Annex D - Sustainable urban (re)development

City Profiles

Annex D
Delft, July 2010

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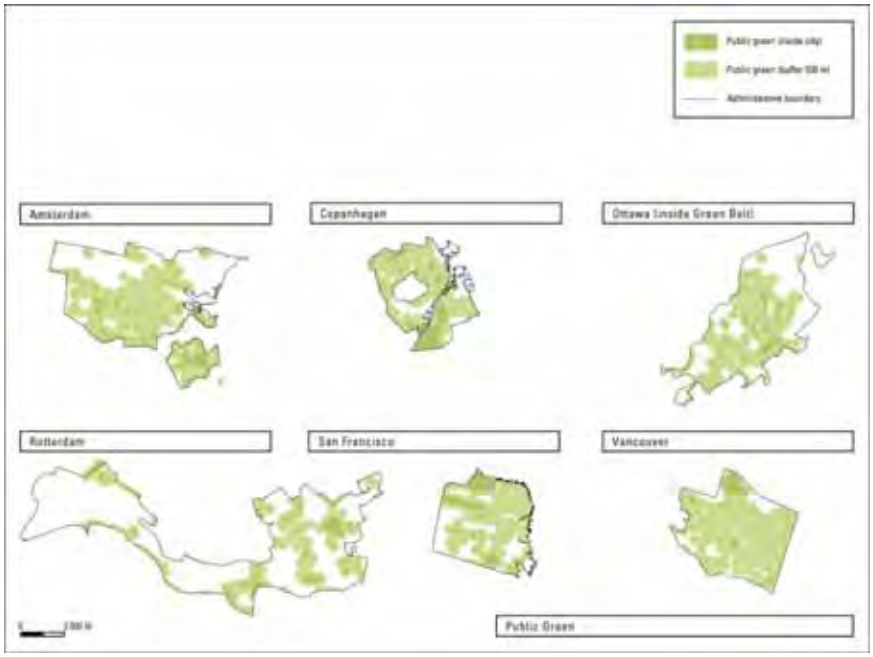
Annex D City Profiles

The city profiles are presented in this separate annex report. This annex report offers an overview of the policy goals and approaches of the exemplary cities considered in this report. The cities are presented in alphabetic order. Per city successively the goals are given, the policies and main projects, the most characteristic data and graphical materials. In figure 1 and 2 an overview of some city characteristics is given.

Figure 1 **Density inhabitants per sq km of the six cities**

Figure 2 **Public green (inside city) of the six cities**



D.1 Amsterdam

D.1.1 Goals

Reduce CO_2 emissions by 20% between 2005 and 2015. The vision is to be the first carbon neutral capital in the world by 2025.

Municipal organization

- In 2015, the City of Amsterdam wants to be climate neutral.

City Districts

- A better climate is not a project that can be 'quickly arranged' from city hall. Like-minded partners with shared objectives create the basis for success. The city districts play an important role in this process.

Sustainable energy

- Amsterdam has decided how much sustainable energy will be generated within the municipality in 2025. This amounts to 20% of the energy requirements of Amsterdam in 2025, if policy does not change. If there is a climate policy that results in reduced energy demand, the share of sustainable energy could be as high as 30%.

New construction

- Beginning in 2010, Amsterdam will build 32,000 housing units at the major locations. In 2010, four out of ten newly built houses will be climate neutral. in 2015, this will apply to all new houses

Existing buildings

- From the perspective of the municipality, the housing associations are an important group because they own more than 50% of the housing units in Amsterdam. The second and third group are private landlords (22%) and owner/residents (27%).

Small and mid-sized enterprises

- A framework of co-operation involving businesses, SME Amsterdam, the Chamber of Commerce, ORAM and the city districts gives shape to the SME programme. During the years to come, the partners in this programme will develop dozens of CO_2 reduction packages for specific SME groups. Key concept: delegating the task of saving energy.

ICT

- The leaders in the Amsterdam ICT sector and the Climate Office are developing the Green-IT programme. This initiative aims to reduce the CO_2 emissions of ICT technology in households and businesses.

Transport

- The Action Plan for Goods Transport and the Priority for a Healthy City programme have the objective of improving the air quality in Amsterdam. Some of the measures that restrict the emissions of particulate matter and nitrogen dioxide also lead to a reduction in CO_2 emissions. The aim of the Action Plan for Goods Transport is to reduce the emissions of heavy commercial vehicles by 15%.

Port of Amsterdam

- The Port of Amsterdam is committed to sustainable development, as shown in its strategic plan (Havenvisie, 2008-2020). This means that wind energy and thermal storage will be expanded, business clusters will benefit optimally from waste streams and sustainable biomass will be introduced as a motor for business. Road transport must be replaced where possible by rail and water transport.

Education

- The education sector comprises a large group of Amsterdam residents: students, pupils, parents and teachers. In this way, education provides the opportunity to inform a large group of people about the climate issue and about the possibilities to contribute to the solution themselves.

D.1.2 Policies and projects

Municipal organization

- New construction for the Municipality of Amsterdam: In recent years, the municipality has made large investments in energy-efficient buildings. Much of the new construction is more energy-efficient than required by law. Nevertheless, no single building is emission-free. The task is now to design buildings with the highest possible energy-efficiency, but which no longer use natural gas for space heating.
- Renovation of the municipality's own buildings: It is often impossible to renovate existing buildings at an acceptable cost so that they become CO_2 neutral. This does not take away from the fact that using existing technologies in older buildings can achieve major reductions.
- Making demands as a tenant: The municipality owns only some of the buildings that uses. The municipality decides to rent buildings depending on the preparedness of the landlord to invest in the energy efficiency of the building during renovation. If the landlord is not sufficiently prepared to make such an investment, the municipality will look for an alternative and will cancel the rental contract. As a result, Amsterdam signals landlords that sustainable buildings are the new standard.
- Energy Team: An Energy Team for municipal buildings is being established. This team will advise and assist the neighbourhoods and the central services during both new construction and renovation. The team will help map out what is required for all municipal buildings to earn an 'A label' for energy efficiency.
- Public lighting: Public lighting provides safety and atmosphere in the city. By using intelligent light measuring and more efficient lamps and materials, a great deal of energy can be saved. In concrete terms, the municipality sees the following as the most important possibilities:
  - For new installations and replacements, the municipality is choosing the most energy-efficient lamps and the most effective armatures. This means, among other things, replacing older lamps with newer types that do not require warm up time (or lamps of a future generation that are even more efficient) and switching entirely to electronic components (savings potential: nearly 8% energy savings and a longer lifespan for the lamps).
  - Continue to be critical of the light measurement system that – depending on the degree of darkness – turns on the public lighting. Responsible public lighting will continue to be the motto, but the lamps do not have to burn longer than is strictly necessary. A recent refinement of the measurement system resulted in energy savings of 1.5%.
  - Due to the geographical location and urban design of Amsterdam-Noord, it is possible to turn on the public lighting somewhat later in this section of the city, and to turn it off somewhat sooner. Additional differentiation in other parts of the city (WestelijkeTuinsteden, Amsterdam Zuidoost) is being investigated.
  - Beginning in 2008, experiments will take place with dimming public lighting for energy savings and to reduce possible light nuisance and light pollution. For example, it is unnecessary to have public lighting at 'full power' with low traffic intensities and clear weather conditions. This type of light dimming on thoroughfares can provide an energy savings of 7.5%.

- Municipal vehicle fleet: The municipal vehicle fleet has approximately 2000 vehicles. And all those lawnmowers, passenger cars, vans, sweeping machines and garbage trucks do not drive themselves.
  - Energy-efficient vehicles: In 2007, the Mayor & College of Aldermen decided to only purchase passenger cars with an A or B energy label. A car with an 'A label' emits at least 20% less CO_2 than average; with a 'B label' this is 10 to 20% less. This resolution of Mayor & College of Aldermen is an order to the central services and an urgent request to the city districts.
  - In addition, a funding scheme from the Air Quality Programme Bureau will accelerate the replacement of polluting vehicles with clean vehicles.
  - A two-wheel alternative: Electric scooters are potentially a good alternative for cars on short trips with little baggage. Compared with four-wheel transport, they use little energy. Moreover, they create less pollution and noise nuisance in the city and they take up less space. A test is being conducted to determine if the scooters are user friendly, reliable and safe, and if the breakdown service for these vehicles can also be properly arranged. If this pilot project succeeds, a fleet of electric scooters may be purchased.
- LED lighting: Partly on the initiative of Philips, a study was conducted this year into which additional technological possibilities for energy savings are available, what the effect of these would be and what accelerated investments these technologies require. For example, LED streetlights developed by Philips were tested at the city hall/Muziektheater. One of the objectives was to enable Amsterdam residents to become acquainted with this new lighting technology. LED streetlights can provide energy savings of up to 51%.

City Districts

- Online monitoring: This year the 'Online monitoring of municipal buildings' will be expanded to all locations. This initiative of ARC gives the building manager insight at all times into the energy use of the building.
- Step2Save: Step2Save is a cooperative project involving Nuon, the Municipality of Amsterdam, eleven city districts and the Far West and Ymere housing associations. Step2Save aims for CO_2 reduction, lower energy bills for tenants and trains unemployed young people to become energy advisers.
- Energy Survival: This year Project Bureau ARC, on behalf of the Netherlands Climate Union (Klimaatverbond Nederland) is again holding the Energy Survival programme in Amsterdam. In this programme, children learn about the importance of energy savings and sustainable energy during an exciting and educational discovery expedition.
- Solar power on your roof is easy: In the summer of 2007, Project Bureau ARC, together with the province of North Holland and Besseling Installatie/Kapitein, conducted the 'Zon op je dak' campaign for the city cistricts of Amsterdam. The aim of the campaign was to promote solar energy systems among the owners/residents in the city private owners could obtain a subsidy on the purchase of a solar energy system.
- Climate Cafés: In 2008, fifteen Climate Cafés will be held by WISE on behalf of the Amsterdam city districts. This is a simple but very effective concept to reach new target groups. In a pub or coffee house, a discussion about climate topics is held while the participants enjoy a drink. The attendees become involved with the theme by means of an exciting climate quiz, among other methods.
- Sustainable energy in urban renewal: The Institute for Environmental Studies of VU University, the General Housing Association (Algemene

Woningbouwvereniging) and the Geuzenveld-Slotermeer city district are jointly pursuing a broadly supported package of CO_2 reducing measures that will be used during renovation projects. Residents, project managers of city districts and housing associations are working together in a dialogue and workshop programme which emphasizes the importance and feasibility of CO_2 reducing measures and provides technologies with which the reduction will be achieved. The aim is to develop a method with which the project leaders can get started in concrete terms.

- Air curtains: For busy shops, open doors are more the rule than the exception. Usually the inside temperature is maintained by using a warm air curtain at the entrance. This is very costly for the business and is not very good for the environment. The City District Centrum wants to help the shops and the environment by talking with them about replacing the warm air curtains with alternatives that are at least 50% more energy efficient. For this purpose, a pilot study has been planned where selected shops will use an energy-efficient air curtain.
- Heat pump at the Airport Business park: The Airport Business park Amsterdam-Osdorp (formerly Lutkemeer) aims to reduce its energy consumption by 40% and to generate 10% of the required energy sustainably. To this end, the business park is using a groundwater system with de-central heat pumps and is taking advantage of a subsidy scheme to realise 10,000 m² of solar panels. Companies at the business park are required to connect to the system. Natural gas lines will not be installed – therefore no alternative is available.
- European demonstration project: Noord Is working on the sustainable renovation project 'Plan van Gool'. As part of this project, 1,170 houses will be renovated in a sustainable fashion. This will be done, among other ways, by greatly improving the insulation of the houses.
- Sustainable renovation: In 2006 and 2007, the Far West housing association implemented an environmentally friendly housing renovation project involving a building complex with 192 units (blocks of flats with shared entrance halls and regular flats) on the Piet Mondriaanstraat and surrounding area. Far West commissioned a study to determine which environmental measures would be most effective and also took affordability into account. The resulted in an ambitious package of renovation measures.
- Laan van Spartaan: "Where football fields were once located, in several years 1,000 new housing units will be built, including sports accommodations, a parking garage and social amenities. All houses will be connected to district heating provided by the Waste Energy Company (Afval Energie Bedrijf)."
- Sustainable City District office: This year, the new city district office for Zuideramstel will be completed. The building complex also contains housing units and a parking garage. The project location is the Kop Rivierenbuurt and is part of the Zuidas. Regarding energy and sustainability, a number of measures have been taken that have led among other things to the Energy Performance Coefficient being 33% better than the legal requirement.
- Energy savings for primary schools: Together with the province of North Holland, the Environmental & Building Department and the school administrations Sirius and Bijzonderwijs, city district Zuidoost has developed an energy savings campaign for 24 primary schools. Schools with a high energy consumption were required to participate in the energy study. The schools were given a 1,000 subsidy and assistance in implementing the very practically oriented advice. Following the completion of the project, the school administrations continued with

energy management on a no cure, no pay basis. In this way, saving energy becomes anchored in the organisation.

- Turby-windmills: Since the first of July 2007, a Turby windmill has been proudly turning on the Flevohuis. The machine stands 12 m high and supplies enough electricity for two households. The installation of the wind turbine is a co-production involving the city district and the Ymere housing association. Each party paid half of the € 20,000 cost. As the owner of the Flevohuis, Ymere manages the wind turbine. City district Zeeburg was responsible for the planning and the environmental-legal issues involved with the installation.

City district office: Oost-Watergraafsmeer is building a new city district complex in the Polderweggebied which will also house the Centre for Visual Arts, Entrepreneurs Centre Oost-Watergraafsmeer and de Kraal school. The building will be completed this year. Environmental measures: As a result of the measures, the Energy Performance Coefficient (EPC) is 50% better than required in the National Building Regulations decree. This performance can be improved even further if wind turbines and solar cells can be installed on the roof (currently under study).

Sustainable energy

- Solar energy: According to the latest insights, after 2016 the price per kWh for solar energy will be equal to the price paid by a private party for electricity from the grid. Profitable exploitation of solar energy is on the horizon. To achieve this, two preconditions must always be satisfied.
  - First, there must be sufficient space to install solar panels, solar boilers or thin-film PV. In Amsterdam, this is no problem whatsoever: businesses, houses, offices (municipal and private) and schools have several million m² of roof area. There are parties who want to make their roofs available without having the ambition of investing in and managing the solar systems.
  - A second precondition is therefore that there are parties who install, maintain and manage the solar installations on a contract basis, and sell the generated energy to a power company. New Amsterdam Climate sees possibilities in the roof area of Amsterdam being used by solar power companies.

  At the national level as well, preparations are taking place for the large-scale rollout of solar photovoltaic systems in the built environment. Therefore New Amsterdam Climate, in co-operation with the Ministry of Economic Affairs, financiers and the energy sector, wants to develop a concept that can be put on the market in the foreseeable future.
- Wind energy: New wind turbines could be installed at various locations in the city. The available space in Amsterdam for large wind turbines is limited, but the new wind location map shows the potential and the possibilities for initiatives. Installing small wind turbines on roofs is an option that requires further study. This year (2008) Amsterdam will present its vision on this possibility.
- The lack of space within Amsterdam can be compensated by participating in wind parks on the North Sea. Amsterdam is taking this option into serious consideration.
- Biomass: Amsterdam is already using biomass from municipal waste and sewage sludge to generate sustainable heat and electricity. The trams and the metro, for example, operate on this electricity. The electricity generation takes place at the Waste and Energy Company (AEB), where slightly more than half of the incinerated waste from non-fossil origin can be considered to be biomass. By expanding the district heating network of AEB and connecting more houses and businesses to this network, even more benefits can be obtained from biomass. Increasing the sales of

residual heat is currently being studied. Food supplies and biodiversity must certainly not suffer in order to produce biomass.
- Another direction in energy production from biomass has been given attention in a study taking place at the Sciencepark, where Waternet is working with Aquaphy to explore the possibilities of producing algae in-house.
- Heat and cold: For supplying heat and cold, technologies are available at the household, building complex or district level. At the level of individual households, the solar boiler is one possibility. At the project level, at dozens of locations in Amsterdam companies are using a thermal storage installation for heating and cooling. This is an efficient technology which has been accepted by the market and will continue to grow significantly. At the district level, Amsterdam has a growing district heating grid. Ultimately this grid will form a ring with Amsterdam. To achieve this, it is essential that the new locations of Buiksloterham and Zeeburgereiland will be connected to the district heating grid. For project developers, thermal storage is often more interesting in financial terms than connecting to district heating. In order to find a good balance, the municipality will have to start directing this process. To this end, a theme been established for the programme managers in the spatial planning sector.
- Sustainability is just as important with the delivery of cold as it is with the delivery of heat. However it is more difficult to realise this on a large-scale, because deep water (in this case the source of cold) is not always available. The Zuidas and the Zuidoostlob are using a cold grid that is fed with deep water from the Nieuwe Meer and the Ouderkerkerplas. Waternet and NUON are working closely together on this project.
- For Teleport, a study is being conducted about the feasibility of a cold grid that will use AEB heat for absorption cooling.
- More and more 'green' electricity: In Amsterdam, 37% of the households are already using ' green' electricity (from sustainable sources). This is slightly more than the national average of 33% (source: Milieucentraal). An interesting aspect is the growth during the past two years, especially among young people. The 40 to 60 age group is lagging behind. In 2009 a major campaign is launched in co-operation with energy suppliers to encourage private parties as well as companies to switch to green electricity.

Process & Partners: To greatly increase the production of sustainable energy, co-operation is essential. This is why the Climate Office and the parties that can make this possible are coming into contact with each other. The partners in this endeavour include not only energy companies, but also businesses that offer sustainable energy products. Co-operation also means joint pilot projects and experimental projects to learn about the obstacles and bottlenecks.

New construction

- Beginning in 2010, Amsterdam will build 32,000 housing units at the major locations. In 2010, four out of ten newly built houses will be climate neutral. In 2015, this will apply to all new houses
- At the Zuidas location, ABN Amro, together with other parties, developed the Dutch Green Building Council. This concept makes it possible to achieve a better sustainability score than is prescribed in the legislation.
- A group of eight market parties is working on a proposal to make the Buiksloterham development district as climate neutral as possible. In this context, the Noordwaarts Administrative Consultation Committee has decided that the project will be awarded to the developer with the most sustainable plan, and not necessarily to the developer with the lowest price. To compare the plans with each other, a 'sustainability meter' is being used. The first experience with this approach is being acquired in

the Buiksloterham. The intention is for many more projects in Amsterdam-Noord and other parts of the city to start using this method .
- In the Spaarndammerbuurt, the De Key housing association is starting to build climate-neutral houses and is bringing existing houses to that level during renovation.

New approach: It won't happen by itself! The entire process of land allocation, development and construction must be based on the new standard. During the development of areas, an energy strategy must be formulated at the earliest stage, which indicates what the best measures are.

Existing buildings

The first steps have already been taken:
- Since February of 2007, the municipality has headed the leaders alliance in which the housing associations are challenged to achieve the best performance. As a result, the attention for energy savings in existing housing has increased. In addition, the leaders alliance has led to concrete initiatives such as the Step2Save project.
- Joint initiatives create a strong network. A good example is the presentation of a joint case study – during the BouwRAI – by the housing associations Ymere, Het Oosten, De Key and the Climate Office. Another example is the Network for Energy Savings, an initiative of the Amsterdam Federation of Housing Associations. As part of this network, all the housing associations exchange expertise about energy savings in existing housing and new housing.
- In the meantime, the first housing associations have formulated their sustainability policy.
- This year, the municipality and the housing associations will jointly realise three model houses. These models houses show what is possible to reduce CO_2 emissions. The plan is to deliver these houses to their new residents at the beginning of 2009.
- The Climate Office and a number of financiers are jointly seeking possibilities to aid owners associations when taking energy saving measures. This concerns advice, implementing the measures and providing the financing for the measures.

More steps to take:
- Every year, the municipal housing service and the housing associations make agreements about the contributions that each of the associations will make to the aims in the housing policy agreement. Climate will be an important aspect in these agreements.
- In 2008, the housing associations will assign energy labels to most of their housing inventory. This process provides a lot of information about the current state of affairs and the steps that still need to be taken. It is important to share this new expertise with each other.
- A number of housing associations need to acquire more understanding of the energy quality of their housing and must begin developing a sustainability policy.
- All the housing associations together sell approximately 2000 housing units per year Generally speaking, the new owner/resident does not invest in energy saving measures. If a housing association implemented these measures before the sale, it could include the investment in the sales price, and the reduction in CO_2 emissions would then be assured.
- Approximately 6% of the households in Amsterdam are still receiving unmetered heat (central heating and warm water). With a meter and an individual account, energy and water consumption is reduced by 10 to 15%.

The demands of the building code hamper far reaching energy savings especially in houses from the pre-war era. Due to its role in this process, the municipality must find a new balance that does justice to both the beauty of the city and the necessity for energy savings.

Small and mid-sized enterprises

- Delegating the task of saving energy In co-operation with several financial institutions and energy companies, a concept is being developed that will make it easier for companies to benefit from energy savings. For example, a business that requires a new lighting installation will not have to invest in this installation itself; it will repay the financed amount from the savings on its energy bill. This concept will be tested in the near future and – if successful – will be structurally included in the other projects and expanded.
- For three SME groups, packages of measures are already being compiled. The strategy here is to bring businesses who are looking for buyers for their sustainable products into contact with businesses who want to make their operations more sustainable, but don't know exactly how to do this.
  - Offices, warehouses and manufacturing: A brief series of business scans brings sustainable savings and benefits into the picture and links these to the best investment moments. Businesses, business associations, parties involved with business park management, suppliers and the municipality all contribute to the realization of pilot projects. The successful approaches used by the leaders will be carefully adapted to a solution which will be interesting for a large group of businesses.
  - Hotels: In this sector, CO_2 reduction concerns the buildings, the technical installations and the hotel room facilities. Here as well, innovative suppliers and Green Key hotels are developing concrete CO_2 reduction options that are being applied. These options will then be made available to a large group of hotels.
  - Shops and cafés/restaurants/catering: Several innovative retailers and suppliers will determine which possibilities are available to reduce CO_2 emissions. They will do this, among other ways, by reducing unneeded lighting at night. In another project, all businesses in the Utrechtsestraat will be advised about simple measures and supported during their implementation. With the experience acquired during the pilot project, street managers can encourage larger groups of shops to implement the solutions. Additional expansion will take place in co-operation with the city districts.

ICT

- The leaders in the Amsterdam ICT sector and the Climate Office are developing the Green-IT programme. This initiative aims to reduce the CO_2 emissions of ICT technology in households and businesses. In addition, Green-IT is looking for possibilities to use ICT elsewhere in the economic system to achieve CO_2 reduction. The programme will gradually comprise initiatives focusing on various issues, target groups and effects. In 2008, the focus will be on reducing the CO_2 emissions of data centres: Green DC. Green DC:
  - Companies will be provided with knowledge about the necessity of sustainable energy consumption and about the available possibilities (technical and otherwise).
  - Together with the sector, it will be determined how the municipality can help businesses contribute to the municipal CO_2 target.
  - Initiatives of leaders will be put in the spotlight for the sector.
  - Data centres and the municipality will make voluntary climate agreements.

- The Climate Office participates in the annual Innovation Award ICT & CO_2 of Digikring; this award aims to challenge the ICT sector and the creative ME in Amsterdam to come up with solutions for energy issues. The Office assigns one project leader and one communications officer to help organise the event and provides the prize money.
- The energy performance of municipal ICT is examined: energy criteria for purchasing; using ICT technology to save energy within the municipal organisation; energy savings in the municipal infrastructure.
- Connected Urban Development: As part of the Clinton Global Initiative, Amsterdam is working together with Seoul, San Francisco and Cisco on making cities more sustainable (climate-friendly) with the aid of ICT (the 'Connected Urban Development' programme - CUD). ICT plays a role in monitoring and in finding solutions, such as creating green buildings or smarter transport methods. In principle, the measures developed in the programme must be reproducible in other cities and countries. Therefore, in addition to developing, testing and implementing measures, the dissemination of the acquired expertise also has a high priority.

