothenburg can be developed, and also to inspire public and private stakeholders to take active decisions leading to the creation of a sustainable city by the river.