Transport

- The Action Plan for Goods Transport and the Priority for a Healthy City programme have the objective of improving the air quality in Amsterdam. Some of the measures that restrict the emissions of particulate matter and nitrogen dioxide also lead to a reduction in CO_2 emissions. The aim of the Action Plan for Goods Transport is to reduce the emissions of heavy commercial vehicles by 15%. An environmental zone for such heavy vehicles will restrict the most polluting ones. The implementation of the quality network for goods transport and promoting other forms of goods transport such as City Cargo, Mokum Mariteam, and bicycle couriers will also make a significant contribution to CO_2 reduction.
- The Priority for a Healthy City programme is an ambitious plan to reduce the air pollution caused by traffic within the Ring A10. An environmental zone for passenger cars and vans and a maximum speed of 80 kph on the major road network will also make a substantial contribution to reducing CO_2 emissions. Discussion is still taking place about the implementation of this measure with the Ministry of Transport, Public Works and Water Management.
- Making vehicles more environmentally friendly Various pilot studies, initiatives and projects will lead to cleaner mobility during the years to come. First of all, the existing means of transport in the city will be made more sustainable. This means more electric scooters, tuktuks and tour boats operating on hydrogen.
- Beginning in 2009, City Cargo will be operating a goods tram. The municipality is consulting with TCA about the possibilities of using cleaner taxis to reduce air pollution and CO_2 emissions.
- Waternet recently began generating biogas from wastewater treatment plants to supply green fuel for the municipal vehicle fleet. Over the longer term, Waternet aims to convert the biogas into hydrogen.
- Electrical transport on the path to hydrogen Hydrogen is a 'third wave' solution, a fuel for the long-term. As an interim step on the path to hydrogen, Amsterdam wants to promote electrical transport. Electrical vehicles have zero emissions; this is good for the air quality and therefore good for the health of the residents. Electrical transport has many similarities with hydrogen transport. Both are driven by an electrical motor, in the first case with a battery and in the second case with a fuel cell. The developments in this area moving fast. More and more manufacturers are producing an electrical or hybrid vehicle for the market. In addition, electrical vans and trucks are going to be driving

through the city. And on the canals, there are more and more electrically powered pleasure boats. Electrical scooters can be recharged in the parking stalls. As a result, the street landscape is going to soon become quieter and cleaner.
- Important role for hydrogen: Three Amsterdam city buses are already operating on hydrogen. In hybrid cars, the use of hydrogen improves the efficiency of the motor; and the first Amsterdam hydrogen boat is waiting to be christened.
- Fewer vehicles: As the municipal parking policy becomes more stringent, and mobility becomes more expensive, more people will start sharing a car. Greenwheels, Wheels4All, Connect-Car en Mobility Mixx have already discovered this opportunity. It is known that people who share cars drive 30 to 50% less than car owners.
- Waterways as blue carpets: As a node in the water transport network, the waterways of Amsterdam offer more transport possibilities that are currently being used. City District Centrum wants to improve accessibility by utilising these possibilities. It plans to encourage and facilitate market parties with a network of public docking facilities and quays. Co-operation between the municipality and hotels, museums, cafés and restaurants and tour boat operators appears to be an obvious step. One initiative that is outstandingly compatible with the plans is Mokum Mariteam, a framework of co-operation of interested organisations that focuses on the transport of goods and the removal of waste using environmentally friendly vessels on the canals of the inner-city.

Port of Amsterdam

- Cleaner transport: Since 2003, the Westpoort Bus has been operating in the Port of Amsterdam; this is a private initiative for collective transport. Every day, between 500 and 600 port workers take the bus instead of their cars.
- Nearly two-thirds of the containers from ocean vessels are transported during the next phase via rail or inland waterways. With better transport links, this share can be increased even further, thereby reducing the use of more polluting road transport.
- One innovative example is the AMSbarge, a specially designed ship for inland waterways with its own heavy container crane that provides a daily pickup and delivery service for companies on or near the waterways. A second ship is now on order.
- The Port of Amsterdam organisation uses hybrid cars.
- The CO_2 emissions of business trips on aeroplanes are compensated with the restoration of 30,000 ha of forest in Malaysia. This region in Malaysia is certified by the Forest Stewardship Council (FSC).
- Source of energy: At the end of 2008, wind turbines with a capacity of 65 megawatts will be installed at Westpoort, which is enough to supply 40,000 households with clean electricity.
- The Energy & Waste Company (AEB), which generates electricity from waste, is also located at Port of Amsterdam. In the years to come, the district heating grid, which AEB supplies with its residual heat, will be expanded so that other businesses in Westpoort can also supply their residual heat to the grid.
- In April 2008, construction began on the new facility for the Greenmills Company. This innovative company produces biodiesel, bio ethanol, compost and green electricity. Greenmills operates as a closed system, where the residual heat that is generated during the fermentation and composting process is used for the rendering plant. The Westpoortbus operates on biodiesel produced by Greenmills. The Port of Amsterdam aims to take a leading position in the blending and distribution of ‘green’ fuels.

- Port of Amsterdam Fund: Businesses that want to make sustainable, innovative investments that exceed their direct commercial needs, or which exceed the applicable legal requirements, can apply for financing to a Port of Amsterdam Fund (Havenfonds), in formation.
- The Environmental Policy Plan 2008-2012 calls for a baseline measurement of the CO_2 emissions of Westpoort and the Port of Amsterdam. This measurement is necessary to map out the effects of later CO_2 reduction measures.
- Another useful study concerns the possibilities for providing electricity to moored ocean shipping vessels, thermal storage for offices and distribution centres, and CO_2 capture, storage and reuse in the port area. The Port of Amsterdam also wants to further optimize the transport connections to the hinterland.
- After 2010, the Port of Amsterdam will commit itself to the development of sustainable business clusters in which products such as heat, electricity and CO_2 will be used (or reused) by the businesses. The Port of Amsterdam holds a strong position on the energy market and has a great deal of expertise in this area. The application of more sustainable energy is therefore a logical step. This philosophy is compatible with businesses that focus, for example, on hydrogen, sustainable biomass, algae production and wind energy.
- 2020 and beyond: Thanks to the first and second wave, in 2020 the Port of Amsterdam will be a sustainable port in which CO_2 emissions are minimised, sustainable energy is generated and cycles are closed whenever possible.
- Taking CO_2 to the sea: Rotterdam aims to store CO_2 in an empty gas field in the North Sea. For Amsterdam, this is also a possibility. The Climate Office commissioned an exploratory study concerning the possibilities of carbon capture and storage (CCS).

Education

- Primary education: Based on the condition of many of these buildings and their technical installations, and considering the possibilities to manage energy and behaviour, it is absolutely clear that the consumption of gas and electricity can be reduced.
- Higher education: VU University, the University of Amsterdam, Amsterdam University of Applied Sciences, InHolland, Amsterdam Regional Community College and Amarantis provide education to more than 150,000 students in approximately 180 buildings. The CO_2 emission of these institutions amounts to 2.5% of the total for Amsterdam. The city is going to change this situation. These parties endorse the climate of objective of the Municipality of Amsterdam and want to contribute to the reduction of urban CO_2 emissions.
- Towards 2010: In 2010, the institutions for higher education will have formulated energy savings plans that are more ambitious than the multiyear agreements. Every four years, these plans will be renewed with new climate initiatives. Every year, it will be determined whether the interim results are sufficient for achieving the ultimate targets. At the very least, large-scale energy savings measures will be implemented that can pay for themselves within five years. All institutions will have switched to green electricity. Sustainability will be the basic principle for the operational management and new construction plans for the institutions.

Sources

Amsterdam Climate Office, 2009
New Amsterdam Climate; Summary of plans and ongoing projects
Amsterdam, 2009

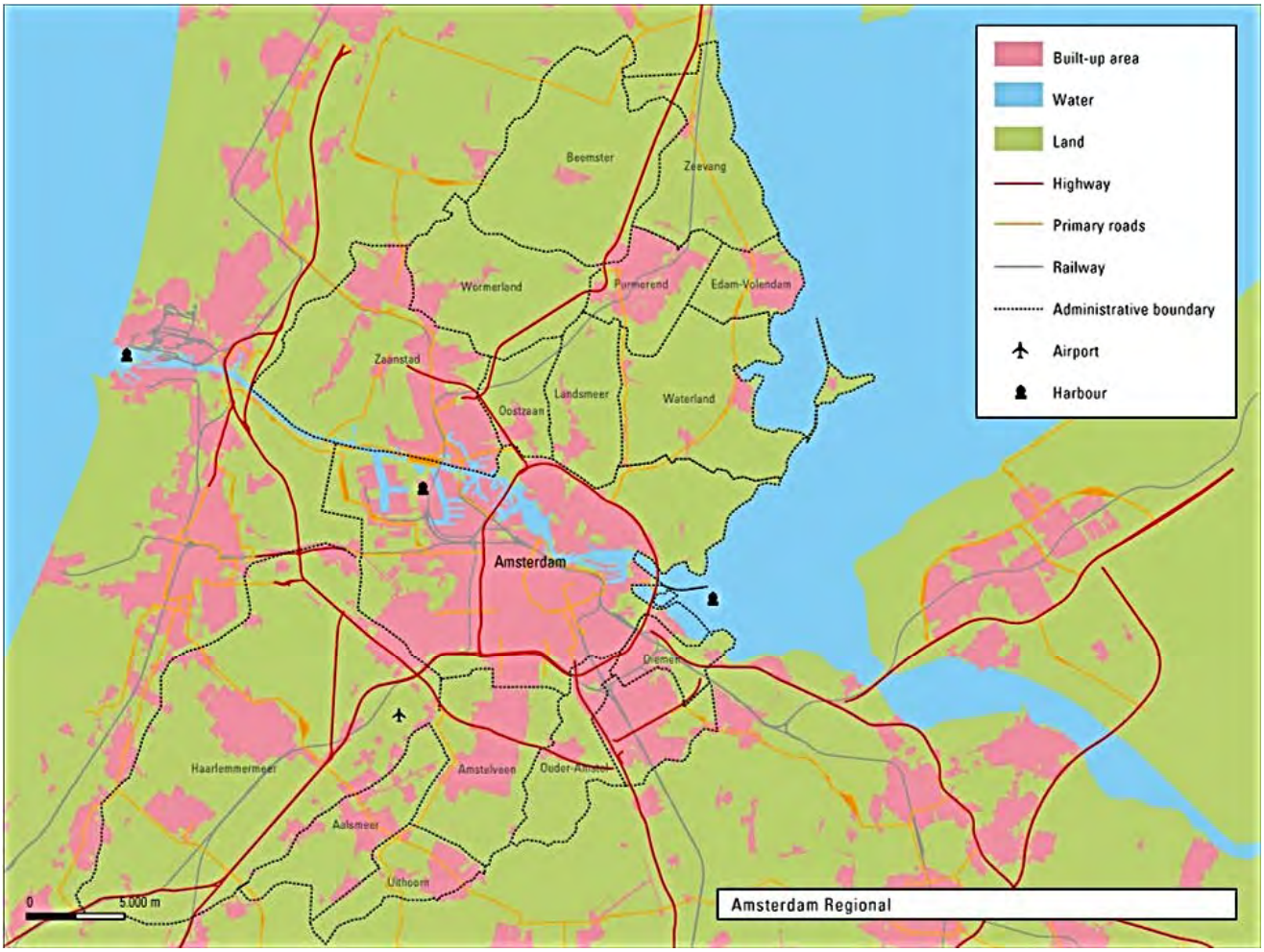
Climate program:
http://www.nieuwamsterdamsklimaat.nl/achtergrond/klimaat_0/klimaatprogramma

D.1.3 Data

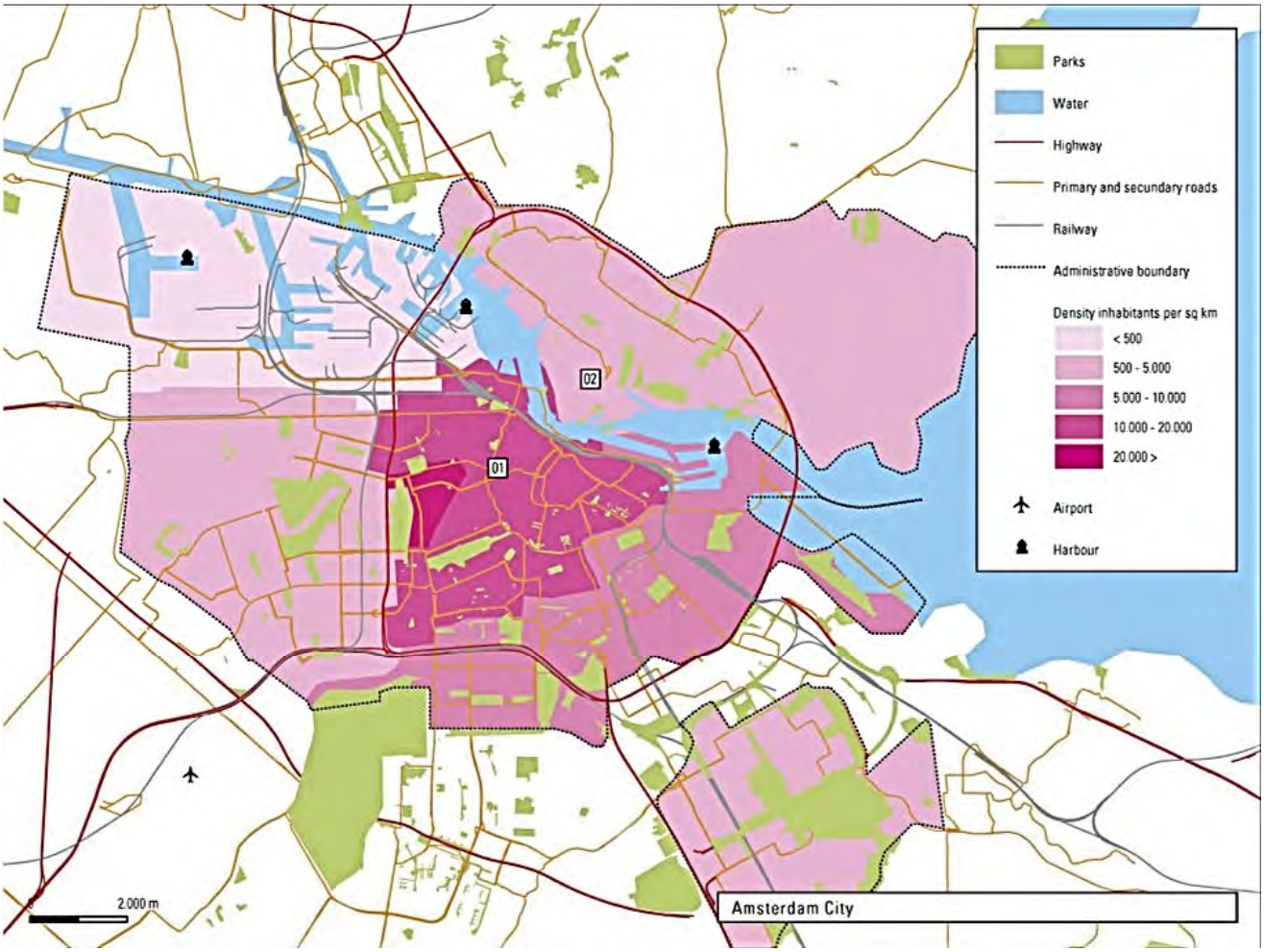
Amsterdam				
General parameters				
Population		2009	756,000	
	Change	*1990-2000*	*5%*	
		1990-2009	*9%*	
Households		2009	416,000	
	Change	*2000-2009*	*3%*	
Density		2009	4,550	Inhabitants/km^2
	Change	*2000-2009*	*3%*	
Ecological parameters				
Total GHG emissions		2006	4.7	Million ton/year
	Change	*1990-2006*	*15%*	
Residential GHG emissions		2006	1.9	Million ton/year
	Change	*1990-2006*	*6%*	
GHG emissions/ capita		2006	6.3	Ton
	Change	*1990-2006*	*7%*	
Residential GHG emissions/capita		2006	2,6	Ton
	Change	*1990-2006*	*-1%*	
Residential energy use share		2007	73%	Gas
The Netherlands		2007	21%	Electricity
		2007	5%	Heat/renewables
	Change	*N/A*	*N/A*	
Solid waste production		2007	482	Kg/capita/year
	Change	*2003–2007*	*+1%*	
		2005–2007	*-1%*	
Recycling		2007	21%	
	Change	*N/A*	*N/A*	
Residential water use		2008	172	Liters/capita/day
	Change	*2004-2008*	*-3%*	
Travel to work		2006	24%	By public transport
		2006	38%	By foot/bicycle
	Change	*2000–2008*	*-15%*	*By car*
		2001–2008	*-7%*	*By public transport*
		2002–2008	*5%*	*By bicycle*
		2003-2008	*-23%*	*By foot*
Air quality trend - PM_{10}		1999–2008	0%	Background concentration
		1999–2008	-22%	Local concentration
	Change	*N/A*	*N/A*	
Air quality trend - NO_x		1999–2008	-10% , -20%	Background concentration
		1999-2008	15%, 22%	Local concentration
	Change	*N/A*	*N/A*	

D.1.4 Graphic material


0
5.000 m
Amsterdam Regional


Built-up area
Water
Land
Highway
Primary roads
Railway
Administrative boundary
Airport
Harbour
Beemster
Zeevang
Wormerland
Purmerend
Edam-Volendam
Zaanstad
Landsmeer
Oostzaan
Waterland
Amsterdam
Diemen
Haarlemmermeer
Amstelveen
Ouder-Amstel
Aalsmeer
Uithoorn
0
5.000 m
Amsterdam Regional


02
01
Amsterdam City


Parks
Water
Highway
Primary and secundary roads
Railway
Administrative boundary
Density inhabitants per sq km
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500 - 5.000
5.000 - 10.000
10.000 - 20.000
20.000 >
Airport
Harbour
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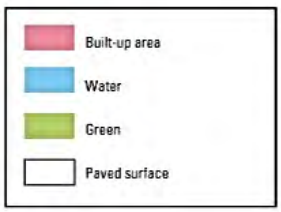
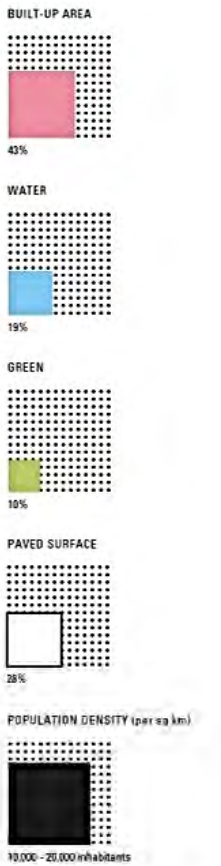
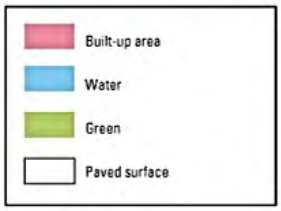
Amsterdam City



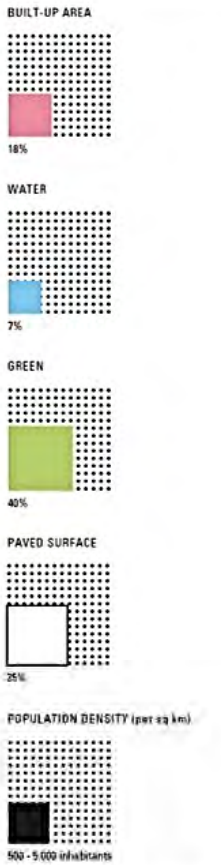
TYPOLOGY
enclosed block with attached housing



Raadhuisstraat, Amsterdam-high density



TYPOLOGY
split level homes



Heimansweg, Amsterdam-low density

TALLEST BUILDINGS

Rembrandt Tower	135 m
Mondriaan Toren	123 m
ABN AMRO World HQ	105 m
World Trade Center Tower 5	105 m
Mahler 4 Ito 100.00	100 m

Amsterdam Skyline

Amsterdam - Noord, lowest density

Amsterdam - Baarsjes, highest density

Amsterdam, GWL area

D.2 Copenhagen

D.2.1 Goals

Reduce CO_2 emissions by 20% between 2005 and 2015. The vision is to be the first carbon neutral capital in the world by 2025.

The world's best city for cycles:

- At least 50% of people will go to their workplace or educational institution in Copenhagen by bike.
- The number of seriously injured cyclists in Copenhagen to be halved compared to 2005 (when 118 cyclists were injured).
- At least 80% of cyclists in Copenhagen to feel safe and secure in traffic.

Climate capital:

- A reduction of Copenhagen's CO_2 emissions of at least 20% compared to 2005.

A green and blue capital city:

- 90% of Copenhageners should be able to walk to a park, a beach, a natural area or sea swimming pool in less than fifteen minutes.
- Copenhageners will be visiting the city's parks, natural areas, sea swimming pools and beaches twice as often as today (on average 1 hour every other day).

A clean and healthy big city:

- Copenhageners should be able to sleep peacefully, free from noise harmful to health from street traffic.
- All schools and institutions should be subject to only low traffic-noise levels.
- The air should be so clean that Copenhageners' health will not be damaged.
- There should be at least 20% organic food in the city's food consumption.
- The city to lead the way with at least 90% organic food in its institutions.
- Copenhagen should be Europe's cleanest capital and one of the cleanest capitals in the world.
- Litter should be cleared from public streets within eight hours.

D.2.2 Policies and projects

The world's best city for cycles

Currently, more than 1.2 km^2 are covered by cyclists in Copenhagen. More than 36% of Copenhageners choose to go by bike to their place of work or education. This number of cycles is presumably a world record and constitutes an important part of Copenhagen's identity.

- The cycle culture has evolved and developed over many years, helped by ongoing investment in cycle tracks, cycle routes and so on. Many Copenhageners want more and broader cycle tracks, more green cycle routes free from car traffic, green waves between traffic lights and better cycle parking facilities, also at their workplaces.
- During recent years, Copenhagen has built a new bridge over the harbour for cyclists and pedestrians. A similar one is under construction over Ågade. Many new cycle parking stands have been set up and several campaigns have contributed to better and safer cycle traffic. The initiative will continue and will be intensified. Conditions for cyclists will improve further, so that even more people will choose to transform the journey to their place of work or education into a bike ride in Eco-metropolis Copenhagen.
- The best alternative to cycling will be public transport, which must also be improved. Investment in ease of travel by metro, bus and so on will ensure

that public transport is the preferred alternative to cycling, rather than the cars.
- It is also important to feel safe and secure when you take your bike, especially for young cyclists and their parents. During the last few years the number of accidents has fallen but nearly half the serious traffic injuries are cyclists. As a minimum, the city must halve the number of seriously injured cyclists.

Climate capital

When Copenhagen hosts the UN's Climate Conference in 2009, the world will be thirsty for a success story. As host city, Copenhagen must make a significant effort to reduce greenhouse gas emissions.

- Copenhagen has already taken giant steps in reducing CO_2 emissions. Every citizen has reduced his input to global warming from 7 to 4.9 tons, by 2.1 tons in fact compared to the 1990 figures. This corresponds to a combined CO_2 reduction of 25% for every Copenhagener over fifteen years of age. This has occurred despite remarkable growth in the city. The fall is primarily due to connecting the district heating system and generating stations to cleaner fuels, especially the change from coal and oil to natural gas.
- Copenhagen improves further. So Copenhagen dares to set an ambitious new goal of reducing CO_2 emissions by a further 20% by 2015 compared to today (2005 figures). This means that by 2015 the city will have reduced emissions by 40% compared to 1990.
- The Municipality of Copenhagen will lead the way. For example, all new municipal buildings will be environmentally friendly. The considerable potential for energy saving already existing in the municipality's own buildings will be exploited by environmentally sensible restoration and renewal. In order to reduce the amount of car traffic, the city will focus on green transport and congestion charging as well as measures to promote public transport.
- The municipality will go first with its star Initiatives and its daily practice. The wider use of sustainable energy through the use of solar cells, geothermal energy and wind power for example, must be strongly promoted.

Integrating climate into energy supply (initiatives)

- Renewable energy replaces coal at Amager power station Unit 1, which converts 100% to biomass (wood chips).
- Renewable energy replaces coal at Amager power station Unit 3, which converts at least 40% of its coal consumption to biomass (wood chips).
- A new combined heat and power station is constructed, based on renewable energy.
- New windmills give Copenhageners the possibility of directly investing in real green electricity.
- New windmills; Copenhagen will work to build new windmills which deliver the equivalent of the entire municipal government's electricity needs and which will come to contribute more and more towards fulfilling the vision of carbon neutrality by 2025. Establishing new windmills take time, collaboration and partnerships. From now on Copenhagen wants to contribute towards enhancing this trend, regardless of whether windmills are built within or beyond city limits.
- Heating with geothermal energy is increased six fold by expanding the demonstration geothermal facility at Margretheholm.
- Heating efficiency is improved at waste incineration plants by introducing flue gas condensation units.

- The district heating network is modernized to reduce heat losses from the pipes.
- Fulfilling vision 2025**:** A new, integrated energy system is needed to fulfil the vision of a carbon neutral Copenhagen. Copenhagen's power infrastructure is ideally suited to adding a diversified selection of renewable energy sources. What is still needed is a system for storing energy over days and season s and which can operate regardless of wind and weather conditions.

Greener transport (initiatives)

- Yet more people choose to bike – Copenhagen adds new and improved bike paths, green bike routes, bicycle and pedestrian bridges and better bicycle parking notably near public transport stations.
- Public transport gets even better – the city invests in comfort, reliability, minimal travel times and smooth linkages between the different public transportation systems. The city investigates whether even better solutions can be introduced.
- Buses must emit less CO_2, and to this end bus companies are required to reduce bus CO_2 emissions by 25%.
- Copenhagen lobbies the government for the right to introduce congestion charges.
- The city lobbies the government for the right to establish environment zones in dense downtown areas where only environmentally friendly cars and trucks are allowed.
- Rerouting traffic away from shopping streets will improve conditions for bicyclists and buses, while reducing automobile traffic.
- Parking restrictions create the incentive to choose alternatives to automobile transport.
- Partnerships and publicity campaigns focus on more effective car use – car sharing, car pooling and climate friendly driving techniques.
- It must be made advantageous to buy climate friendly taxis and drive them in a climate optimal way.
- Intelligent transport systems optimise the city's traffic signals to the benefit of bicyclists and buses and GPS transmitted parking opportunities reduce congestion from drivers on the hunt for a parking space.
- Private citizens as well as bus and taxi companies are encouraged to use electrical and hydrogen powered vehicles – the City of Copenhagen provides refuelling stations and free parking.
- All the municipality's administrations develop implementation plans for environmentally friendly transport, both during work hours and for their employee's commute to and from work.
- The municipality's vehicle fleet is converted to hydrogen powered and electrical cars.
- Energy use in the transport of Copenhagen's waste is reduced by a third through procurement criteria, improved fuel efficiencies and targeted waste processing.
- Street lighting is made less CO_2 intensive by switching to more energy efficient lighting and by collaborating in the development of LED technologies that could cut energy use for lighting in half.
- Fulfilling vision 2025: Developing a transport system which contributes to a carbon neutral capital, requires goal oriented urban planning, based on reduced transport needs, improved access to public transportation and improved bicycle and pedestrian flows. A fee system and an infrastructure to support electrical and hydrogen powered cars are also necessary. Despite great efforts, achieving non-CO_2 transport in Copenhagen by 2025 remains beyond reach. The task is to reduce CO_2 emissions as much as

possible. The City of Copenhagen will actively build partnerships in the transport area.

Energy efficient buildings (initiatives)

- All of the municipality's buildings are managed and maintained in an environmentally correct manner.
- The municipality puts a climate focus on all renovation projects for municipal buildings.
- All of the municipality's new construction and municipally financed construction is based on low energy principles.
- All buildings the municipality rents must meet energy conservation criteria.
- The municipality establishes an energy fund with savings from climate upgrading to finance upcoming projects.
- Building owners, renters, trade workers and consultants receive targeted training on CO_2 reduction opportunities.
- Inhabitants and businesses gain perspective on their building's heat losses via the 'hot mapping' function on the municipality's homepage.
- The municipality starts a dialogue with businesses about energy conservation measures and the significant economic benefits these bring.
- The municipality opens a dialogue with the national and regional governments about energy upgrades of their buildings in Copenhagen.
- The municipality will contribute towards establishing and developing solar cell solutions through partnerships and a heightened information campaign.
- A national energy labelling scheme for public buildings is the basis for developing climate upgrades of municipal buildings. The Danish local government association (Local Government Denmark) has entered into an agreement with the national government through which all climate upgrade projects with less than a five year payback period will be completed within five years of receiving the energy label. The municipality doubles that investment horizon. This means that they will execute climate upgrades in municipal buildings even when it takes up to ten years to get a return on the investment.
- Fulfilling vision 2025**:** By 2015 a number of the city's buildings will have become significantly better places to live, work and be in. These sensible investments will continue at the same pace through to 2025. New building construction initiated after adoption of the Climate Plan will make up 15% of the municipality's total real estate holdings. It is therefore important that the buildings meet the best low energy standards. Energy savings among Copenhageners, businesses and the municipality are a central component of the emissions reductions needed to achieve carbon neutrality by 2025. The buildings and the energy savings opportunities they offer play a decisive role in this.

Copenhageners and the climate

- Climate knowledge on the internet – debate, inspiration and specific actions for Copenhageners.
- Climate consultants advise Copenhageners about electricity and heat conservation in their own homes, about transport options and waste separation – possibilities, savings advice and much more.
- Plastic is separated from the waste stream, and waste generation is minimized.
- The new virtual climate science centre makes Copenhagen a leader in climate education of children and youth, and helps to create a new generation of climate wise Copenhageners.
- Companies are encouraged and supported in reducing their CO_2 emissions.

- Climate partnerships, network solutions and scope for innovation in private enterprises link business development to climate action.
- Business and academia combine forces in an innovative think-tank to develop proposals for CO_2 reductions and economic development.
- The municipality's employees are trained in climate friendly conduct.
- The municipality sharpens focus on energy efficiency in all its procurement efforts.

Climate in urban development

- The municipal plan addresses climate by promoting a dense city less dependent on transport.
- Climate is integral to sustainability planning in all city development projects.
- All new city development areas are designated low energy areas with the toughest low energy standards.
- The municipality will enforce compliance with low energy requirements.
- Fulfilling vision 2025: In order to fulfil the vision of a carbon neutral Copenhagen, all municipal plans must actively ensure the creation of neighbourhoods with minimal transport and energy requirements. The municipality will establish pilot areas where additional requirements must be met. Experience and knowledge gained through these pilot projects will improve the climate friendly planning in the future.

Adapting to the future climate

- The municipality develops various ways of draining water from big downpours – and applies these methods throughout the city.
- Additional green areas, pocket parks, green roofs and green walls slow rainfall run-off, thus reducing the risk of flooding.
- More buildings use alternatives to air conditioning units, such as sunshades, improved ventilation and insulation.
- Safeguarding against flooding and rising sea levels.
- The municipality develops a comprehensive climate adaptation strategy.
- Fulfilling vision 2025: A climate adaptation plan with long-term investments and timely planning give us the needed edge to ensure that the city is prepared for violent rainstorms and heat waves.

A green and blue capital city

- Copenhageners are crazy about blue and green areas. Fælledparken (a historic central park in Copenhagen) alone is used by 11 million people each year – three times as many as Tivoli, the world-famous amusement park.
- The city's popular parks, beaches and sea swimming pools are visible proof that a good environment enhances peoples' daily well-being. They send out strong messages to us city dwellers. They offer us the chance for physical activity and development, peace and relaxation as well as the chance to experience birds and animals.
- Research has shown that in this way, green and blue areas can contribute decisively to city dwellers' health and well-being. Copenhageners simply feel better by visiting the park, the beach or a sea swimming pool on a regular basis.
- A sustainable city is also a city in harmony with nature.
- The clean water in the harbour tells us that the city is on the right track to develop a sustainable water system. The city's trees, parks and natural areas combine to purify the air and create shelter. The city's parks and natural areas contain an environment for a rich plant and animal life, thereby contributing to the city's biological diversity. There must be a place for both animals and people in Eco-metropolis Copenhagen.

- The city knows that busy city dwellers do not have much spare time in their daily lives. Today, every Copenhagener spends on average one hour in a park every other day. Today, 60% of Copenhageners live within fifteen minutes walk of green or blue areas. This is good but it can be improved.
- The initiative will cover the creation of new parks, beaches and sea swimming pools as well as good, safe, green connections through town so it will easier to reach the blue and the green areas. The city is not necessarily talking about large areas. Even small parks of about 2,000 square meters, about a fifth the size of a football pitch, are large enough for many activities and experiences. Within the most tightly packed parts of the city, where there is little room for new green areas, it is a question of improving the existing parks.

A clean and healthy big city

Copenhagen will offer everyone one of the world's cleanest and most healthy big city environments. An even cleaner and healthier capital needs an extraordinarily broad effort. Compared to many other big cities, Copenhagen already provides a clean and healthy urban environment.

- Improvement of the air quality in Copenhagen is the ultimate success story. Since the 1960s, the air quality has quite simply got better and better. This is an excellent example of how economic growth and environmental improvement go hand in hand. Today, car traffic is by far the greatest cause of air pollution in Copenhagen.
- The air can and must be even cleaner than it is now. The goal is clear. People should be able to move around in Eco-metropolis Copenhagen and breathe the air without risk to their health. Like the majority of big European cities, Copenhagen has difficulty in living up to the air quality requirements for nitrous dioxide (NO_2) and large particles (PM_{10}). By 2015 at the latest, the city must be able to meet all the national and international limits for material in the air, which can be damaging to the health. The planned environment zone will contribute positively and mean fewer premature deaths. The municipality however, wants to go further than the law currently allows.
- The environment zone decree must be made dynamic and it must become possible to tighten limits covering vehicles' exhaust emissions on an ongoing basis. Congestion charging and environmentally friendly vehicles must be introduced in the municipality. National and international limits ensuring improved air quality should be tightened. The municipality will work actively to achieve these goals not least by securing support for the necessary means for achieving them.
- Noise must be combated. Noise influences childrens' ability to learn as well as everybody's health, especially if citizens do not get a good night's sleep. Despite an effort to reduce noise in residential areas, the number of dwellings subject to noise has not decreased. The city does not have the figures for such affliction at night but they do know that there are 40,000 dwellings in Copenhagen which are affected by excessive traffic noise on a round-the-clock basis. Of these, 5,000 dwellings are affected by a noise level which is damaging to health (over 70 dB).
- The trend must be broken and the number of Copenhagen citizens who are most affected by noise (over 70 dB) must first have this nuisance reduced. Recent research shows that noise reduces childrens' learning ability. The city will therefore work to ensure that the municipality's schools and institutions are not subject to more than a low noise level (55 dB). Many initiatives must be taken to achieve the goal, for example, reducing the speed limit, regulating the traffic, laying new road surfaces and insulating dwellings and institutions.

– Ecology in itself enhances the environment and the health of Copenhageners. Today, about 45% of food in municipal institutions is ecological. This is probably unmatched in any other capital in the world. The city wants to be twice as good however: by 2015 Copenhagen will have doubled this figure to 90%. At the same time, the city is working to increase the percentage of ecological food eaten throughout the capital from a current national figure of about 7 to at least 20%. This will be a world record. Copenhagen is also working on increasing the nutritional value of the food as well as its taste.

Sources

Bjerregaard, R. et al., 2009
Copenhagen Climate Plan; The short version
Copenhagen, 2009

City of Copenhagen, 2009
Copenhagen's green account
Copenhagen, 2009

Climate and environment:
http://www.kk.dk/sitecore/content/Subsites/CityOfCopenhagen/SubsiteFrontpage/InformationAndServices/ClimateAndEnvironment.aspx

Climate solutions in Copenhagen:
http://www.kk.dk/sitecore/content/Subsites/CityOfCopenhagen/SubsiteFrontpage/InformationAndServices/ClimateAndEnvironment/ClimateSolutionsInCopenhagen.aspx

D.2.3 Data

Copenhagen				
General parameters				
Population		2009	519,000	
	Change	*1990-2000*	*5%*	
		1990-2009	*11%*	
Households		2009	278,000	
	Change	*2000–2009*	*1%*	
		1990–2009	*3%*	
Density		2009	5,900	Inhabitants/km^2
	Change	*2000-2009*	*5%*	
Ecological parameters				
Total GHG emissions		2005	2.5	Million ton/year
	Change	*1990-2006*	*-25%*	
Residential GHG emissions		2008	0.8	Million ton/year
	Change	*2005-2008*	*-19%*	
GHG emissions/capita		2005	4.8	Ton
	Change	*1990-2005*	*-30%*	
Residential GHG emissions/capita		2008	1.5	Ton
	Change	*2005-2008*	*-20%*	
Residential energy use share		2007	15%	Gas
		2007	20%	Electricity
		2007	12%	Oil
		2007	54%	Heat/renewables
	Change	*N/A*	*N/A*	

Copenhagen				
Solid waste production		2008	433	Kg/capita/year
	Change	*2003-2007*	*-3%*	
Recycling		2007	27%	
	Change	*N/A*	*N/A*	
Residential water use		2008	114	Liters/capita/day
	Change	*2001-2008*	*-12%*	
Travel to work		2007	51%	By bicycle or by foot
		2007	17%	By public transport
	Change	*N/A*	*N/A*	
Air quality trend - PM_{10}		2002-2006	-12%	
	Change	*N/A*	*N/A*	
Air quality trend - NO_x		2001–2008	7%	
	Change	*N/A*	*N/A*	

D.2.4 Grapic material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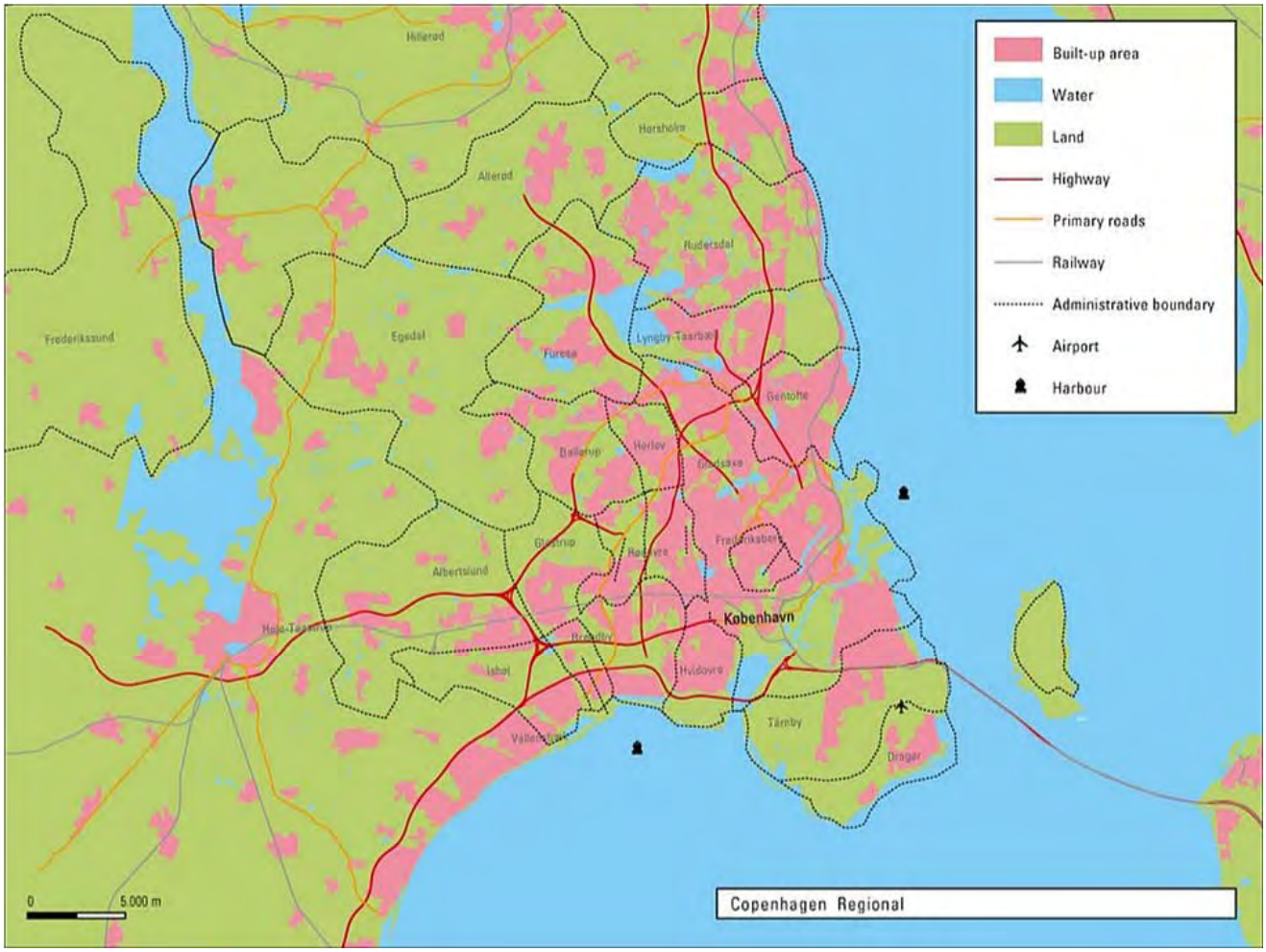
5.000 m
Copenhagen Regional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Land
Highway
Primary roads
Railway
Administrative boundary
Airport
Harbour
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Allerød
Hørsholm
Rudersdal
Egedal
Frederikssund
Furesø
Lyngby-Taarbæk
Gentofte
Ballerup
Herlev
Albertslund
Hvidovre
Tårnby
Dragør
København
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Copenhagen Regional


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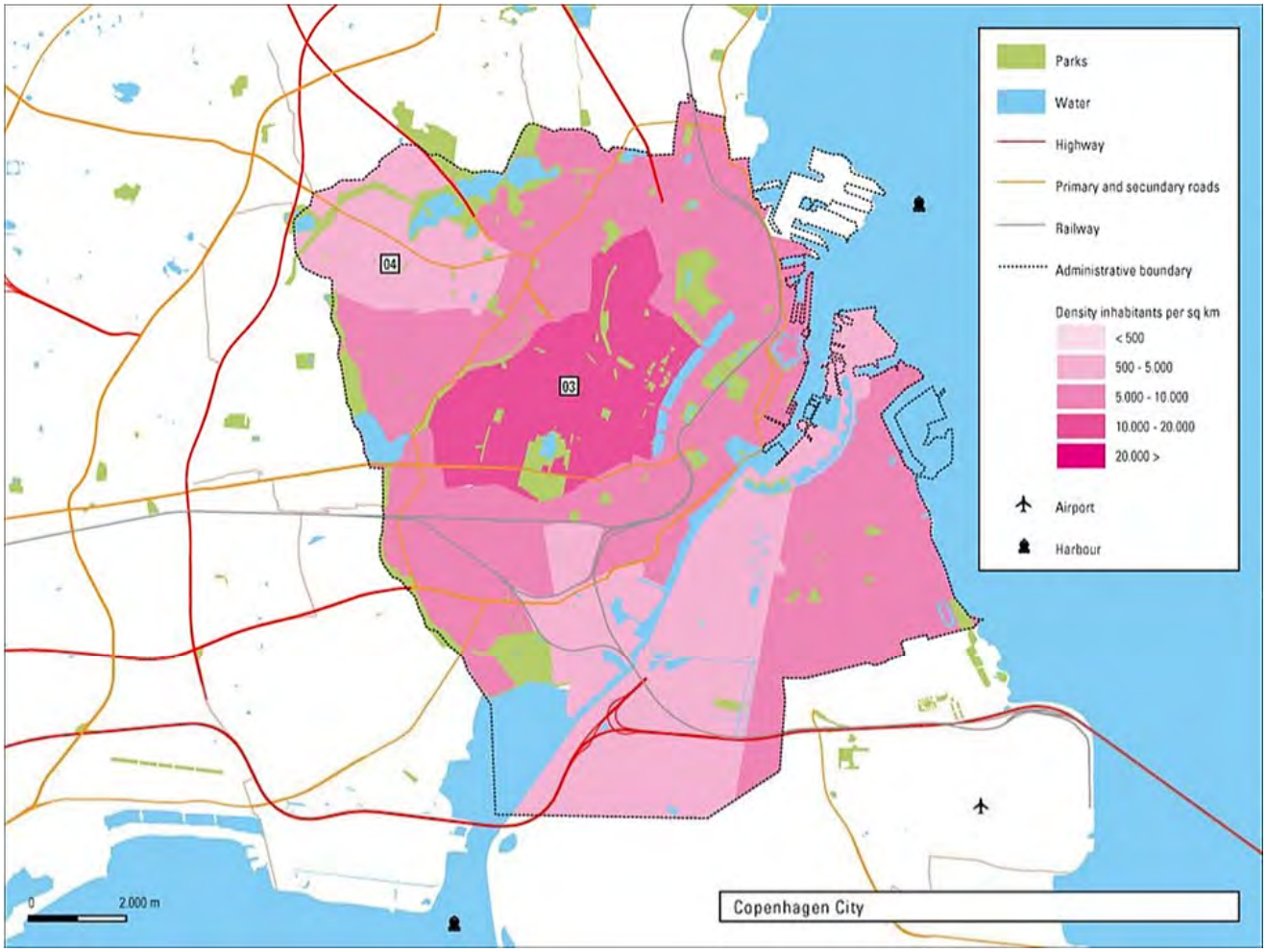
Copenhagen City


Parks
Water
Highway
Primary and secundary roads
Railway
Administrative boundary
Density inhabitants per sq km
< 500
500 - 5.000
5.000 - 10.000
10.000 - 20.000
20.000 >
Airport
Harbour
04
03
0
2.000 m
Copenhagen City

Built-up area
Water
Green
Paved surface

TYPOLOGY
attached homes enclosed block

BUILT-UP AREA
13%

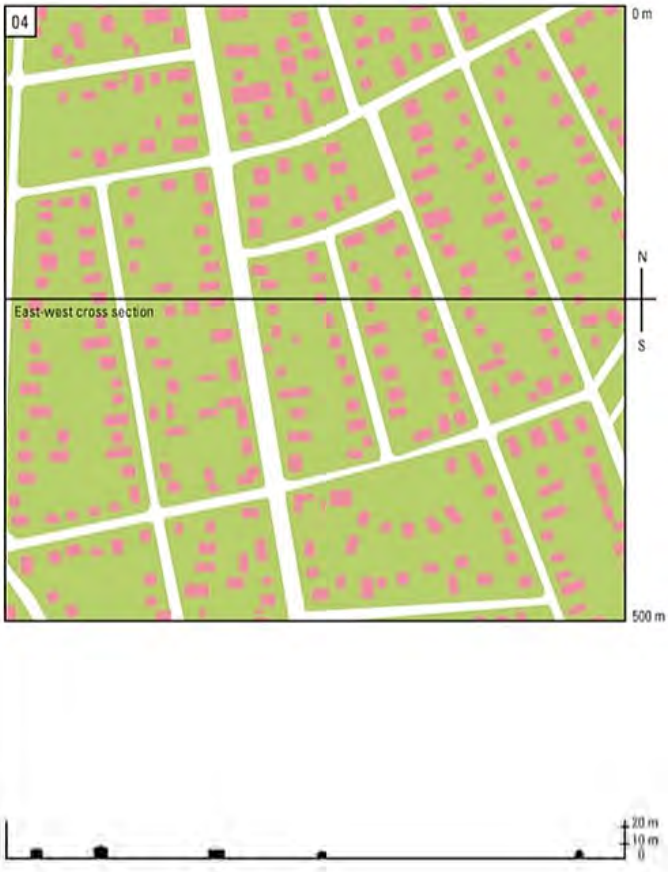
WATER
0%

GREEN
73%

PAVED SURFACE
14%

POPULATION DENSITY (per sq km)
20 000 > inhabitants

Godthabsvej, Copenhagen-high density



Built-up area
Water
Green
Paved surface

TYPOLOGIE
single family detached house

BUILT-UP AREA
28%

WATER
0%

GREEN
39%

PAVED SURFACE
33%

POPULATION DENSITY (per sq km)
< 100 inhabitants

Skippingevej, Copenhagen-low density

TALLEST BUILDINGS

Radisson Blu Scandinavia Hotel	86 m
Ferring International Center	80 m
Kongens Bryghus	70 m
Rigshospitalet	70 m
Radisson SAS Royal Hotel	70 m

Copenhagen Skyline

Copenhagen - Vestamager, lowest density

Copenhagen - Norrebro, highest density

Copenhagen, bicycle counter

D.3 Ottawa

D.3.1 Goals

Ottowa 20/20 a green and environmental sensitive city

Green city:

- Have a network of greenspaces where residents feel relaxed and that supports healthy watercourses, protects biodiversity, improves air quality and helps combat climate change.

Targets:

- Achieve 30 per cent forest cover.
- Plant 100,000 trees over the next four years (2007-2010).
- Achieve four hectares of open space per 1,000 population (equivalent to 16-20 per cent of gross land area).
- Protect moderate and high rated urban natural features and rural natural environment areas through acquisition programs and land use policy.
- Protect significant wetlands through land use policy.

Development in Harmony with the Environment:

- Take an ecosystem approach that considers and protects natural cycles such as water, carbon and nutrients as well as natural habitat before and during development.
- Use developed spaces wisely, making best use of existing infrastructure, minimizing disturbance of existing greenspaces and sub-watersheds.
- Develop lands within the current urban boundary and avoid outward sprawl.

Targets:

- Require a sub-watershed plan or environmental management plan prior to consideration of new development/redevelopment areas or community design plans.
- Meet a target of 36 per cent of new dwelling units within the Greenbelt between 2001 and 2011.

Focus on Walking, Cycling, and Transit:

- Create pleasant transportation corridors for commuting and recreation where people can walk and cycle safely.
- Develop a convenient and cost-effective public transit alternative to single occupant vehicle use.
- Reduce commuting and shopping distances.

Targets:

- Increase transit share from 17 per cent (2001) to 30 per cent by 2021.
- Increase walking share from 9.6 per cent (2001) to 10 per cent by 2021.
- Increase cycling share from 1.7 per cent (2001) to 3 per cent by 2021.
- Triple the number of bicycle trips from 4,500 (2001) to 12,000 by 2021.
- Make cycling safer for cyclists of all skill and age levels.

Clean Air, Water and Earth:

- Air and water that does not cause harm to human health, plants or animals.
- Air that does not contribute to climate change.
- Natural water systems that support healthy aquatic environments.
- Soils that support agricultural activities and support healthy plants and animals and are safe for recreational and other uses.
- Less waste, noise and light pollution.

Targets:

- 20% reduction in greenhouse gas emissions (GHG) from 1990 levels in corporate operations by 2007 (this target has now been met and a new target is being established); 20% in GHG from 1990 levels in community operations by 2012.

- Leadership in Energy and Environmental Design (LEED) certification for new municipal building construction over 500 square meters.
- 40% waste diversion by 2007 and 60% by 2008 for the residential waste stream (Integrated Waste Management Plan).
- Reduce phosphorus levels below 0.03 milligrams per liter in rivers and streams.

The city commits to:

- Manage material, human and natural resources as efficiently and effective as possible.
- Manage greenhouse gas emissions (20% reduction within own operations by 2005 and in the community by 2012).
- Incorporate environmental factors and costs in the city decision-making on policies, programs and initiatives.
- Demonstrate and promote leadership in environmental stewardship.
- Taken an ecosystem management approach in the protection of the natural resource features.
- Measure, assess, and report on progress of the city on these commitments.

D.3.2 Policy and projects

The city has embraced a strong, cross-departmental environmental agenda to do the part to improve and preserve Ottawa's environment. Every sector of the city's operations is involved in the environmental agenda. The city is committed to developing and implementing environmental policies to protect Ottawa's environment for generations to come and to developing programs to facilitate the adoption of environmentally friendly technology and practices. Policies from 2004/2005, phase I (2004-2005) planning and monitoring; phase II (2005-2008) implementation of the management strategy and refinement of the plan; phase III (2009) evaluation and management measures.

Green city:

Tree Planting and Forest Cover

- Tree planting programs will help achieve the targets of 30 per cent forest cover and planting 100,000 trees over the next four years. In 2006, the city planted 1997 trees on city property.
- Ottawa is partnering with Tree Canada and the Federation of Canadian Municipalities to evaluate city green, a methodology for estimating the value of tree cover.
- Ottawa's new Tree Maintenance Strategy sets standards and takes a pro-active approach to maintaining city trees and conservation forests. The Tree Protection By-law protects trees on highways and city property.
- TREE Program: The Tree, Reforestation and Environmental Enhancement (TREE) Program is a four-year program to plant 100,000 trees in Ottawa's urban and rural forests between 2007 and 2010. TREE encourages Ottawa residents, businesses, community groups and schools to plant trees to increase the tree canopy and combat climate change. Options for action include planting a tree, suggesting a location for a tree, or volunteering to plant trees.
- The Trees in Trust Program provides homeowners with trees for planting (and care) on city owned street frontage.

The Green Acres Program

- Ottawa's rural reforestation program is delivered by the Rideau Valley Conservation Authority and funded by the city. The program advises and assists landowners with planting plans and quality planting stock at moderate prices. Up to 50 per cent of the cost of reforestation is funded. In 2006, Green Acres planted 91,920 trees to create 45 hectares of new forest.

Greenspace Master Plan

- Council approved this strategy for Ottawa's urban greenspaces in 2006. It expresses the vision for greenspace in urban Ottawa and establishes policies to achieve the vision. The plan is being implemented through community design plans and development review.

Acquiring and Protecting Natural Areas

- Ottawa's urban and rural land acquisition programs seek to protect moderate and high rated urban natural features and natural environment areas. Land assessed as having a high environmental value is designated as Natural Environment or Natural Feature area. These are sensitive areas where development could unduly stress ecological functions and which require careful management, restoration and preservation.
- Ottawa's new Urban Features Strategy was approved in 2007 with $ 4.7 million initial funding. It is one of Ontario's most ambitious programs for the protection of urban natural features and woodlands. The strategy will protect natural areas and features such as woodlands, wetlands and vegetated ravines throughout the urban area. In June 2007, the city made its first acquisition under this program with the Innes Park Woods, a 8.7 hectare woodland in the east end.
- Natural Environment Area (Rural) Acquisition Program: This sister program has been allocated $ 350,000 in the 2007 budget. It will purchase lands designated as Natural Environment Areas. Ottawa has already purchased lands in the South March Highlands, the Carp Hills, Constance Bay and the Marlborough Forest. The city owns over 10,000 hectares of conservation forests in these areas.
- Building a Greenspace Network: Ottawa's greenspace network includes formal parks, open space and recreational trails, which are owned and maintained by the city, the National Capital Commission, Parks Canada and Conservation Authorities.
- Spring/Fall Cleaning the Capital: This biannual program brings home the importance of maintaining the greenspaces and preventing pollution from contaminating the streams and rivers. Spring/Fall Cleaning the Capital energizes and supports community groups and events to complete spring and fall clean-up projects. In spring and fall 2006, over 65,000 participants completed 1,020 registered clean-up projects and collected 112,450 kilograms of trash.
- The Green Partnership Pilot Program: This pilot program provides funds for community greening projects on city property and common grounds in partnership with community groups.
- The Community Environmental Projects Grants Program: This program funds small-scale, community-based initiatives managed by non-profit organizations interested in the improvement and preservation of the environment. Fifty thousand dollars was made available to improve and preserve the environment in such areas as solid waste diversion, water efficiency, water environment protection and climate change. In 2006, grants were given to support fourteen community projects including projects in the areas of bicycle transportation, rain barrels, anti-idling and river shoreline clean-up.
- Community Partnership Minor Capital Program: The city invests more than $ 270,000 in about 55 projects annually to help community groups build play structures and make other improvements to parks.

Leading by Example

- More public greenspace: The city landscapes and provides access to the grounds around some facilities such as the city's two water purification plants (Lemieux Island and Britannia) and storm water ponds in developed areas to create additional neighborhood greenspaces.

- Green Roof: The city is installing a green roof at the Britannia Water Purification Plant and assessing other opportunities to “green” city facility rooftops when conventional roofs need replacement. Green roofs reduce storm water run-off, help insulate buildings thereby reducing heating and cooling needs, reduce the “urban heat island effect” and can provide extra greenspace in urban areas.

Development in Harmony with the Environment

Require a sub-watershed plan or environmental management plan prior to consideration of new development/redevelopment areas or community design plans; Meet a target of 36 per cent of new dwelling units within the Greenbelt between 2001 and 2011.

Watershed and Sub-watershed Planning

- Watersheds are the land areas that feed rivers. The goal is long-term, ecological sustainability of the watershed and its significant natural resources. To date, eight sub-watershed plans (representing about 25 per cent of Ottawa) have been approved or are in progress in areas undergoing development pressures. Sub-watershed plans currently underway include Greater Cardinal Creek (between Orléans and Cumberland Village) and Mud Creek (between North Gower and Manotick).
- The city is currently developing a Stormwater Management Strategy (SWM) that will provide a long-term plan to guide the safe and effective management of storm water run-off while sustaining the health of urban streams and rivers. The SWM Strategy will include:
  a SWM Policies and Planning Guidelines to direct storm water management efforts in newly developing areas.
  b A SWM Master Plan that will identify opportunities for SWM retrofit and stream rehabilitation in older areas of the city that developed before storm water management was required. The strategy will place greater emphasis on source controls which keeps rainwater where it falls by maintaining pervious surfaces, installing green roofs, using rain barrels or cisterns, and planting trees and shrubs.
- As a result of watershed/sub-watershed studies, stream restoration projects are planned for sections of the Carp River and Feedmill Creek, Poole Creek, Shields Creek and Sawmill Creek. They will reduce erosion, improve water quality, enhance fish habitat and restore stream corridors for the enjoyment of residents.
- The Ottawa by Design Program supports that objective by specifying design guidelines for greenfield neighborhoods, arterial main streets, large-format retail, drive-through facilities and collector roads. The guidelines encourage green roofs, enhanced landscaping and rainwater recycling, and other measures all of which help to minimize the impact of development.
- The city also requires tree preservation and protection plans, and landscaping plans for all subdivision and site plan proposals. These plans are designed to retain as much natural vegetation as is feasible and outline tree planting and landscaping plans for new development.
- Environmental impact statements (EIS) assess how animals, plants and functions such as groundwater recharge will be affected by development. Based on the results of the EIS, development may be restricted in certain areas or other measures to minimize impact may be required to minimize impact.

New dwellings

- Ottawa's Official Plan directs us to “grow in, not out” by concentrating growth within the existing designated urban area. The Official Plan targets for 36 per cent of new dwellings between 2001 and 2011 to be built inside the Greenbelt. In 2006, 23.8 per cent were built inside the Greenbelt (12 per cent short of the target). Urban intensification (i.e. not Greenfield

sites) accounted for 35.8 per cent of development in 2006 (up from 28.2 per cent in 2005).

A Focus on Walking, Cycling and Transit:

Transportation Demand Management Program

- The Transportation Demand Management Program is the city's integrated approach to improve the efficiency and sustainability of the transportation system through demand management. It supports infrastructure elements, such as car pooling lanes, as well as policies and tools that result in sustainable transportation systems such as transit or walking/cycling friendly site design. Focused programs designed to increase the livability of communities by shifting behaviour away from single occupancy vehicle use to more sustainable transportation modes are also an integral part of this initiative.
- TravelWise is a component of the city's transportation demand management program that works with employers, schools, community groups and the general public to inform, educate and promote active and sustainable commuting options.

More Walking and Cycling

- The Ottawa Cycling Plan: This comprehensive 20-year cycling plan aims to establish a citywide on and off-road cycling network, which will be supported by policies and cycling education and promotion programs. Working with local community-based organizations, it will build on the existing network of cycling facilities and programs. The Plan aims to triple the number of bicycle trips from 4,500 in 2001 to 12,000 by 2021, and to ensure a safer cycling environment for cyclists of all skill and age levels.
- The Pedestrian Plan: A pedestrian friendly city makes walking a pleasant and safe alternative to driving. Ottawa is working to better integrate pedestrian travel into transportation and neighborhood design with the Pedestrian Plan which is currently being finalized.

Pathway Network for Canada's Capital Region: 2006 Strategic Plan

- The Strategic Plan provides a basis to coordinate pathway construction among three partners: the National Capital Commission and the cities of Ottawa and Gatineau. The partners continue to expand the Capital Region's network of multi-use pathways, which promote healthy and active living, encourage sustainable transportation and connect users to capital attractions, greenspaces, local cycling routes and other destinations.
- The Rural Pathways Plan is a grassroots initiative by local community volunteers, city staff and professionals to develop proposals for pathways within and between villages, and to link these with urban pathways and major trails such as the Rideau and TransCanada trails.

Better Public Transit

- Over the last five years, Ottawa has successfully increased ridership by 7 million rides a year. In 2006, the number of transit rides per capita grew 1.27 per cent over 2005 as there was an all time high of 91.8 million customer trips.
- Ottawa continues to invest in transit, including vehicles, Park and Ride and Transitway facilities, as well as operational improvements (such as global positioning systems) to improve service delivery. Ottawa is reviewing its transit network to create an expansion plan that will help us manage growth and infrastructure demand in the next decades.
- Over the last five years the city has invested $ 67 million to add 127 buses and 190,000 hours of service.

- Rack and Roll is OC Transpo's program to put bike racks on buses and facilitate connections between cycling and the bus network. Racks are installed on a variety of routes that run across most areas of the city and a new route is added each year. Bikes can also be brought onto the O-Train year round.
- Ottawa was a pioneer in Canada in establishing bus-only lanes and the city continues to improve transit access on city streets.

Clean Air, Water and Earth:

Air Quality and Climate Change Management Plan

- This plan proposes projects and activities to reduce air pollutants and greenhouse gas (GHG) emissions, and outlines a strategy to deliver on these actions. The Plan partners the municipality and taxpayers to improve local air quality and mitigate global climate change.
- Transportation: see above.
- Better Buildings Partnership (BBP): BBP is a private-public partnership initiative to promote and implement energy efficient retrofits of existing commercial, institutional and multi-residential buildings. The use of proven technologies to conserve energy would be encouraged through both promotional materials and financial incentives. The City of Ottawa will function as a 'clearing house' and, in partnership with the initiators, will manage and co-ordinate all aspects of the program.
- Promotion of Green Buildings: construct new or retrofit existing buildings in such a way as to reduce environmental impacts. Sustainable design and construction can yield a range of impacts including reduced GHG emissions, air pollution, and water consumption. There are several tools for promoting Green Buildings, one of which is the Leadership in Energy & Environmental Design (LEED) certification program. Another tool consists of the guidelines established by ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers). The City of Ottawa is developing an internal policy to use the LEED system within city buildings. Also, the city will promote green buildings to the development community with the help of the National Capital Green Building Association, the Ontario Association of Architects, Building Owners and Managers Association, Home Owners Association, and others.
- Aligning Regulatory Requirements to promote Green Buildings: The Canada Mortgage and Housing Corporation suggests a “regulatory dialogue” amongst relevant stakeholders to identify a way to align existing regulations and supporting processes to achieve more sustainable or “green” building practices. In addition, some changes to the national and provincial building codes are required to significantly advance private sustainable building design, a change that is already building in momentum among municipalities across the country.
- City Building Retrofit and Energy Audits: The energy efficiency retrofit program for city buildings is being implemented in response to energy audits conducted on 49 city buildings. An Energy Services Company (ESCO) contract is in place and over the next two years, retrofits will result in savings of 2,913,000 kWh and 15,000 cubic meters of water usage. Further opportunities for retrofitting will be explored, particularly longer payback time retrofitting.
- In order to manage energy use, regular energy audits will be encouraged among city buildings.
- The federal Energuide for Houses program: This program has been delivered locally for several years by EnviroCentre, a non-profit organization which receives in kind support from the city, notably office space. EnviroCentre advises residents on the most cost-effective ways to

make homes more energy-efficient and healthier to live in. EnviroCentre also plans to work with private housing builders to investigate the potential for synergy between the city's inspection process and better energy efficiency and ventilation levels in new home construction.

- To finance building energy efficiency improvements (EEI), the Pembina Institute is developing the concept of using Local Improvement Charges (LIC). A property owner would decide to incorporate EEI, and then contact the municipality who would have a list of eligible contractors and technologies. Once selected, the contractor and the owner would discuss options. Once a contract is signed; the municipality would inspect the job and pay the contractor. The costs are then spread over 5, 10 or 15 years at the Bank of Canada rate, appearing as a separate item on the tax bill. The charge is attached to the property, not to the owner, with the payments set slightly below the actual energy savings.
- District heating and wind energy are being explored and encouraged in 2004. The results are unknown.
- Renewable energy: energy cogeneration, Ottawa's Robert O. Pickard Environmental Centre wastewater treatment facility converts gas produced in the waste treatment process into electricity and heat, which are then used to service the facility and reduce the cost of purchased electricity and natural gas.
- Trail Road Landfill Gas to Electricity Project: This partnership project with Energy Ottawa is capturing and burning methane gas from the landfill to produce electricity, thereby reducing GHG emissions and creating renewable energy to power 4,000-6,000 homes.
- Plasma Gasification at Trail Road: Under an agreement with the City of Ottawa, Plasco Energy Group Inc., Ottawa is piloting a project at the Trail Road landfill to convert solid waste to clean heat and usable by-products. The process will convert 75 tonnes of municipal solid waste a day into synthetic gas, inert solid material and heat. The heat and gas will produce electricity to be sold back into the power grid.

Air

- Air Quality Mapping Pilot: The air pollution maps, which will identify where the problems are and help track sources of pollution, will assist in designing effective environmental and public health protection measures.
- Anti-idling Campaign and By-law: Ottawa has adopted a new Idling Control By-law that is effective since September 2007. This effort is supported by a public education campaign. The by-law limits idling to three minutes when the outside temperature is between 5 and 27°C.
- Smog Alert Program: Ottawa has implemented the Ontario protocol for establishing a local smog-response program. The program sets out steps to be followed to prepare for smog alerts, and actions to follow when a smog alert arises.
- Street Sweeper Pilot: The city is in the process of obtaining a PM_{10} street sweeper. This type of street sweeper is capable of removing fine particles of dirt that pose a danger to human health by improving air quality during street sweeping.
- Using Biodiesel and Alternative Fuels: The city has an ambitious plan for reducing emissions for the city fleet of vehicles through the use of alternative fuels. The city has converted its buses to biodiesel fuel since 2008. The city also has over 1,000 vehicles fuelled by ethanol or propane, or that are electric/hybrids.
- Biodiesel Electric Hybrid Buses: The city has bought two prototype biodiesel/electric hybrid buses for testing in 2008. The resulting recommendations were used to configure the 200 buses Ottawa will purchase between 2009 and 2010.

- Bus Replacement Program: As Ottawa retires its old, less-efficient buses, the city reduces the emissions of particulate matter, hydrocarbons, carbon monoxide and nitrogen oxides.
- Corporate Anti-idling policy: city vehicles, with some exceptions, are not permitted to idle more than one minute.
- Smart Car Pilot Program: A Smart Car has been purchased for By-law and Regulatory Services to determine if it can meet their needs.

Water

- Lower Rideau Watershed Strategy: This provides strategic guidance, priorities, and coordination in the planning, development, and delivery of watershed management to the city and partner agencies. A primary concept is to encourage 'environment first' in the way everyone approaches issues in the watershed, with regular monitoring and reporting on the condition of the watershed.
- Water Efficiency Strategy: To raise awareness of water efficiency and defer infrastructure expansion, Ottawa has adopted a three-phase 10-year water efficiency strategy. Phase I (2005-2008) targets high-volume users using education and incentives, which include rebates on water saving items and assistance with audits and fixture retrofits. The strategy also targets outdoor water use, which accounts for much of the increased demand for water infrastructure.
- The city also has an ongoing program to control loss in the water system through reducing leakage and other measures which in turn, reduces the need to treat and distribute water.
- Surface Water Quality Monitoring: The Water Environment Protection Program conducts field monitoring programs for the water environment.
- Ontario Drinking Water Source Protection Program: The city is a partner in this provincial program led by conservation authorities to protect surface and groundwater sources for municipal water supplies.
- Pollution Prevention: Ottawa has a daily impact on the Ottawa and Rideau rivers and their tributaries. Waste water from homes and businesses, and rainfall run-off carrying litter, pet excrement and pesticides have the potential to degrade water quality in the streams and rivers.
- Since 1993, the City of Ottawa's Sewer Use Program has worked in partnership with industries, businesses and institutions to control pollution at the source and protect the Ottawa River. Wastewater discharges to the sewer system are regulated through the Sewer Use By-law.
- Rural Clean Water Program: Ottawa and its conservation authority partners offer incentive grants and educational initiatives to promote rural best management practices. The Ottawa Rural Clean Water Program seeks to protect and improve surface water and groundwater quality by encouraging and assisting rural landowners to implement changes that reduce pollution run-off and infiltration to both surface water and groundwater. In 2006, the Rural Clean Water Program funded 66 well upgrades, 21 septic system repairs/replacements and twelve farming projects including nutrient management and manure storage.
- Reducing Combined Sewer Overflows: Heavy rain can overwhelm “combined sewers” resulting in the release of untreated (though diluted) sewage to the Ottawa River. A new real-time control system is being used to assess available capacity in the pipe system during storm flows.
- Road Salt Management Program: Ottawa has an ongoing salt management program to reduce the detrimental impacts of road salts on water quality, soils and vegetation by using best practices such as timing applications and reducing overall quantities used.

Leading by example

- Ottawa works to reduce the impact of city facilities or activities on water, air and earth by:
  - Piping waste from the city's two water purification plants to the wastewater treatment facility before release into the Ottawa River.
  - Treating leach ate from the Trail Road Landfill.
  - Water Efficient Fixture Replacements in City Facilities. For example, in 2007 the City's Civic Centre washrooms were retrofitted with water efficient fixtures.
  - Corporate Pesticide Use Policy: Ottawa's corporate policy forbids the use of insecticides, rodenticides, herbicides and fungicides on city property for cosmetic purposes.

Earth

- Blue and Black Box Recycling: Ottawa recycles many substances, from glass and metal to plastics and all manner of paper.
- Take it Back! Program: Working in partnership with retailers, this program ensures proper waste management for consumer products by the vendors that sell these materials.
- Leaf and Yard Waste Collection: Yard waste is diverted from landfill through leaf and yard waste collection program and composted by the city. Christmas trees are collected and chipped. Compost is tendered out to soil blending companies and sold to residents as well.
- Household hazardous waste depots: The city hosts hazardous waste depots throughout the year to help residents dispose of oil-based paint, pesticides and other toxics safely.
- Institutional, Commercial and Industrial (ICI) Waste Management/ Diversion: The city is studying ways to influence the reduction of ICI waste and increase options for ICI recycling.
- The Yellow Bag Program offers small non-residential establishments and businesses an opportunity to recycle more and provides an affordable option for relatively small quantities of weekly waste.
- Study of Waste Processing Technologies: Ottawa is studying alternative waste management technologies and approaches.
- Biosolids Management: Ottawa's Robert O. Pickard Environmental Centre wastewater treatment facility generates 40,000-45,000 tonnes of biosolids as a by-product of wastewater treatment. The city's Biosolids Management Plan follows best practices to ensure that biosolids are beneficially reused as a soil amendment. Biosolids may be applied to agricultural land in accordance with practices established by the Medical Officer of Health and provincial laws and regulations.

Leading by Example

- Recycling at City Facilities: More than 200 city owned facilities including libraries, pools, community centers, etc. The city is targeting improved diversion rates and performance, and working closely with facility users, event planners, and residents.
- The city is now collecting mercury containing light bulbs from its facilities.
- An underground storage tank management strategy that removes surplus underground storage tanks and carries out required soil and groundwater remediation.
- Prevention of spills at fuel dispensing and service bays and clean-up of any fuel or oil spills.
- A Hazardous Materials Management Program to remove and dispose of potential harmful substances such as waste oil and mercury from Public Works garages.

Sources

City of Ottawa, 2006
Greenspace Master Plan; Strategies for Ottawa's Urban Greenspaces
Ottawa, 2006

City of Ottawa, 2003
Environmental Strategy For the City of Ottawa
Ottawa, 2003
City of Ottawa
http://www.ottawa.ca/index_en.html

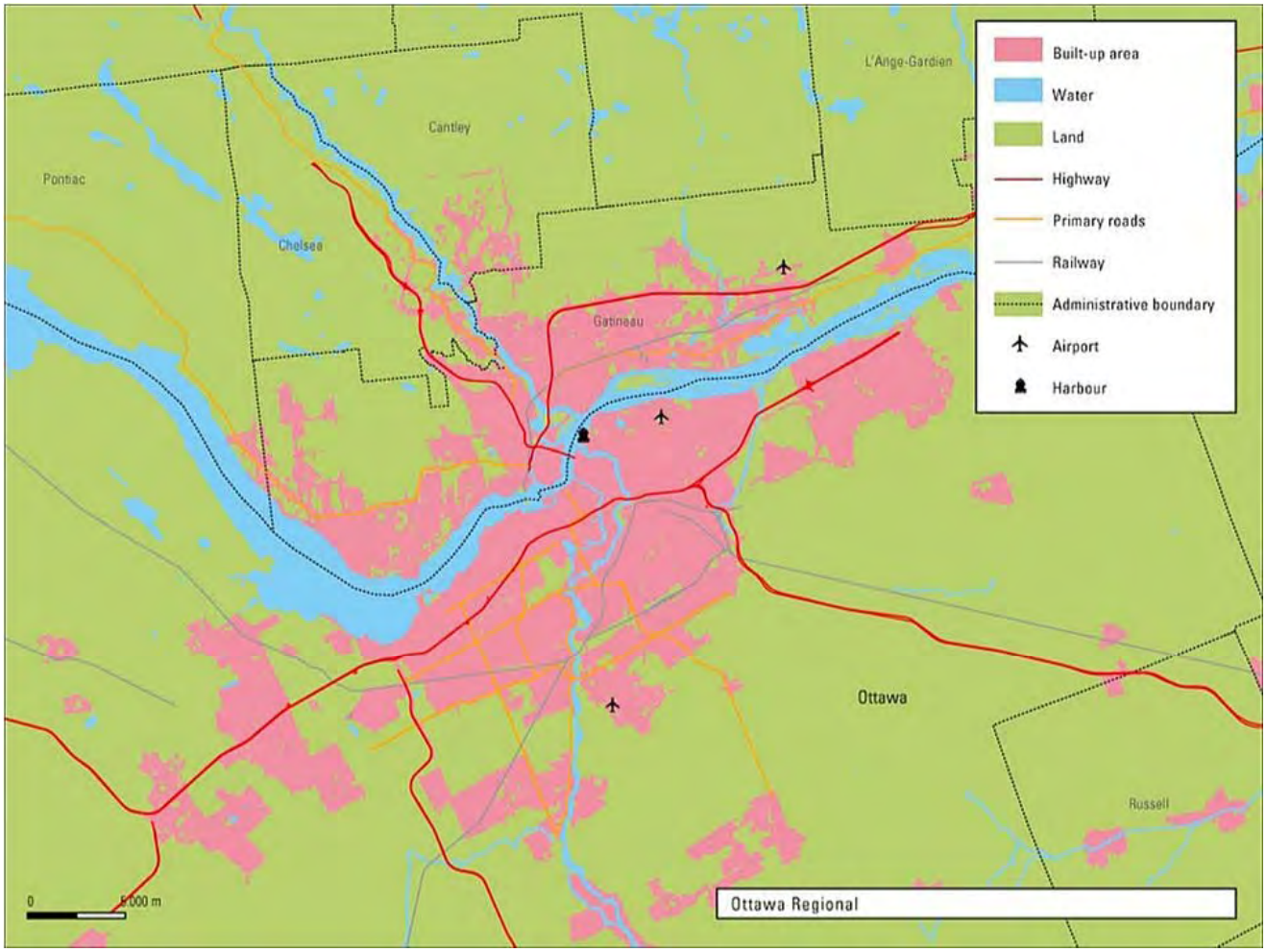
Environmental Policies and Strategies
http://ottawa.ca/residents/environment/city_hall/policies_en.html

D.3.3 Data

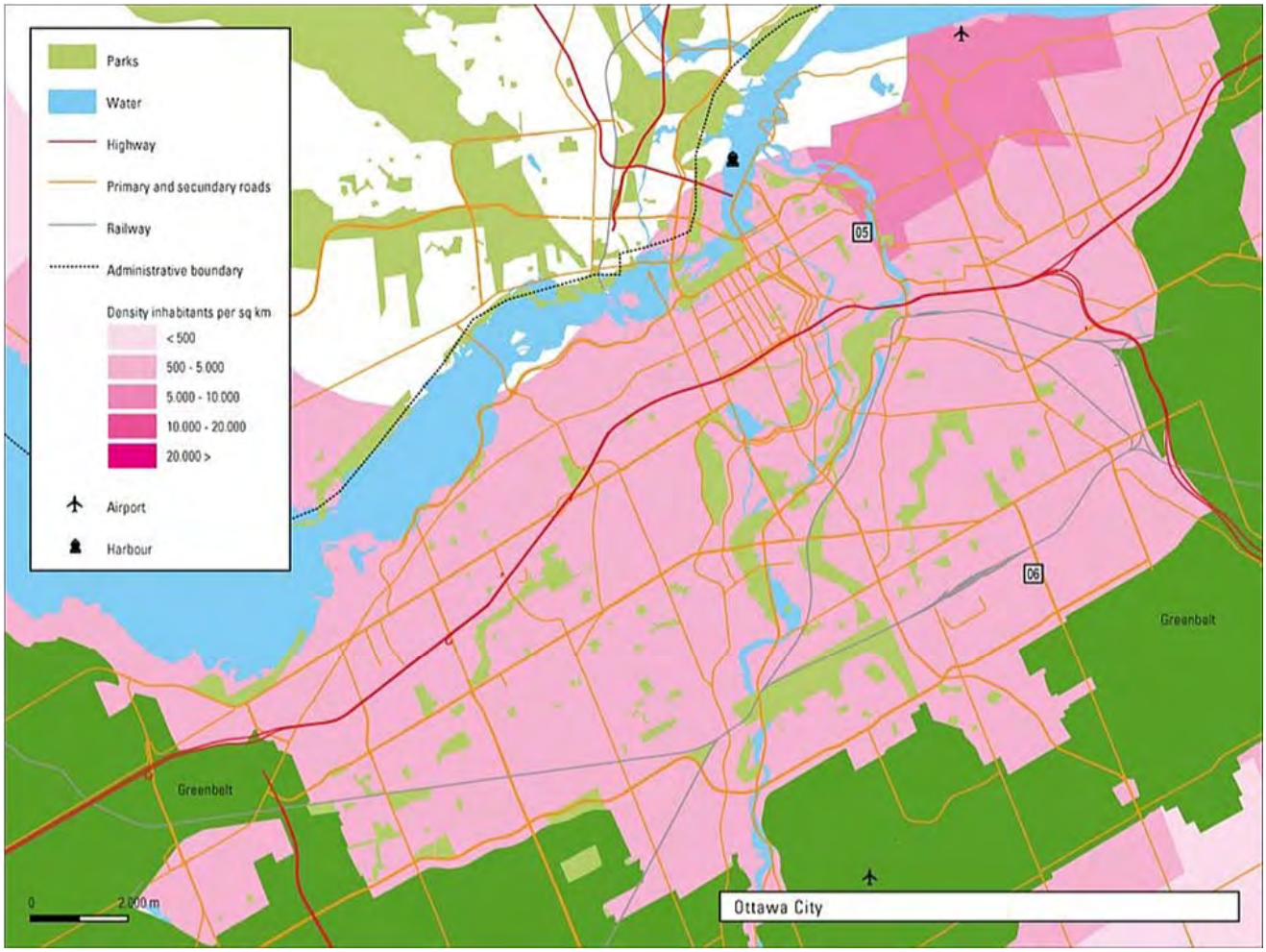
Ottawa				
General parameters				
Population total		2009	900,000	
Population inside green belt			485,000	
	Change	*2000-2009*	*11%*	
		1990-2009	*22%*	
Households		2009	367,000	
	Change	*2000–2009*	*15%*	
Density Inside green belt		2008	2,880	Inhabitants/km^2
Density Outside green belt		2008	1,640	
	Change	*2000-2008*	*N/A*	
Ecological parameters				
Total GHG emissions		2004	4.6	Million ton/year
	Change	*1990-2004*	*5%*	
Residential GHG emissions		2004	2.6	Million ton/year
	Change	*2005-2008*	*8%*	
GHG emissions/capita		2004	5	Ton
	Change	*1990-2004*	*-15%*	
Residential GHG emissions/capita		2006	3	Ton
	Change	*1990-2006*	*-6%*	
Residential energy intensity Ontario				GJ/household
	Change	*2000–2007*	*-6%*	
Solid waste production			N/A	Kg/capita/year
	Change	*N/A*	*N/A*	
Recycling		2007	32%	
	Change	*N/A*	*N/A*	
Residential water use		2004	340	Liters/capita/day
	Change	*2002-2006*	*-16%*	
Travel to work			N/A	By public transport
			N/A	By foot/bicycle
	Change	*N/A*	*N/A*	
Air quality trend – O_3		2002–2006	25%	
	Change	*N/A*	*N/A*	
Air quality trend – NO_2		2003–2007	-36%	
	Change	*N/A*	*N/A*	

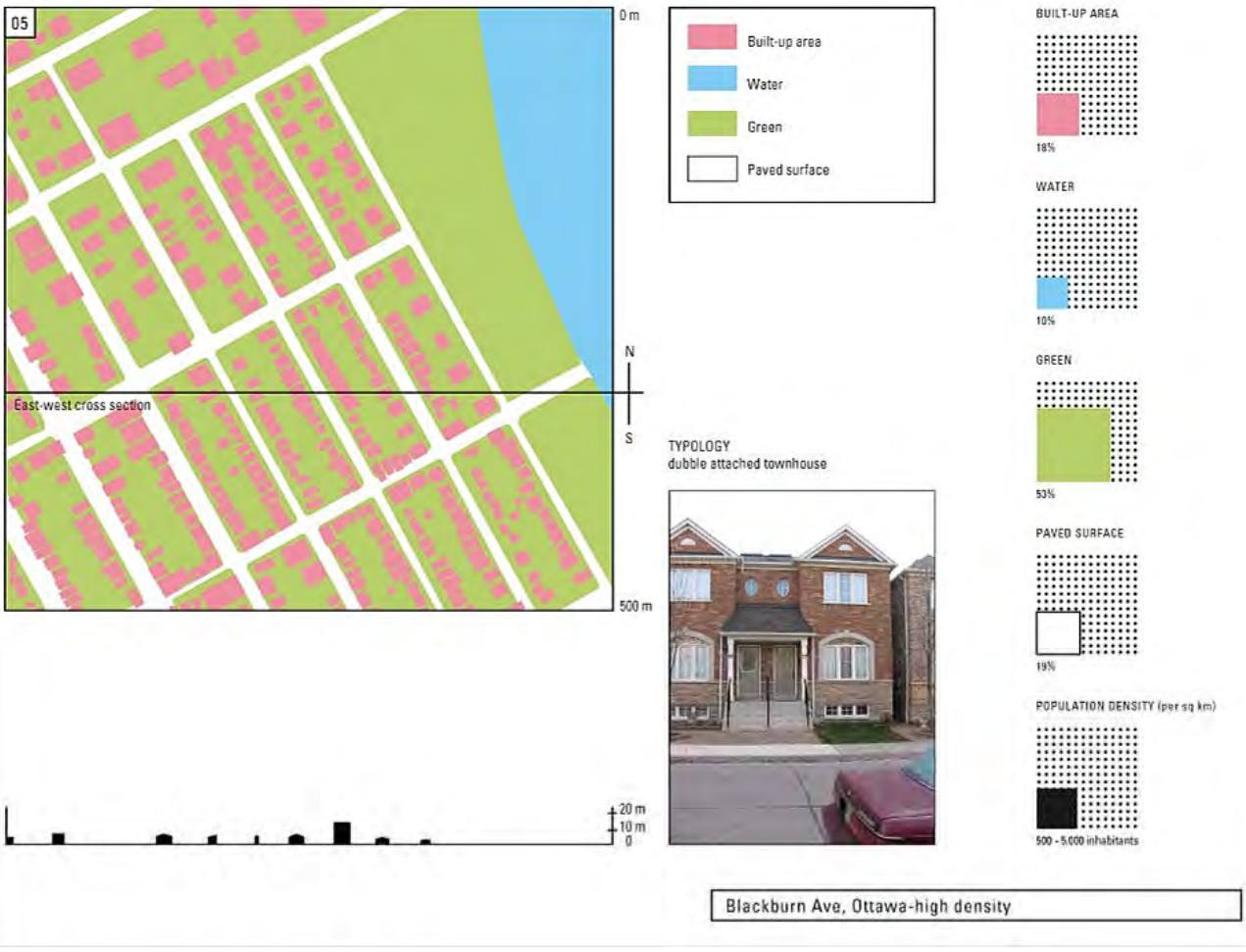
D.3.4 Graphic material


0
5000 m
Ottawa Regional

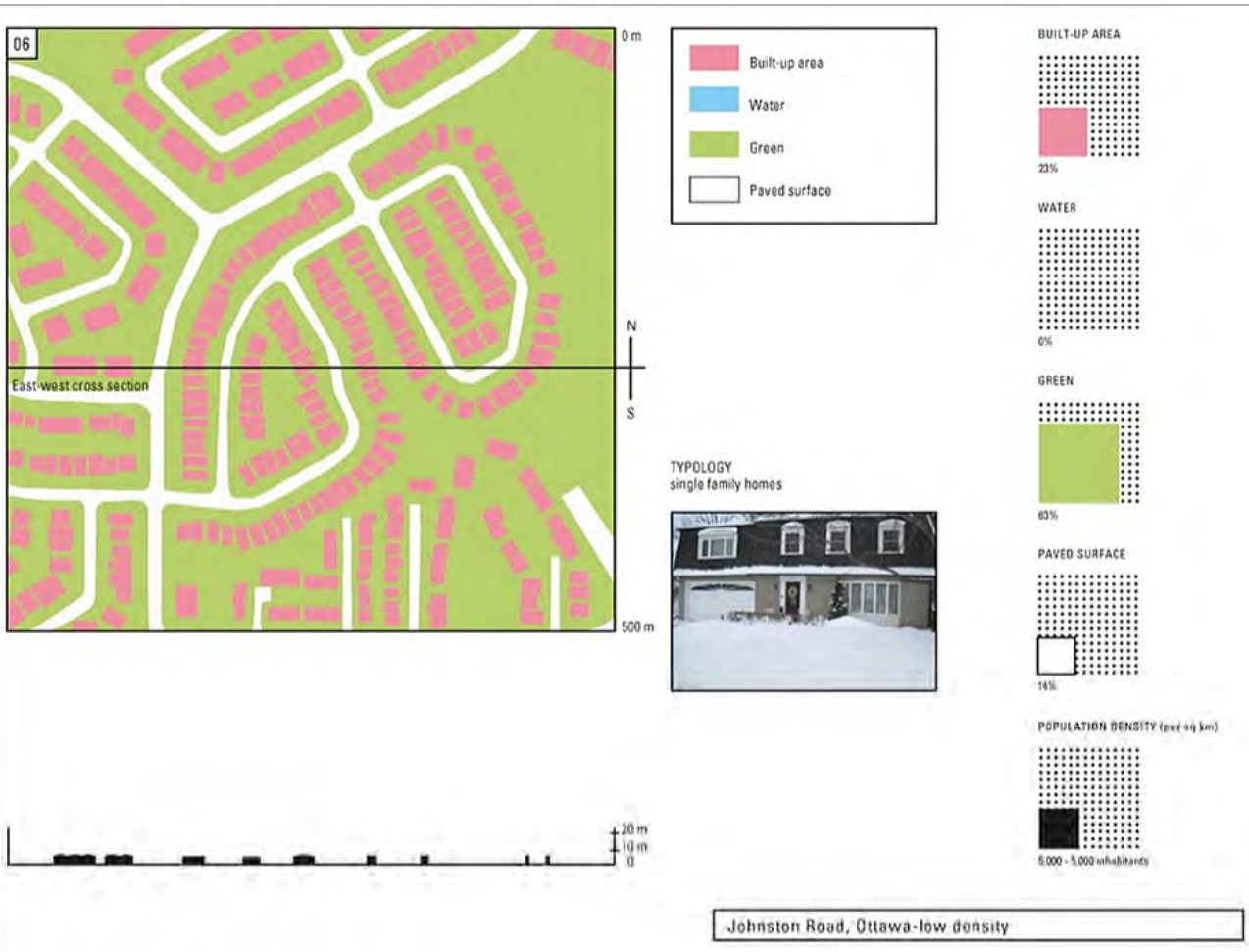

Built-up area
Water
Land
Highway
Primary roads
Railway
Administrative boundary
Airport
Harbour
L'Ange-Gardien
Cantley
Pontiac
Chelsea
Gatineau
Ottawa
Russell
0
5 000 m
Ottawa Regional


05
06
0
2.000m
Ottawa City


Parks
Water
Highway
Primary and secundary roads
Railway
Administrative boundary
Density inhabitants per sq km
< 500
500 - 5.000
5.000 - 10.000
10.000 - 20.000
20.000 >
Airport
Harbour
05
06
Greenbelt
Greenbelt
0
2.000 m
Ottawa City



Blackburn Ave, Ottawa-high density



Johnston Road, Ottawa-low density

TALLEST BUILDINGS

Terrasses de la Chaudière	124 m
Place de Ville II	112 m
Minto Metropole	108 m
Le Parc	104 m
Place du Portage	101 m

Ottawa Skyline

Ottawa - Innes, lowest density

Ottawa - Rideau-Vanier, highest density

D.4 Rotterdam

D.4.1 Goals

Improving the climate for the benefit of people, the environment and the economy; that is the challenge confronted by the collective initiators; Port of Rotterdam, the City of Rotterdam, employers' organization Deltalinqs and DCMR Environmental Protection Agency Rijnmond.
Objectives:
- 50% reduction of CO_2 emissions.
- 100% climate proof.
- In combination with strengthening the Rotterdam economy.

Rotterdam sustainable city:
- The CO_2 emission of the built-up area in Rotterdam will be reduced by 50% in 2025 compared with 1990.
- Newly developed property is connected to the heating system.
- Municipal property and municipal services will be 3% more energy efficient every year.

Rotterdam energy port:
- The CO_2 emission of the Industrial Port Complex of Rotterdam will be reduced by 50% in 2025 as compared with 1990.
- 2% annual energy saving.
- Accelerated realization of CO_2 capture, utilization, transport and subterranean storage.
- Increase of the use of biomass in energy production, industry and transport.

Rotterdam sustainable mobility:
- The CO_2 emission of traffic and transport will be reduced by 50% in 2025 as compared with 1990.
- The air quality standards will be realized for fine dust in 2010 and for nitrogen dioxide in 2015.
- Active use of sustainable energy (e.g. biomass).

Citizens and companies of Rotterdam united for sustainability:
- The people of Rotterdam will be more aware of their impact on the climate and will consider the climatic consequences of their actions. Behavioural effects in quantitative terms are not included in the plans to realize the 50% objective.
- Example is better than precept. Active CO_2 policy of partners and model buildings/icons in the city.

Rotterdam innovation lab:
- The economy of Rotterdam will be strengthened and new trade and industry will be attracted to the RDM area.
- To realize an innovation fund called 'Climate and energy'.

D.4.2 Policy and projects

Rotterdam sustainable city

Housing corporations: Starting from 2008, 3% annual energy saving
- A cooperation agreement was signed with 'Woonbron' (30,000 houses) in July 2007. The other corporations were approached to effect identical energy saving agreements by mid-2008.
- In collaboration with the energy companies and the Social Affairs and Employment Department, specific energy saving measures will be developed for the minimum-income group.

Heat supply: Between 2008 and 2015, 6,000 houses (and equivalents) will be connected annually to a community based heating system
By 2015, 50,000 dwellings will be connected

- Putting into operation of community-based heat supply (in 2008).
- Newly developed property and redevelopment areas in Rotterdam will be connected to a community based heating system (starting from 2015).
- Pilot project for the connection of existing constructions completed (mid-2008).
- Results guarantee agreements with corporations for the connection of existing buildings in 2010.
- Further development of initiatives to use residual heat, contribution to Grand Design (started in 2008).

Private rented dwellings: Starting from 2010, 0.8% annual average energy saving. In 2015, the average will be 1.5%

- Plan of approach 'built-up area' completed (2008).
- By mid-2008 a pilot agreement with one or several large investors had to be signed (outcome unknown).

Owner-occupiers: Starting from 2010, 1% annual average energy saving
Starting from 2015, the annual average energy saving will be 2%

- Plan of approach 'built-up area' completed. Pilots in the area of sustainable construction will be carried out. The existing information desk Sustainable Construction will be used for this purpose (2008).
- Coordination between ENECO, NVM, Uneto-VNI, housing corporations, private landlords and banks, aimed at collaboration in energy saving in construction and existing buildings. Transition platform for the Rotterdam approach (2007).
- Presentation and publication of model projects for energy driven renovation of existing buildings (2008).
- For owner-occupiers, a pilot was started up as part of the plan called 'Do More with Less'. This concerns a system that includes an energy scan, concrete saving measures, and financing, all in one (a form of energy performance contracting). This takes place in collaboration with parties including energy companies and banks (2008).
- Research completed into local supporting policy, for instance property tax differentiation (2007).
- Link between the subject of energy saving and the owners' association approach.
- As soon as all dwellings have been provided with an energy label, a specific policy will be developed directed at the worst houses.
- There will be a survey concerning additional local energy performance standards for new constructions (local supplementary EPC standard) (2008).

Property owners: Starting from 2015, 3% annual energy saving

- Transfer of knowledge in the area of low energy construction. Initiative of the municipality. Aimed at knowledge development and change in behaviour (2008).
- Agreements between the municipality and private developers, investors and property managers, aimed at climate objectives in renovation and new property development (2008).

Municipal property: Starting from 2008, 3% annual energy saving

- Entirely green energy community.
- Energy is part of the schedule of requirements for new construction (tendering) (2008).
- All public buildings have an energy label. All municipal buildings will be provided with an energy label (2009).
- Municipal energy control system operational (2008).

- Carrying out of climate scans at all locations (2009), which will be included in a renovation project and an energy saving project.
- The new municipal office will be a model for ecological construction. It will be among the international top in terms of energy performance and sustainability.

Schools and sports complexes: 3% annual energy saving (2008)

- Start up of a pilot (2008) with two MUWI schools and a community school in IJsselmonde. The results should lead to adjustment of the guideline the municipality uses in the construction of schools (2009).
- The 'Renovation Approach Energy and Health in Schools' (2008). From 2008 onwards, between five and fifteen schools will be dealt with annually.
- Renovation approach Energy and children and young adults/sports (sports locations) completed (2008).
- New construction of sports complexes, like the new 'Kuip' and the ice-skating rink, will comply with the highest international standards.

Outdoor space and public lighting: 3% annual energy saving in municipal facilities outdoors (2008)

- Approach public lighting completed, including three concrete pilot projects in the city (2008).
- Approach pumping stations completed (2008).
- Based on a CO_2 scan of the works in the public space outdoors (products, projects and services), approach completed (2008).
- An active approach focused on the implementation of innovations with an implementation desk and analysis of innovations by third parties (start-up 2008).
- Low energy traffic lights (2008).

Sustainable town planning: Building specification as an opportunity

- Programme sustainable town planning in collaboration with parties including 'Architectuur Instituut Rotterdam', aimed at transfer of knowledge, inspiration and implementation (2007-2010).
- Detailed vision completed, including phased plan, departing from the municipal vision, city centre plan, water plan. Elements include: traffic and transport, public spaces, building specification, water collection (2008).

Greenspace planning and adaptation measures

- Climate vision on green planning developed (2008).
- Start of Adaptation programme Rotterdam Climate Change Proof (2008).
- Plan of approach green roofs completed (2008).
- Two model projects with green roofs completed (2008).
- Start of new afforestation, including the 'Oranje Buitenpolder' and the 'Millennium forest' (2009).

Sustainable energy

- The elaboration of the Second 'Maasvlakte' zoning plan provides for windmills on the hard seawalls. In addition, the possibilities are explored of the Motion more space for windmills (2007).
- Research biogas completed, focused on mapping out the possibilities for the production of biogas based on the biomass that is released in the city (e.g., in public gardens, sewage treatment, the zoo, etc.) (2007).
- Request for assessment framework for sustainable energy and wind energy completed (2008).
- Plan of approach completed with respect to encouragement and removal of regulatory impediments for the application of solar panels and other sustainable forms of energy generation (2008).

Intelligent demolition

- Objective and plan of approach 'intelligent demolition' completed. The results of the European project IRMA show that improved methods of demolition can lead to significant reductions in CO_2 emission (2007).

Rotterdam energy port:

Accelerate CO_2 capture, transport, utilization and storage

- Drawing up a collaboration agreement for the preparation of a CO_2 infrastructure with a number of parties (2007).
- Start of platform Carbon Capture and Storage (CCS) for further elaboration of CO_2 capture and storage (2007).
- Business plan CO_2 infrastructure completed. The results of the study concerning the possibilities and opportunities for CO_2 capture and storage in the Rijnmond district show that it should be commercially viable within a relatively short period of time, to capture 10 million tons of CO_2 annually, utilize it in greenhouse farming (1.5 million tons a year), and store it with a good chance of enhanced gas recovery. A business plan should provide evidence of commercial viability (2008).
- Enter into bilateral agreements with various energy and industrial companies in the HIC on CO_2 capture (2008 and 2009).
- Appeal to the national and European governments concerning their role in the realization of CO_2 capture and storage. For the European government it is important to ensure that the system of emissions trading promotes the capture and storage of CO_2 and that the Rotterdam port area will be one of the European pilots where CO_2 capture and storage will be developed as a priority.
- Obtain clarity from the national government concerning the legal framework for CO_2 storage, particularly with respect to the subject of the legal ownership of the stored CO_2 and the corresponding guarantees.
- Develop a business model for the capture, transport and storage of CO_2 (2008). The central question in this respect is to what extent the infrastructure will be set up, financed and managed in a private or public setting.
- At least two pilots for CO_2 capture and storage from the 'Borssele funds' allocated to companies in Rotterdam (2008).
- In at least two new power stations, large-scale CO_2 capture (10-50 MW) will be part of the decision-making process (2010).

Organization of international conference ports and industrial cities

- Prepare and organize an international conference for ports and industrial cities in order to initiate collaboration for the purpose of CO_2 reduction through energy saving, sustainable energy, CO_2 storage, and improvement of the air quality through measures in shipping and industry (2008). Participating cities include Houston, Los Angeles, New York, Sao Paolo, Singapore, Shanghai and Tokyo. Current considerations address the possibility to add a city in Africa or the Middle East (Dubai) and Australia to the list. In addition, ship owners and relevant international companies (chemistry and energy) are involved in the process, which is supported by the Clinton Climate Initiative.
- The subjects include:
  - Measures to improve the air quality through collaboration between ports and companies and shipping companies.
  - Joint approach for the development of CO_2 capture and storage in industry and the energy sector.

2% annual energy saving of the port and industrial complex

- Business plan 'Stoompijp Botlek' completed. Preparation of a collaboration agreement between Stoompijp and Visser & Smit Hanab, Eneco Netbeheer, and the Port of Rotterdam. The results of the Stoompijp feasibility study, conducted on the instructions of ROM Rijnmond, show that a reduction potential of 0.4 million tons CO_2 should be commercially feasible. This is almost 10% of the technical reduction potential in energy efficiency in the

entire HIC. The business plan to be drawn up should demonstrate this commercial feasibility (2008).
- Research by the Port of Rotterdam, BP and Lyondell on central waste-water treatment in Maasvlakte 1 and 2 completed (2008).
- 2% annual energy saving in the corporate sector in the present government's term of office. Deltalinqs will draw up a programme within the Energy Forum together with the corporate sector to realize a 2% annual energy saving in the corporate sector in the present government's term of office (2007-2011). The objective of the Rotterdam Climate Initiative is eventually to realize a 2% annual energy saving in the corporate sector until 2025. Supplementary to the Energy Forum, a number of companies will aim to realize an even greater annual saving by analysing the possibility of additional energy saving and CO_2 reduction. This will be laid down in bilateral agreements with approximately 25 large energy and industrial companies in the HIC on energy efficiency objectives (to be completed in 2010).
- Synchronization takes place with initiatives in this area on a national level.

Increase the share of sustainable energy
- Biomass Programme completed. Subsequently, a survey was carried out concerning the required storage and transhipment capacity for biomass in the port and industrial complex. Feasibility study biomass trade from Malaysia/Indonesia, together with the UN (2007).
- Bilateral agreements with the energy companies on admixture of biomass and capture of CO_2 in/from the new coal-fired power stations (2008).

Rotterdam sustainable mobility:

Vision on sustainable traffic and transport: 50% CO_2 reduction
- Draw up of an action programme containing details of the 50% CO_2 reduction in traffic and transport (2007). This concerns an integrated vision including air quality and the vision of the city.

Rotterdam bids on sustainable fuel: means of transport, fuel stations, supporting policy
- Rotterdam will apply its auction policy for fuel stations to proceed with the introduction of bio-ethanol. The aim is: 12 bio-ethanol stations in 2010.
- In addition to this, the Rotterdam transport company RET had 80 buses converted to Euro 5 in 2006. Furthermore, 90 new low energy buses in Euro 5 standard were purchased in 2006. With these € 170 five standard buses, RET now ranks among the cleanest bus fleets in Europe.
- Experiments are carried out with other sustainable fuels as well.
- The system of environmental zoning to prevent polluting lorries from entering certain parts of the city was introduced in the city centre by 2007. Following evaluation of the effects in the central zone, further expansion of the environmental zoning plan will be considered.
- Together with a few pioneer companies, the city will actively pursue the realization of CO_2 free distribution transport in the city. First electric vehicles in 2007. Pilot in collaboration with market parties early in 2008.
- In the context of NEMS, a test will be carried out in which five existing buses will be converted into hybrid buses, saving 50% fuel.
- Draw up a list, together with ECN, of activities in the area of hydrogen in the Rotterdam region, resulting in an action plan (2008).

Joint approach air quality and climate: the national objectives for air quality for 2010 and 2015 will be achieved in time
- For the transition to sustainable mobility, the city will link up with the Rotterdam and Regional Air Quality Approach. Rotterdam's current active

approach of the air quality problems will be continued in good harmony with RCI, with a specific focus on achieving synergy advantages.
- In connection with the Air Quality programme (RAP & RAL), an additional set of measures will be formulated with an emphasis on CO_2 (2008). In the framework of assessment of the Rotterdam Air Quality Approach, which will be drawn up for the benefit of priority shifting, CO_2 reduction is expressly included. Rotterdam aims to realize a clean municipal fleet to the extent that 75% of the municipal fleet will be clean. The first cars that will be tackled are those of the Municipal Executive. The 1,600 municipal vehicles will be among the cleanest and most energy efficient of their kind. In this respect, Rotterdam focuses on hybrid vehicles and the use of bio-ethanol (end of 2009). For special applications, electric vehicles will be deployed; in 2007 a pilot was started with electric street sweepers. At a Euro City level, research will be carried out into the possibilities of central purchasing of electric cars.

Approach shipping emissions: national and international
- International agreements on reduction of shipping emissions and elaboration of feasible CO_2 measures for the shipping industry in conjunction with the air quality programme. The international conference focuses on issues including international agreements concerning ocean shipping (2008).

Public transport, bikes, parking policy
- Rotterdam is working on the public transport network, is expanding the number of P&R locations in well selected parts of the city, and applies a parking fee structure within the ring. These measures will reduce traffic in the city and result in a cleaner atmosphere.
- Biking traffic and public transport will be promoted actively, with measurable results. In this respect, the importance of biking traffic and pedestrian routes is given express attention in relation to the pre- and post-transport in public transport.

Citizens and companies of Rotterdam united for sustainability:

Exemplary behaviour: Every partner has an active CO_2 policy
- New (sustainable) cars for the Municipal Executive (biofuel) and the Port of Rotterdam (2007) and DCMR (2008 and 2009).
- Climate friendly lease fleet arrangement Port of Rotterdam (2008).
- Energy targets will be included in the management contracts with the municipal services. Reports will follow in the context of the P&C cycle (end of 2008). Each municipal service will have an individual plan of approach containing the results the service will achieve and the time in which this will be realized.
- A new transport plan available per service (2008). Support in this respect will be given by the Rijnmond Traffic and Transport Department (Verkeers- en Vervoerscentrum Rijnmond, VVCR). In 2009, the percentage employees who walk to work or use the bike or public transport will be increased by 10%. Electric bikes and scooters will receive attention in this respect.
- The plan of approach for sustainable tendering will be completed, including standards imposed on the contracted services and products in terms of CO_2 emission (2008).
- A zero measurement concerning the operations was carried out in all of Rotterdam's municipal services within the framework of Corporate Environmental Management (Bedrijfsinterne Milieuzorg, BIM) (2008). The analysis concerns the elements of Energy (including CO_2), Water, Sustainable Purchasing, Waste Processing, and Transport. By the end of 2009, all municipal services will have a plan of approach for reduction, and will be actively engaged in the realization.

- By the end of 2009, a new standard for the separate collection of waste products (Waste Care) will be introduced. For this purpose, Roteb/Kleinpolderplein and Servicedienst/Wijnhaven are currently conducting a pilot. In addition to waste collection, the employment of people with a labour market disadvantage will play a role (2009).
- 75% of the municipal fleet is clean as a result of a mix of different measures. Soot filters/catalytic converters on existing diesel vehicles, like refuse lorries and vans. New, low energy heavy diesel vehicles in Euro 5 and, whenever possible, EEV standard. New, low energy petrol and diesel passenger cars and vans, preferably with hybrid and flexi-fuel (bio-ethanol) technology. For special applications, electric vehicles will be deployed. In 2007, a test was started with electric street sweepers. At a European level, research will be carried out into the possibilities of central purchasing of electric vehicles.

Companies/SME: Starting from 2008, 0.3% annual average energy saving in small and medium-sized companies. 1% annual average energy saving as from 2012.

- Annual CO_2 dinner with entrepreneurs, aimed at a wider approach to energy saving (started from 2007).
- Action programme SME completed. Companies are rewarded for taking energy saving measures with a Golden Membership. At least 50 will be granted every year. Every year, 10% of the small and medium-sized businesses (approximately 1,500) will have drawn up a plan to save energy, aimed at a 3% reduction annually (2008).

Saving in households, appliances, transport behaviour: Starting from 2008, 3% annual energy saving

- Started at September 2007, an annual Rotterdam Climate Festival will give substance to the Week of Progress, a public event in the centre of the city aimed at mobility and the climate in a broad sense. Innovations are a central theme.
- Low energy light bulb campaign/tips to save energy: low energy light bulb and tips to save energy for every household (2007).
- Monthly energy scans carried out in the home of a 'celebrity' from Rotterdam (2008).
- Multiannual campaign plan completed, coordinated with national/local activities of third parties and other municipal campaigns (year of the young/health & exercise) (2007).
- Environmental education plan completed (2008).

Intensification waste treatment/collection

- Roteb will intensify the separate collection of domestic and corporate waste products, and will further elaborate pilots with synthetic waste, including PET bottles (2007/2008).
- Roteb will join AVR in considering options to optimize the production of energy/residual heat at AVI Brielselaan (2008).
- AVR has a logistic plan for household refuse in the Rijnmond district. A basis of support is sought among regional municipalities and other municipal clients of AVR (2008).

Rotterdam innovation lab:

Vision on economic and innovation opportunities

- Picture of the future of Rotterdam (city and port) as an Innovation Lab, based on a vision and scenarios to be developed (end of 2007).

Innovation fund

- Multiplication of the investment in the Innovation Lab to the amount of 10 million, by a factor of 3 in the next 4 years. To be generated by additions to the RCI budget out of budgets originating from the government (local,

provincial, national, European), the corporate sector (sustainable commercial activities in the built-up area, port and mobility), and knowledge institutes (end of 2011).
- Innovation fund active with 10 successful participations in 2010, setting up an incubator (market introduction of 5 new techniques), setting up the RDM area as a knowledge pool location for Research, Development and Manufacturing (BVG) (2007).

RDM as a centre of innovation
- Allocation of land for the benefit of sustainable energy related activities on RDM 400,000 m². An overview is drawn up of the available land allocations and the developments in this respect.
- Collaboration agreement with knowledge institutes (TUD, EUR, Hogeschool) leading to at least two chairs and five master classes a year (early 2008). Working conference in year of the young 2009.
- Establishment of 10 innovative companies through acquisition of energy related activities. 10% of the starters (300 starters) in 2007-2010 should be energy related starters (though improvement of the climate for establishing a business, labelling at the time of registration with the Chamber of Commerce, zero measurement yet to be carried out) (2010).
- Setting up a demopark (five testing stations), inviting venture capital companies to invest in RCI initiatives (energy initiatives) in Rotterdam (three elevator pitches a year) (end of 2010).

Knowledge development
- End of 2010: double the growth in sustainable energy related activities (built-up area, mobility, harbour) compared to 2006, by introduction of and knowledge dissemination on clean technologies, the realization of ten initiatives within the scope of energy saving, and transition in the following areas: solar panels, green roofs, total energy, residual heat, wind turbines, innovative use of materials/insulation, recycling and capture of CO_2, co-siting, lighting, waste products as sustainable base material, biofuels, hydrogen/fuel cell, hybrid electric vehicles.
- End of 2010: Rotterdam will be seen as the knowledge centre for energy related innovation. Realization of building blocks for the development of Rotterdam as a centre of knowledge in the next four years: agreements, chairs, Wubbo Ockels Institute, World Port International Congress 2008, port student summit 2009, increase in patents and licences.
- 2007, the research and education programme should have been completed: 10 doctoral candidates, 25% of the traineeships and graduation assignments of TUD, EUR and Hogeschool aimed at sustainability. Incorporate this in agreements with knowledge institutes and the corporate sector.
- Build up a network of knowledge institutes in twelve ports that co-organize the World Port International Congress 2008 (2007).
- Together with the Expert Team, studies are carried out and the knowledge gained is disseminated.

Sources

Project group Rotterdam Climate Initiative, 2007
The World Capital of CO_2 free energy
Rotterdam, 2007

Project group Rotterdam Climate Initiative, 2007
Action programme and objectives 2007-2010
Rotterdam, 2007

D.4.3 Data

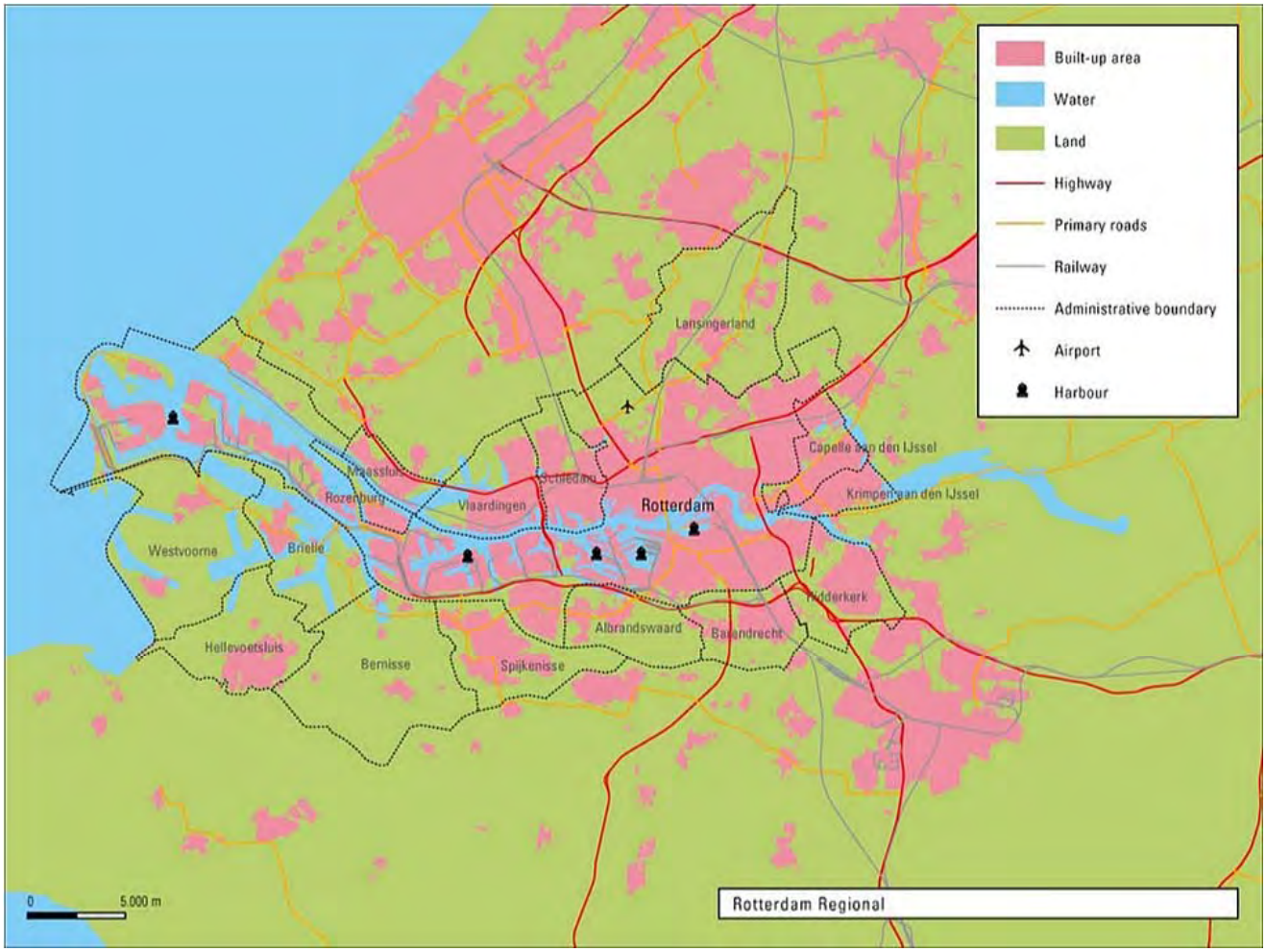
Rotterdam				
General parameters				
Population		2009	587,000	
	Change	*2000-2009*	*-1%*	
		1990-2009	*1%*	
Households		2009	296,000	
	Change	*2000-2009*	*0%*	
Density		2009	2,870	Inhabitants/km^2
	Change	*2000-2009*	*1%*	
Ecological parameters				
Total GHG emissions		2005	3.9[1]	Million ton/year
	Change	*1990-2005*	*44%*	
Residential GHG emissions		2005	0.6	Million ton/year
	Change	*1990-2005*	*-14%*	
GHG emissions/capita		2005	6.5[2]	Ton
	Change	*1990-2005*	*35%*	
Residential GHG emissions/capita		2005	1	Ton
	Change	*1990-2005*	*-13%*	
Residential energy use share		2007	74%	Gas
The Netherlands		2007	23%	Electricity
		2007	5%	Heat/renewables
	Change	*N/A*	*N/A*	
Solid waste production		2008	567	Kg/capita/year
	Change	*N/A*	*N/A*	
Recycling		2007	33%	
	Change	*N/A*	*N/A*	
Residential water use		2004	124	Liters/capita/day
	Change	*N/A*	*N/A*	
Travel to work		2003	22%	By bicycle or by foot
		2003	18%	By public transport
	Change	*N/A*	*N/A*	
Air quality trend - PM_{10}		No significant trend		
	Change	*N/A*	*N/A*	
Air quality trend – NO_x		No significant trend		
	Change	*N/A*	*N/A*	

D.4.4 Graphic material

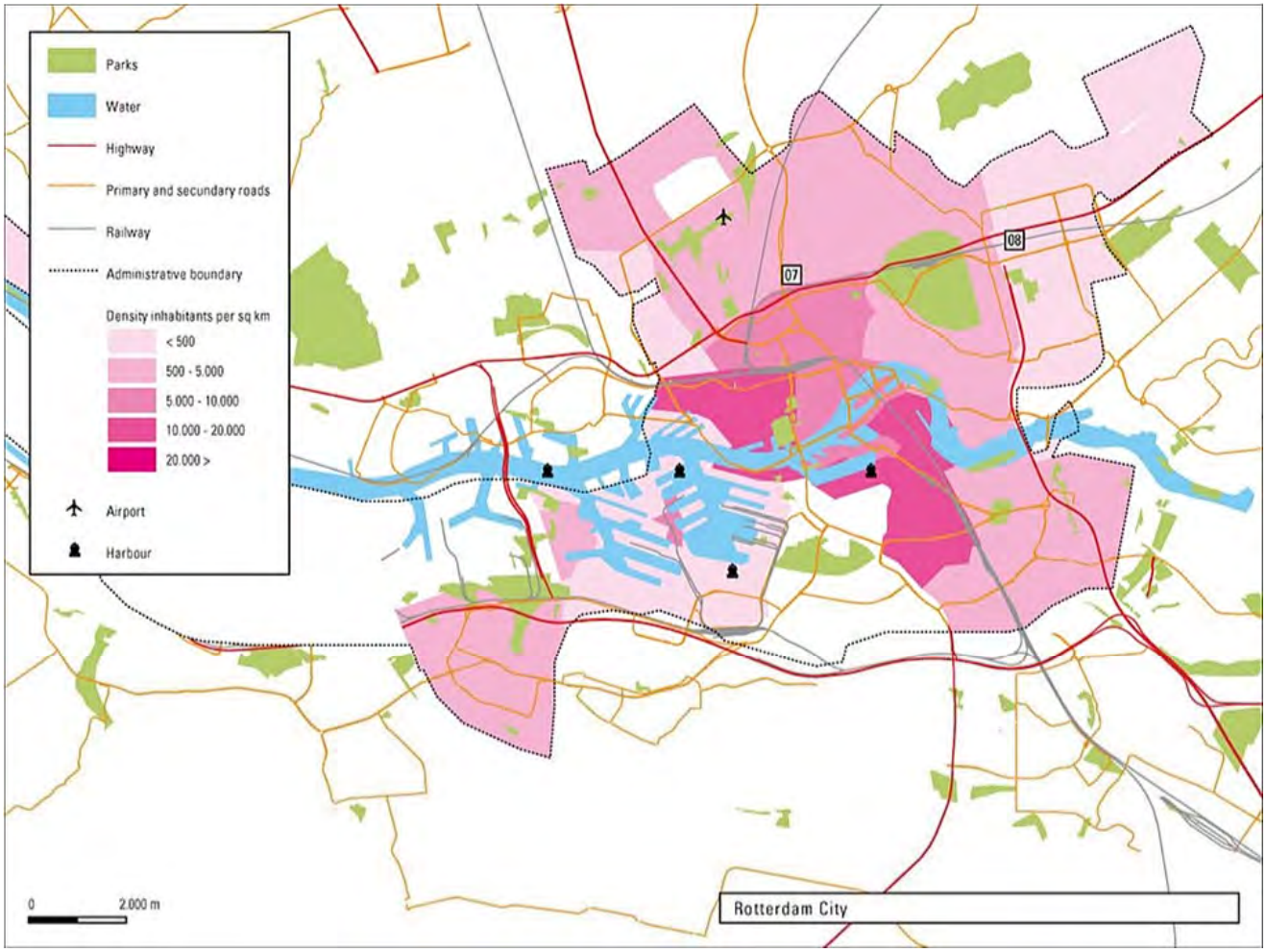
1 Excluding harbour activities.

2 Excluding harbour activities.

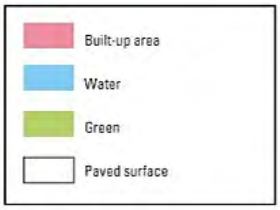

0
5.000 m
Rotterdam Regional


Built-up area
Water
Land
Highway
Primary roads
Railway
Administrative boundary
Airport
Harbour
Lansingerland
Capelle aan den IJssel
Krimpen aan den IJssel
Maassluis
Schiedam
Vlaardingen
Rotterdam
Rozenburg
Westvoorne
Brielle
Ridderkerk
Albrandswaard
Barendrecht
Hellevoetsluis
Bernisse
Spijkenisse
0
5.000 m
Rotterdam Regional

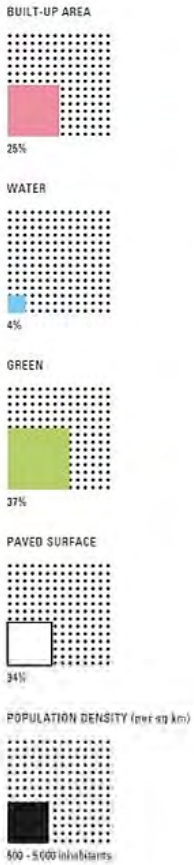

07
08
0
2.000m
Rotterdam City


Parks
Water
Highway
Primary and secundary roads
Railway
Administrative boundary
Density inhabitants per sq km
< 500
500 - 5.000
5.000 - 10.000
10.000 - 20.000
20.000 >
Airport
Harbour
07
08
0
2.000 m
Rotterdam City

07

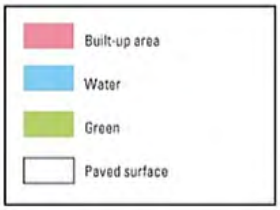


TYPOLOGY
enclosed block by attached appartments



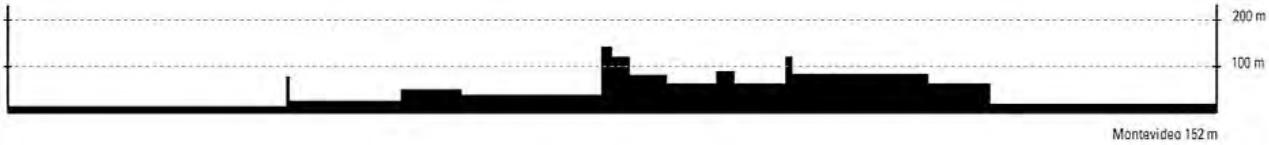
Schieweg, Rotterdam-high density

08



TYPOLOGY
row homes

Hoofdweg, Rotterdam-low density



TALLEST BUILDINGS

Maastoren	161 m
Montevideo	152 m
Gebouw Delftse Poort	151 m
Millennium	131 m
World Port Center	123 m

Rotterdam Skyline

Rotterdam - Overschie, lowest density

Rotterdam - Delfshaven, highest density

Rotterdam, Wallisblok construction

D.5 San Francisco

D.5.1 Goals

San Francisco's reduction target is 20% below 1990 levels by 2012. This is about 2.5 million tons below 2000 levels. With 'business as usual', greenhouse gas emissions are predicted to rise to 10.8 million tons per year in 2012. The 20% reduction target would reduce San Francisco's overall GHG emissions to 7.2 million tons per year by 2012.
The *Climate Action Plan*, called for in the resolution, describes what San Francisco can do to achieve its stated goal and to slow the effects of climate change:

Transportation:

- Reducing vehicle trips and by travelling in vehicles with lower emissions.
- Shift from driving to alternative modes such as public transit, ridesharing, bicycling and walking. This would be accomplished through improved services and financial incentives.
- Switching to more fuel-efficient or cleaner-fuelled vehicles and by downsizing fleets.

Targets (options):

- Increase the use of public transit as an alternative to driving.
- Increase the use of ridesharing as an alternative to single occupancy driving.
- Increase bicycling and walking as an alternative to driving.
- Support trip reduction through employer-based programs.
- Discourage driving.
- Increase the use of clean air vehicles and Improve fleet efficiency.

Energy Efficiency:

- Reducing energy use reduces GHG emissions from fossil fuels burned in power plants and in buildings.
- Offering incentives on select products can encourage consumers to invest in efficient appliances or in home improvements that lower energy use.
- Other methods to increase energy efficiency include providing technical assistance and energy management services such as energy audits and design assistance for residential, commercial and municipal buildings.
- Education and outreach programs need to broaden general public awareness and to train particular groups (such as designers and building contractors) on energy efficiency practices.
- The city has the power to strengthen energy codes and standards for both existing buildings and new construction that would bring both immediate and long-term benefits in terms of financial savings to businesses and residents.

Targets (options):

- Increase incentives, direct installation and technical assistance (residential buildings, commercial buildings, municipal buildings).
- Expand education and outreach; strengthen legislation, codes and standards.

Renewable Energy:

- Renewable energy technologies such as solar, wind, and biomass are now available, reliable and often cost-effective alternatives to fossil fuels for producing electricity.
- Emerging technologies such as fuel cells and tidal power should be researched and pilot projects developed.
- Increasing the amount of renewable sources ('green power') in the city's electricity mix through local projects as well as through the state's electricity grid can have a great impact on greenhouse gas emissions and should be an ongoing action item.

Targets (options):

- Develop renewable energy projects (solar energy, wind energy, biomass energy).
- Conduct pilot projects for emerging technologies.
- Support and develop green power purchasing.

Solid Waste:

- Recycling reduces CO_2 emissions by avoiding the energy used during the extraction and processing of virgin raw materials to manufacture new products.
- Reducing landfill reduces the amount of methane–a potent greenhouse gas released into the atmosphere.
- Actions should include expanding recycling and composting programs, to include more sectors of the city; encouraging recycling of construction and demolition debris; and increasing recycling in city departments.

Target:

- Increase residential recycling and composting.
- Increase commercial recycling and composting.
- Expand construction and demolition debris recycling.
- Support alternate collection methods for recyclable materials.
- Promote source reduction, reuse and other waste reduction.
- Expand municipal programs.

D.5.2 Policy and projects

The city has adopted the 2002 *Electricity Resource Plan* as a policy guideline to be used in proposing and implementing specific actions. The Plan includes implementing energy efficiency programs and developing renewable energy resources such as wind and solar power.

In 2002, the San Francisco Board of Supervisors passed the *Greenhouse Gas Emissions Reduction Resolution*, committing the city and county of San Francisco to a greenhouse gas emissions reductions goal of 20% below 1990 levels by the year 2012. The resolution also states that the Mayor and Board of Supervisors actively support the Kyoto Protocol, and calls upon national leaders to do so as well. In 2003, Mayor Willie Brown joined mayors of over 100 other cities.

The *Climate Action Plan*, called for in the resolution, describes what San Francisco can do to achieve its stated goal and to slow the effects of climate change.

SF Environment - San Francisco's Environment Department - is a collection of visionary environmental professionals who are dedicated to helping all San Francisco residents and businesses take an active role in protecting and enhancing their urban environment.
SF Environment is responsible for a wide range of programs that constitute a core part of the city & county's vision for sustainability.

Zero Waste:

Zero waste is complete waste reduction & reuse followed by total recycling and composting by all producers and consumers to avoid the final option of disposal. It is a full system redesign to achieve maximum resource efficiency and sustainable economic development which San Francisco supports.

- Mandatory Recycling & Composting: To help San Francisco move closer to its goal of zero waste by 2020, the Mandatory Recycling and Composting Ordinance requires everyone in San Francisco to separate their refuse into recyclables, compostables and trash. No one may mix recyclables, compostables, or trash, or deposit refuse of one type in a collection container designated for another type. All property owners are required to maintain and pay for adequate refuse service. Tenants can report if their

property own fails to provide compost and recycling services by filling out the anonymous form.

Waste Reduction & Reuse

- Food Service Waste Reduction Ordinance: The Food Service Waste Reduction ordinance, effective June 1, 2007, prohibits any establishment that serves food prepared in San Francisco from using polystyrene foam (Styrofoam) to-go containers. The Ordinance further requires that any containers used be either recyclable or compostable in the city's programs. In Spring 2009, San Francisco reached 94% compliance with this ordinance, making it easier for the public to recycle or compost their lunch leftovers and disposable food containers.
- Plastic Bag Ban: Effective December 2007, large Supermarkets (over $ 2 million in gross annual sales receipts) and chain pharmacies were prohibited from distributing plastic checkout bags. Instead they may distribute BPI certified compostable bags, paper bags made with a minimum 40% post consumer recycled content, or reusable bags.
- Producer Responsibility: When companies are responsible for ensuring their products are recycled responsibly, and when health and environmental costs are included in the product price, there's a strong incentive for producers to design - and consumers to purchase - goods that are more durable, easier to recycle, and less toxic. San Francisco has taken steps toward increased producer responsibility such as the Extended Producer Responsibility Resolution, Food Service Waste Reduction Ordinance, and Plastic Bag Reduction Ordinance.
- Consumer Responsibility: San Francisco stimulates people to buy only what they need and select products that are less toxic, minimally packaged, that contain high post-consumer recycled content, are durable, repairable, and recyclable or compostable at the end of their life.
- Bring Your Own Bag: Stimulates people to bring their own bags every time they go to the store.

Recycling

- City Government Recycling: Comply with the Green Purchasing Ordinance. City purchases may only be used for Required items listed in the SF Approved Catalog. Recycling coordinators help the city meet its goal of diverting 75% of waste from landfill by 2010 and reaching Zero Waste by 2020. They act as liaisons between their departments and SF Environment. SF Environment hosts annual workshops for all recycling coordinators and provides guidance and support with your office recycling efforts.
- Residential en business recycling: San Francisco works closely with Golden Gate Disposal & Recycling and Sunset Savenger to ensure that every single family home, apartment tenant and businesses in San Francisco has access to recycling and composting programs.
- Construction and Demolition Debris Recycling: In 2006, the city adopted Ordinance No. 27-06 mandating the recycling of construction and demolition (C&D) debris. This ordinance affects all construction projects such as new construction, remodels and partial demolitions, and requires the building permit holder or the property owner to make sure that all C&D materials removed from the project are properly recycled. This ordinance prohibits any C&D materials from being placed in trash or sent to a landfill.
- Special Event Recycling and Composting: San Francisco Special Events Ordinance No. 73-89 requires any applicant seeking permission for the temporary use or occupancy of a public street, a street fair or an athletic event within the city and county that includes the dispensing of beverages or which generates large amounts of other materials to submit a recycling plan.

Composting

- Residential and business composting: Everyone in San Francisco has access to green carts for compost collection.
- Compostable Bags and Other Products: Composting is easy and liner bags are not required, though many residents and businesses find it easier to participate when they use a compostable bag or container liner.

Toxics Reduction:

SF Environment's toxics reduction program educates citizens about how they can protect themselves and the environment from untested and/or dangerous chemicals in the everyday lives. This includes promoting SF Approved Green Products for landscapers, disposing of Hazardous Materials and working to ensure safe Home & Body Products**.**

- Pest Management (IPM): The Integrated Pest Management Ordinance - established the city's IPM program for city properties in 1996. It requires an integrated approach to all pest control operations; establishes posting, recordkeeping, and accountability requirements; and phased out use of the most hazardous pesticides. The ordinance does not regulate pesticide use outside of city operations: That authority is held by the U.S. Environmental Protection Agency and the California Department of Pesticide Regulation.
- Toxic Products: Recycling & Disposal of the city & county of San Francisco sponsors a variety of programs for its residents, businesses and city departments to safely recycle and dispose of hazardous materials.
- Home & Body Products: Awareness program, to make people aware of all the toxics in home & body products.
- Green Your Business: San Francisco Green Business meet high environmental standards and are recognized by the city and county of San Francisco for their achievement.

Energy:

The city has form plans for energy self -reliance, improved air quality, and the reduction of greenhouse gases by 20 percent below the 1990 levels. The city has planned to achieve this through energy efficiency in buildings, transit alternatives, alternative vehicle fuels, and generating electricity with renewable energy.

Energy Efficiency

The city sees energy efficiency as one of the most important issues they'll face in the 21st century and to that end has developed a Sustainability Plan and Climate Action Plan to reduce electricity and natural gas use in homes and businesses, an Electricity Resource Plan that that set specific goals for reducing energy use, and programs like the Power Savers Program and Peak Energy Program that so far have reduced peak electricity demand by 12 megawatts.

- Sustainability Plan: San Francisco adopted this plan to maintain and provide a good quality of life for residents when it comes to the city's environment. The plan establishes broad goals and addresses key concerns. This version includes the introduction, letters from city leaders, and the specific environmental topics.
- Climate action plan (see textbox above).
- The electricity resource plan:
  - Demand Reduction through energy efficiency and load management: This is generally a cost-effective means of reducing electricity load. The objectives are: 16 MW by 2004; 55 MW by 2008; 107 MW by 2012.

- Renewables: Programs to harness the sun, wind, water, and other natural sources will be a high priority. The objectives for renewables is 50 MW by 2012.
- Medium-sized Generation and Cogeneration: Mid-size plants of about 50 megawatts can provide high levels of reliability and could be built in several locations in San Francisco. This Plan assumes the megawatts needed to help shut down Hunters Point and Potrero Unit 3 are: 150 MW by 2004; 250 MW by 2008.
- Small-scale Distributed Generation (DG): These include fuel cells, packaged cogeneration, and micro-turbines. DG generators range from 10 kilowatt to 5 megawatts in size and usually support single facilities. The objective is 72 MW by 2012.
- Transmission: An upgrade to an existing line and a new transmission line scheduled to be built on the Peninsula to service San Francisco will be necessary for long-term reliability, and should be supported by the city. At the same time the city should commit to securing a continually increasing percentage of renewable sources to feed into the transmission grid.
- Environmental Justice: SFE will take responsibility for seeing that communities in Southeast San Francisco will benefit from the programs developed through this Plan.
- Air quality will be more effectively monitored as a measure of the success of the Plan.
- The department will also monitor and periodically report on bills for low-income residents and the dispersion of energy program benefits, including training, employment, and business development.

Medium Term Action Plan - 2006 through 2012:
The most important challenges facing the city in the medium term is to develop sufficient new resources to permanently close Potrero Unit 3 and to limit the operation of the diesel-fired peaking plants at Potrero to genuine emergencies. In addition, the city must take aggressive steps to meet its commitment to reduce greenhouse gases, which means commitments to fossil fuel reduction both in the city and in the power sources feeding the transmission grid. The key components of a mid-term action plan include:

- Completion of the Jefferson to Martin transmission line.
- Accelerated development of solar electric generation in San Francisco with the objective of having 50 megawatts installed by 2012.
- Development of additional renewable energy, cost-effective co-generation, and clean distributed generation technologies in San Francisco.
- Maximizing investments in energy efficiency and demand reduction with a goal of maintaining peak demand at a level no higher than 909 megawatts (the average of 1996-2000).
- Development of at least 150-megawatts of new wind or other renewable generation that can be imported into San Francisco.

– Power Savers Program: In 2002-2003 with funding provided by the California Public Utilities Commission, SF Environment and its partners helped over 4,000 small business owners reduce their lighting electricity loads by upgrading from older fluorescent and incandescent lighting to newer, energy efficient fluorescent lighting.
– Peak energy program: In 2003-2005, SF Environment (SFE) – in partnership with PG&E – reduced 1megaWatts of electric load through serving residential customers, primarily in Bayview Hunters Point, with cost-saving measures in their homes and replacing inefficient equipment in business throughout the city.

Renewable energy

By installing renewable energy systems like the 675 kilowatt solar system on the roof of the Moscone Convention Center, finding innovative financing for renewable energy projects - including 2001's landmark $ 100 million solar bond initiative - and supporting the development of emerging technologies like tidal power and cogeneration, San Francisco is proving its commitment to promoting a healthier environment and reducing the city's dependence on fossil fuels

- Solar and Other Renewable Generation: The Power Enterprise is researching and developing renewable electrical generation utilizing such resources as solar (which converts energy from the sun into electricity), geothermal, wind, and wave to provide clean, local generation. Currently the city has completed projects resulting in over 5 megawatts (MW) of PV solar and cogeneration installed in San Francisco plus several new projects that are in development at a variety of other facilities.
- GoSolarSF - Solar Energy Incentive Program: To encourage more installations of solar power in San Francisco, the city has been offering incentives to San Francisco residents and businesses to install solar power on their properties. The incentive program, GoSolarSF, coupled with the California Solar Initiative, a rebate program sponsored by the State of California, and federal tax credits, could pay half the cost or more of a solar power system installed in San Francisco.
- Solar Heating: Incentives (from California) Currently, there is a 30% Federal Renewable Energy Tax Credit3 that can be taken for solar water heating systems installed through 2016. The Solar Water Heating and Efficiency Act of 2007 (AB 1470) authorized the California Public Utilities Commission (CPUC) to develop a state-wide Solar Hot Water incentive program pending the outcome of a pilot program conducted in San Diego.
- Ocean power: Anyone who's been knocked over by a sizeable wave knows how much power there is in the ocean. That power - the natural movements of seawater, its tides and currents - can be harnessed. Ocean Power (also known as “ocean energy”, “marine energy” and “marine renewable energy”) is a new and emerging area of renewable energy that San Francisco is exploring to possibly play a large role in providing clean energy in the coming years.
- Biodiesel: In its role as a leader in the use of alternative transportation fuels to clean the air, promote renewable energy, and reduce greenhouse gas emissions, San Francisco now has more than 800 alternative fuel vehicles in its fleets. Several city departments and agencies have successfully tested and used biodiesel in pilot programs using B20 or higher biodiesel blends, including:
  - San Francisco Airport (SFO): The airport is using B20 without incident, but has had problems with the city's fuel provider regarding reliability and availability of the fuel and is looking for new contractors to meet their biodiesel needs.
  - Department of Public Works: Central Shops, which provides motor vehicle maintenance and repair services for several city departments, has converted their 6,000 gallon tank in Golden Gate Park to B20 as Phase 1 of a project that will eventually convert 100 percent of Central Shops' other tanks. No problems with the fuel have been reported or are anticipated. Central Shops' staff services a fleet of approximately 5,300 units ranging from lawn edgers to aerial fire trucks and completes 34,000 maintenance repair orders a year.
  - San Francisco Municipal Transportation Agency (Muni): the largest user of B20, Muni is interested in seeing how fuel demands are going to be met for 12 buses that will be part of a future pilot program.

    - San Francisco Zoo: The zoo's first biodiesel powered vehicle was the ZooMobile, a travelling outreach program with an annual audience of about 12,000 children, teachers, and seniors. The zoo's poop truck, which picks up animal droppings inside the park and transports them for recycling as fertilizer, was recently converted to biodiesel. There are plans to covert three other zoo vehicles, all of which will be served by the solar powered biodiesel depot on zoo grounds.
    - San Francisco Fire Department: In May 2006 the fire department initiated a six-month pilot program to test and monitor the use of B20 in nine of their vehicles. Upon successful completion of the pilot program, the department expects to expand the use of biodiesel throughout the city.
- Cogeneration: Among waste heat's many valuable applications is the generation of steam for commercial canneries and hot water for health clubs and commercial laundries. And the uses of cogeneration aren't limited to heat: The energy it generates can be used in cooling or refrigeration to power modern chiller and refrigeration technologies that use heat instead of mechanical energy to provide cooling.

Climate change

- Business Council on Climate Change (BC3): The Business Council on Climate Change started in 2005 when San Francisco Mayor Gavin Newsom signed on to the UN Global Compact and agreed to participate in the Global Compact Cities Pilot Programme. The BC3 evolved from a partnership between SF Environment, the Bay Area Council, and the UN Global Compact.

The San Francisco Carbon Fund

The San Francisco Carbon Fund is an innovative carbon reduction program that invests monies from activities that produce climate damaging greenhouse gas pollution (such as air travel) into local projects that reduce greenhouse gas pollution and support local economic development. All of the projects in the Fund take place within San Francisco's boundaries and thus contribute directly to the sustainability. The SF Carbon Fund is completely transparent, accountable, and creates real benefits for San Francisco's citizenry and environment, including:

- Reducing the production of greenhouse gases in San Francisco.
- Expediting the development of innovative local climate projects that will serve as showcase projects to educate, inform and inspire city residents.
- Supporting non-profits working to better the community by providing resources that reduce their operating costs, allowing them to spend more on programming.
- Breaking down market barriers to non-polluting technologies by showcasing and promoting various technologies.
- Increasing green collar jobs and supporting the local economy.
- Reducing other types of air pollution related to electricity generation.

Air Quality & Transportation:

The pollution generated by hundreds of thousands of motor vehicles travelling to and from San Francisco poses a serious threat to the quality of air throughout the Bay Area. The city's Climate Action Plan aims to reduce those emissions by encouraging the use of clean fuels and vehicles and alternative modes of transportation.

- SF Environment's Clean Air Program (CAP) - Leading the city's clean air and transportation efforts since 1993.
- Spare the Air Program: The Spare the Air Program was established by the Bay Area Air Quality Management District to educate people about air pollution and to encourage them to change their behaviour to improve air quality.

- Cleaner fuels and vehicles: To support the growing alternative fuel industry, San Francisco has secured grants to buy vehicles for the city's fleet, encouraged manufacturers to produce cleaner vehicles, built fuelling and recharging stations accessible to the public, and sponsored public exhibits of the latest in clean fuel technology.
- Alternative Fuel Vehicles in the City Fleet: San Francisco has more than 800 alternative fuel vehicles (AFVs) in its fleet, including natural gas, electric, bi-fuel such as biodiesel, hybrid, and propane vehicles. Under a two-year demonstration, two Honda FCX hydrogen-powered fuel cell vehicles were leased, making San Francisco one of the few cities in the world to possess hydrogen-powered fuel-cell cars. And more than half the San Francisco public transit (Muni) fleet is made up of zero emission electric vehicles (ZEVs).
- Healthy Air and Smog Prevention Ordinance: The city's AFV fleet increased dramatically as a result of the 1999 Healthy Air and Smog Prevention Ordinance, an innovative ordinance that requires all new purchases or leases of passenger vehicles and light duty trucks to be the cleanest and most efficient vehicles available on the market.
- SF Muni Clean Air Plan: In 2002, the San Francisco Municipal Transportation Agency (Muni) unveiled a Clean Air Initiatives report that described its Clean Air programs, including an Alternative Fuel Pilot Program. recently, in June 2007, Muni took delivery of the first of 86 diesel electric hybrid Orion VII low floor buses from DaimlerChrysler Commercial Buses, making them California's first series production diesel electric hybrid buses in transit service, and making San Francisco the home of the largest hybrid bus fleet in the country.
- Driving alternatives: Since 1993, the city and county of San Francisco has been creating programs and incentives to support and encourage driving alternatives.
- Carpool/vanpool: San Francisco stimulates car pooling and vanpooling for instance by the carpool lane (in more places in California). You are only allowed to drive on the carpool lane when you are in the car with > 1 person. Other benefits from car pooling and vanpooling:
  - Enjoy free trips over Bay Area Bridges during commute hours. Check the Bay Area Toll Authority (BATA) for toll schedules.
  - Vanpool-specific events:
    - Use pre-tax dollars for expenses.
    - Discounted parking in San Francisco.
    - Get $300-900 in gas cards for new vans.
- City Car sharing: Car sharing is a service that provides members with 24/7 access to a fleet of vehicles on an hourly basis (comparable with Greenwheels in NL).
  - New Members: CCSF employees get the $30 application fee waived and a $ 20 driving credit.
  - Existing Members: CCSF employees who are already members get a $ 20 driving credit.
- The City Bicycle Fleet: Instead of driving from one meeting to another, employees can conduct work-related business by pedalling around San Francisco, helping reduce vehicle trips and greenhouse gas emissions. Individuals or departments can sign up to receive a free bicycle, helmet, u-lock, and a one-year maintenance plan.
- The City Hall Bicycle Room: For employees who work at or near the city hall, there is a secure bike room available to store bicycle and personal items for day use only. Lockers and showers are also available.
- SF Bike Plan: The Bicycle Plan is a 5-year master plan and ambitious roadmap meant to boost an already impressive transportation mode to new heights of safety and convenience. The Bike Plan outlines 60 near-term

improvements to the Citywide Bike Network, as well as long-term opportunities for bike route upgrades.

- Commuter Benefits: this is a federally approved program that allows employee pre-tax deductions up to $ 230 per month to pay for public transit and vanpool expenses. Employees and employers save on their taxes. Pre-tax deductions for transit are a great financial incentive to encourage commuters to use driving alternatives.
- Emergency Ride Home: The San Francisco Emergency Ride Home (ERH) program provides a free or low-cost ride home in cases of emergency for employees who use alternative transportation, such as car pooling, vanpooling, public transit, bicycling, and walking.
- Telecommuting Program: this programme Guidelines and Participation Packet is intended to achieve the following results:
  - Assist employees and supervisors in understanding the requirements and conditions for participating in the city's Telecommuting Program, including the process to apply to telecommute.
  - Provide participating employees and supervisors with necessary information and guidance to ensure successful and mutually beneficial participation in the Program.

Green Building:

Green Building is the integration of the built environment with natural systems. SF Environments promotes Green Building to residents, businesses and city departments.

- 2008 Green Building Ordinance - Requires new buildings constructed in the city to meet green building standards developed by the Mayor's Green Building Task Force.
- LEED Gold Priority Permitting Program - provides an expedited permit review in the Planning Department, Department of Building Inspection, and Department of Public Works.
- San Francisco's Rainwater Harvesting Rules - Homeowners are able to legally disconnect their downspouts and use rainwater for non-potable purposes both inside and outdoors.
- Resource Efficiency Requirements and Green Building Standards Ordinance - requires all city building projects (new construction and major renovations over 5,000 square feet) to achieve LEED Silver certification from the U.S. Green Building Council.
- Resource Conservation Ordinance - bans the purchase or use of products that contain polyvinyl chloride (PVC) by city departments when non-chlorinated plastic alternatives are available.
- Tropical Hardwood and Virgin Redwood Ban - prohibits the city from purchasing and using wood from tropical rainforests and virgin redwood products.
- Arsenic-Treated Wood Ban - prohibits the city from purchasing and using wood that is treated with arsenic-based wood preservatives
- 2005 Residential Green Building Resolution - endorses the California Model Green Home Building Guidelines.
- The San Francisco Department of Public Works (DPW) tackles ongoing projects like Graffiti Watch, Community Corridor Partnership, and Streetscape Improvement Projects, for improving the city's public right-of-way for all users.
- The livable city initiative: This program is comprised of three program areas: Reforming City Standards and Operations; Creating Great Public Spaces; and Empowering "Grassroots" Greening.
  - Reforming City Standards and Operations: The Livable City Initiative necessitates a green approach to how San Francisco will manage their

city infrastructure, ensuring that greening not only beautifies, but increases public safety, reduces noise and airborne pollution, cuts city maintenance costs, improves resource efficiency, reduces water consumption, and enhances the ability to manage wastewater.

- Creating Great Public Spaces: Since 2005, results from the Livable City Initiative have begun to dramatically improve the beauty, safety, and sustainability of streets, parks and plazas. Greening is now a core part of the everyday work of city departments, through smarter capital planning, maintenance partnerships, and the expansion of environmental priorities in project design and permitting.
- Empowering "Grassroots" Greening: The Livable City Initiative empowers residents and business with new programs that allow them to take the lead in greening efforts, and to make greening a gateway to neighbourhood development, jobs, public safety, and better health.

San Francisco Green Business Program

– The San Francisco Green Business Program helps business adopt environmental practices that are sustainable as well as profitable. This is achieved by setting stringent criteria, providing technical assistance, and publicly recognizing and promoting Green Businesses with a seal that enables customers to shop in keeping with their values.

Urban Nature:

The city counts itself lucky to be surrounded by natural wonders and resources, and feels a special responsibility to the care and preservation of every tree, animal, and open space in San Francisco through programs like the Landmark Tree Program.

Environmental Justice:

Closely with residents and businesses to make sure that the basic necessities of life-water, air, food, and shelter-are of the highest quality, the city's Environmental Justice program has committed itself to providing fundamental rights to a safe and healthy environment in every San Francisco community.

Sources

San Francisco Department of the Environment, 2004
Climate Action Plan for San Francisco: Local Actions to Reduce Greenhouse Gas Emissions
San Francisco, 2004

Environment department:
http://www6.sfgov.org/index.aspx?page=109

Site environment department:
http://sfgov.org/site/frame.asp?u=http://www.sfenvironment.org

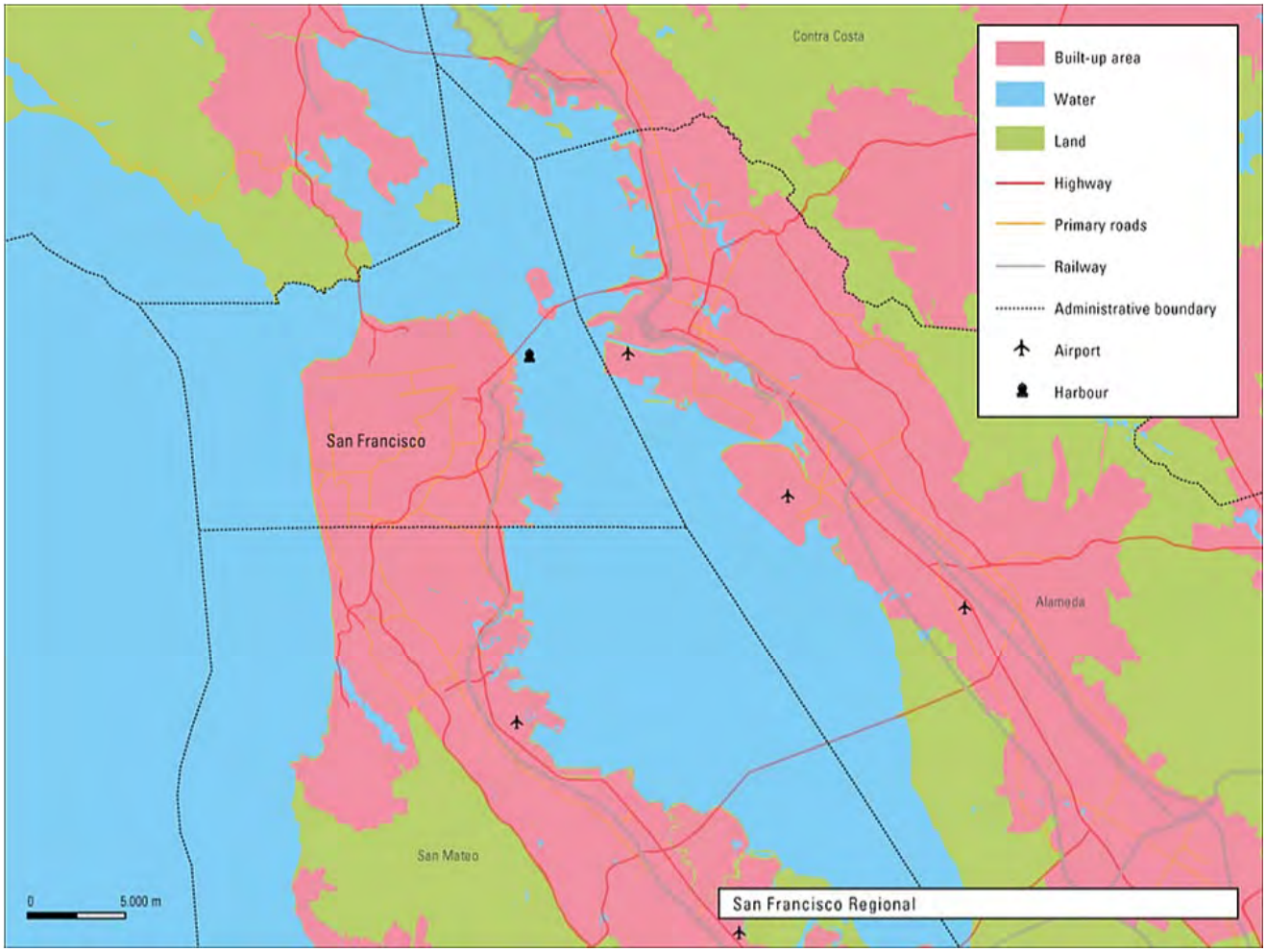
Our city policies:
http://sfgov.org/site/frame.asp?u=http://www.sfenvironment.org

D.5.3 Data

San Francisco				
General parameters				
Population (SF county)		2009	813,000 (estimation)	
	Change	*2000-2009*	*4%*	
		1990-2009	*11%*	
Households		2009	329,000 (estimation)	
	Change	*2000–2009*	*-2%*	
Density (SF city)		2009	6,700 (est.)	Inhabitants/km^2
	Change	*2000-2009*	*5%*	
Ecological parameters				
Total GHG emissions		2005	9.2	Million ton/year
		2009	6.7 (est.)	
	Change	*1990–2005*	*1%*	
		1990-2009	*-27%*	
Residential GHG emissions			N/A	Million ton/year
	Change	*N/A*	*N/A*	
GHG emissions/capita		2009	8.2	Ton
	Change	*1990-2009*	*-34%*	
Residential GHG emissions/capita			N/A	
	Change	*N/A*	*N/A*	
Residential energy use share		2007	57%	Gas
		2007	35%	Electricity
		2007	5%	Wood & Solar PV
		2007	3%	LPG
	Change	*N/A*	*N/A*	
Solid waste production		2008	740	Kg/capita/year
	Change	*2000–2008*	*-33%*	
Recycling		2007	72%	Including incineration
	Change	*N/A*	*N/A*	
Residential water use			259	Liters/capita/day
	Change	*No significant trend*		
Travel to work		2008	38%	By car
		2008	32%	By public transport
		2008	12%	By bicycle
	Change	*2000–2008*	*-25%*	*By car*
		2000–2008	*3%*	*By public transport*
		2000–2008	*9%*	*By bicycle*
Air quality trend - PM_{10}		2000–2008	-33%	
	Change	*N/A*	*N/A*	
Air quality trend – NO_x		2000–2008	-28%	
	Change	*N/A*	*N/A*	
Air quality trend – O_3		2000–2008	11%	
	Change	*N/A*	*N/A*	
Air quality trend – $PM_{2,5}$		2000–2008	-14%	
	Change	*N/A*	*N/A*	

D.5.4 Graphic material


San Francisco Regional


Contra Costa
Built-up area
Water
Land
Highway
Primary roads
Railway
Administrative boundary
Airport
Harbour
San Francisco
Alameda
San Mateo
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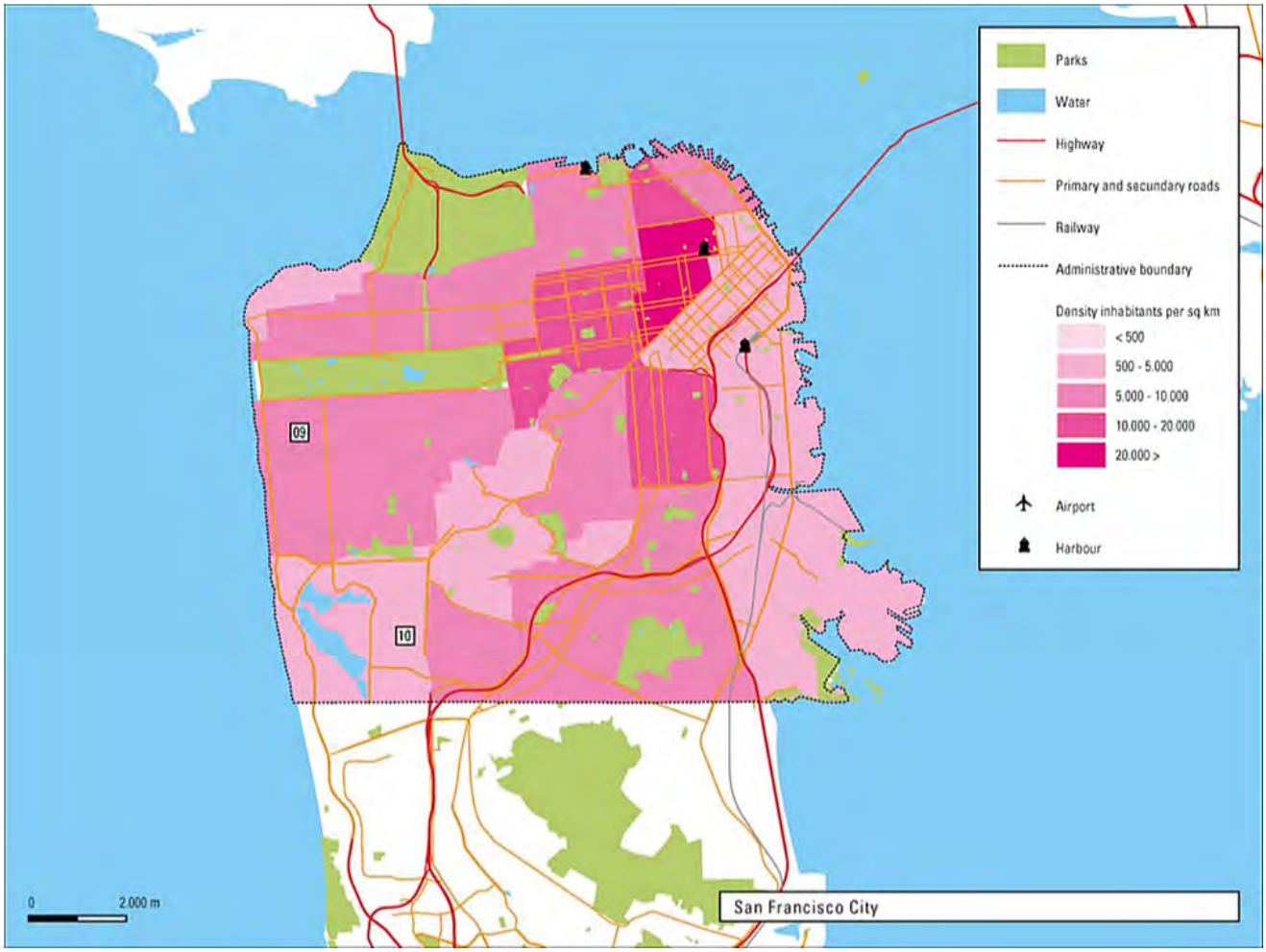
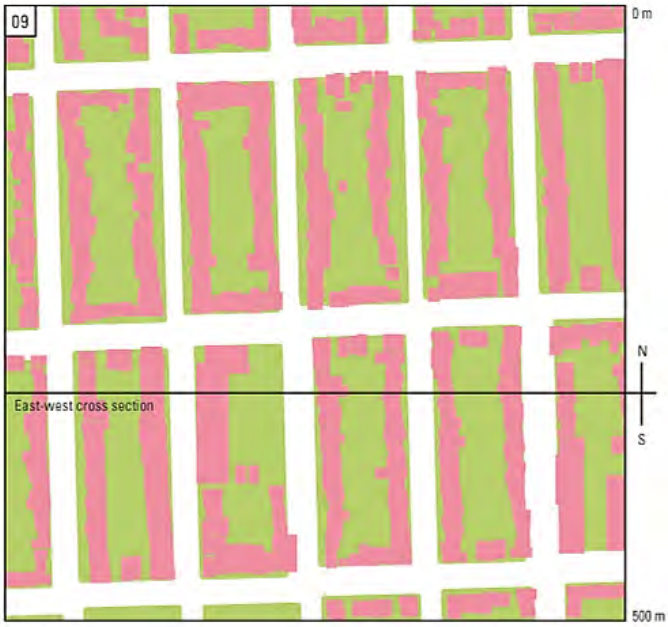
San Francisco Regional


09
10
San Francisco City


Parks
Water
Highway
Primary and secundary roads
Railway
Administrative boundary
Density inhabitants per sq km
< 500
500 - 5.000
5.000 - 10.000
10.000 - 20.000
20.000 >
Airport
Harbour
09
10
0
2.000 m
San Francisco City



Built-up area
Water
Green
Paved surface

TYPOLOGY
attached homes with private garden

BUILT-UP AREA
34%

WATER
0%

GREEN
33%

PAVED SURFACE
33%

POPULATION DENSITY (per sq km)
5.000 - 10.000 inhabitants

41st Ave, San Francisco-high density

Built-up area
Water
Green*
Paved surface

* 5% of the green area is subtracted for the sidewalks and paved walkways

TYPOLOGY
community apartments

BUILT-UP AREA
21%

WATER
0%

GREEN
57%

PAVED SURFACE
22%

POPULATION DENSITY (per sq km)
500 - 5.000 inhabitants

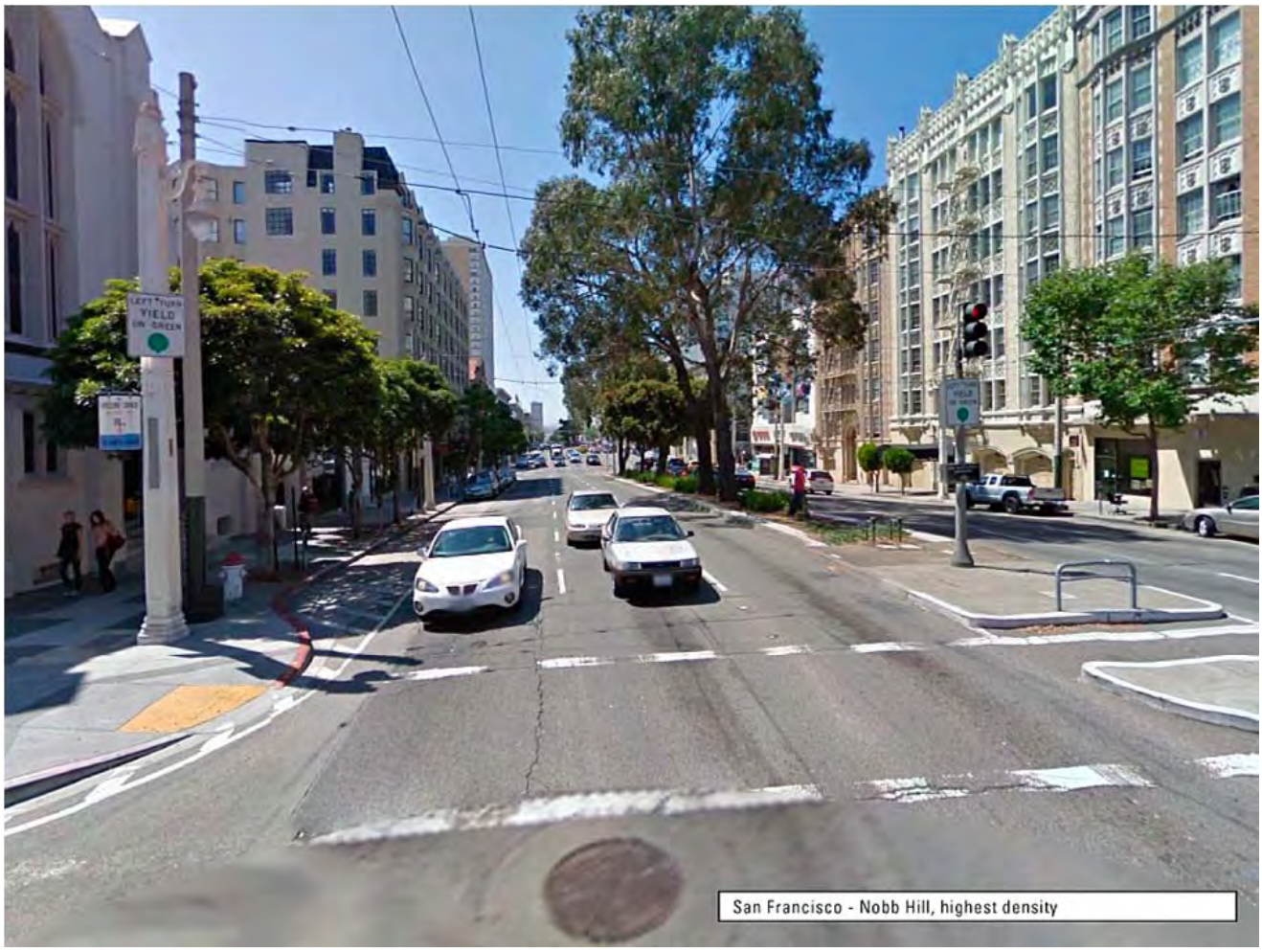
Holloway Ave, San Francisco-low density

TALLEST BUILDINGS

Transamerica Pyramid	260 m
555 California Street	237 m
345 California Center	212 m
Millennium Tower	197 m
One Rincon Hill South Tower	195 m

San Francisco Skyline

San Francisco - Sea Cliff, lowest density



San Francisco - Nobb Hill, highest density

San Francisco, park(ing) day

D.6 Vancouver

D.6.1 Goals

Becoming the world's greenest city by 2020

Green economy, green jobs:
- Gain international recognition as a Mecca of green enterprise.
- Eliminate dependence on fossil fuels.
- Lead the world in green building design and construction.

2020 target:
- Create 20.000 new green jobs.
- All new constructions are carbon neutral; improve efficiency of existing buildings by 20%.
- Reduce GHG emissions by 33% from 2007 levels.

Greener communities:
- Make walking, cycling, and public transit preferred transportation options.
- Create zero waste.
- Provide incomparable access to greenspaces, including the world's most spectacular urban forest.
- Achieve a one-planet ecological footprint.

2020 target
- Make the majority of trips (> 50%) on foot, bicycle, and public transport.
- Reduce solid waste per capita going to landfill or incinerator by 40%.
- Every person lives within a 5 minute walk of a park, beach, greenway, or other natural space; plant 150,000 additional trees in the city.
- Reduce per capita ecological footprint by 33%.

Human health:
- Enjoy the best drinking water of any mayor city in the world.
- Breathe the cleanest air of any major city in the world.
- Become a global leader in urban food systems.

2020 target
- Always meet or beat the strongest of B.C., Canada, and World Health.
- Organization drinking water standards; reduce per capita water consumption by 33%.
- Always meet or beat World Health Organization air quality guidelines, which are stronger than Canadian guidelines.
- Reduce the carbon footprint of the food by 33%.

D.6.2 Policy and projects

Over the years the City of Vancouver has been dedicated to becoming more environmentally responsible by incorporating sustainability into all its city operations as well as city services.

Green economy capital:

20.000 new green jobs
- The green building code will inspire the next generation of architects, designers, engineers, and building professionals.
- Building and operating the public transit infrastructure needed to meet the mobility goals will create many more jobs.

- Initiatives to boost the production and consumption of local food, plant 150,000 trees, increase recycling and composting will all create green jobs.

Reduce GHG emissions by 33% from 2007 levels

- Vancouver benefits from the provincial government's requirement that all electricity be carbon neutral, and the carbon tax, if it proves effective in reducing emissions.
- Building and vehicles produce more than 85% of Vancouver's GHG emissions and the overarching issue that affects emissions from both buildings and vehicles is density. The activities of the Ecodensity program[3], related to increasing environmental sustainability while increasing density, are a step in the right direction. The city council recent approved laneway housing (The laneway house would be a small house in the backyard where the garage is now; it could be added by a homeowner while keeping the existing house).

All new constructions carbon neutral and improve efficiency of existing buildings by 20%

- The city has a Green Homes Program for one and two family dwellings. On June 26, 2008 city council unanimously approved changes to the Vancouver Building By-law and how has the greenest building code in North America for new houses.
- Solar Hot Water Incentive for New Homes : The City of Vancouver, SolarBC, Terasen Gas and Off setters are offering an incentive of $ 3,500 - roughly 50% of the cost of a solar hot water system - to people building new homes in Vancouver. It will be available to 50 homes on a first come, first served basis starting in January 2010.
- Passive Design Toolkits: The city has developed and approved two passive design toolkits detailing ways to reduce energy use in new buildings.
- Proposed Renovation By-law: In January 2010, City of Vancouver staff will be going to Council with a proposed green renovation by-law.
  How is the city addressing green renovations?
  - Inform the Community: Provide education and develop resources explaining green renovation strategies and the associated environmental and personal benefits.
  - Amend the Building Code: Amend the Existing Buildings portion of the Vancouver Building By-law (the building code) and other by-laws that interface with renovation projects. This will set a minimum energy performance standard and increase the quality of the existing houses.
  - Take Advantage of Existing Incentives: Ensure the proposed green strategies allow homeowners to get money back or reduce costs through Municipal, Provincial, Federal and Utility Provider incentive programs.
  - Mandate Energy Audits: Energy audits act as public education tools, and provide statistical information to the city to help guide future sustainable initiatives. An energy audit is an evaluation of your home's energy use. Getting an energy audit makes the renovation eligible for government incentive program. EnerGuide is a program funded by the Federal Government, and administered by Natural Resources Canada.
- The City of Vancouver is implementing a Green Building Strategy (GBS)for all commercial, institutional, mixed-use, and high density residential buildings in the City of Vancouver. The GBS is one of many green building initiatives currently underway to reduce the environmental impacts of

[3] EcoDensity is the product of over two years of creative thinking and challenging public debate on how density, design, and land use can contribute to environmental sustainability, affordability, and livability.

buildings and related infrastructure, others include Green Homes, EcoDensity, SEFC and major re-zonings.
- There are initiatives to pilot an innovative "On-Bill Financing" program, but this is not effective yet.
- Vancouver demonstrated leadership in green buildings through its commitment to achieving LEED gold for new municipalities.

Greener communities:

Make the majority of trips (> 50%) on foot, bicycle, and public transport
- The City of Vancouver maintains approximately 2,100 kilometres of sidewalk. Each year the city installs upwards of 200 pedestrian ramps adjacent to "accessible" bus stops and along arterial streets, pedestrian collector routes, and local residential streets. Currently, the city has completed approximately 20,000 corner ramps and is working to complete curb ramps for the entire city.
- Besides making all streets more accessible and safe, the city is also establishing corridors dedicated exclusively to pedestrians, such as pedestrian corridors during the Olympics and along greenways. Already there are 65 kilometres of Greenways in Vancouver.
- Expanding the Bicycle Network. Over the past ten years, the Bicycle Network has more than doubled in size, and cycling is the fastest growing type of transportation in the city.
- The aim is to continue to provide convenient, efficient facilities for cyclists and to encourage more people to ride their bicycles for day-to-day transportation and leisure.
- The city, in partnership with TransLink (the Coast Mountain Bus Company), manages and upgrades transit operation within the city. Ongoing programs include:
  - Bus priority measures which include bus lanes, bus bulges, special roadway surfaces and transit signals location of bus stops to upgrade on-street bus operation and transit customer service.
  - Installation of concrete passenger areas and concrete areas for accessible transit service operations.
  - Implementation of new transit routes.
  - Coordination of on-street construction to facilitate transit operation.
- There are initiatives for road pricing, and tolls being imposed on Metro Vancouver's bridges to finance transit improvements. This is not effective yet.
- Vancouver endorses the provincial government's clean fuel regulations, the federal government's commitment to higher fuel efficiency standards for vehicles, and incentives offered by governments for the purchase of smaller, cleaner, more efficient vehicles.

Reduce solid waste per capita going to landfill or incinerator by 40%
- Vancouver is committed to the Zero Waste Challenge.
- Vancouver lacks the statutory authority to enforce a ban on certain materials like plastic bags and polystyrene foam etc., so the provincial government should be pressured to either impose a province-wide ban or amend Vancouver charter to allow the city to act on its own.
- Reducing the household waste and help the environment by composting at home. Composters are available to City of Vancouver residents for $ 25 each, including taxes (about half cost).
- In 2003, the City of Vancouver upgraded the landfill facility to make the best use of landfill gas. The city partnered with Maxim Power Corp who built a system to utilize the landfill gas. It is collected, then cooled to remove water and siloxanes prior to being piped to a powerhouse. At the

powerhouse, landfill gas is converted to electricity. Waste heat from the engines is collected in the form of hot water and utilized in nearby Hot House Growers' Village Farms greenhouses. Additional gas collection wells are installed as more waste is placed in the landfill. Over the next 20 years the City of Vancouver will receive $ 250,000 to 300,000 in energy revenues each year, which will offset the cost of operating the landfill gas control system.

Every person lives within a five minute walk of a park, beach, greenway, or other natural space; plant 150.000 additional trees in the city

- Strategic partnerships with key organizations organizations - e.g. the Nature Conservancy of Canada, Land Trust Alliance of BC, Evergreen Foundation, the Vancouver Foundation, Nature Trust of BC, and Vancouver Natural Heritage Society.
- Vancouver could also lobby the provincial government to raise the ceiling on parkland dedication (the amount of land a developer must convey to the city for parkland or other recreational purposes).

Reduce per capita ecological footprint by 33%

- Demonstrate leadership (high green standards for municipal buildings and the early adoption of clean vehicle technology).
- Communication: The city's communication efforts - such as "One Day Vancouver" - is promoting the goal of becoming the world's greenest city and engaging citizens to participate in the endeavour.

Greener communities:

Always meet or beat the strongest of B.C., Canada and WHO drinking water standards; reduce per capita water consumption by 33%

- Vancouver phased out the sale of bottled water at city hall and other civic facilities.
- Vanvouver builded a $ 600 million Seymour/Capilano Filtration Plant, which includes using ultraviolet light (UV) for disinfection, should help eliminate turbidity problems and reduce the use of chlorine.
- Implement universal water metering and volume based pricing.
- Strengthening water efficiency requirements in the Vancouver Building Code (for both new construction and renovations).
- Tested and approved high performance water saving technologies; and, purple pipes (a second set of plumbing that uses rainwater and recycles water from dishes, washing, and showers) in all new buildings.
- Rebates for the purchase of water efficient fixtures.
- Increased social marketing and public education.
- Stimulate a greater use of rainwater.
- Water efficiency audits, including a proactive leak detection program; and,
- Increased enforcement of water conservation by laws, including sprinkler restrictions.

Always meet or beat World Health Organization air quality guidelines, which are stronger than Canadian guidelines

- Many of the actions aimed at making Vancouver one of the world's first fossil fuel free cities also will have positive effects on air quality.
- Smart land-use decisions, increases in walking, cycling, and public transit use, as well as a shift towards cleaner fuels, cleaner and more efficient vehicles, and greater use of rail will all decrease air pollution.
- To demonstrate global leadership in air quality, Vancouver will have to measure its performance against World Health Organization guidelines for air quality rather than the relatively weak Canadian guidelines.

Reduce the carbon footprint of the food by 33%

- Vancouver already supports and promotes local food through farmers markets, community gardens, and events that connect producers and consumers.
- The City of Vancouver is focussing on policy and regulatory resources on the following key areas:
  - Green roofs, which can be used to grow food and provide many other environmental benefits, require supportive policies and regulations.
  - Institutional low-carbon purchasing policy for Vancouver and city events; Building on Vancouver's ethical purchasing policy, the development of a low-carbon purchasing policy that includes food would boost demand for low-carbon products and invest in the local economy.
  - Advocating for the preservation of agricultural lands in Metro Vancouver and the Fraser Valley.
  - Development requirements for community garden set-asides, food processing and storage (e.g. community kitchens), and small-scale food retail in new and retrofit developments. And
  - Edible landscaping policy requiring city facilities to include at least 25 per cent edible landscaping (on green roofs, for example).

Sources

Robertson, G. et al., 2009
Vancouver 2020 a bright green future; An Action Plan for Becoming the World's Greenest City by 2020
Vancouver, 2009

City of Vancouver:
http://vancouver.ca

Greenest City:
http://vancouver.ca/greenestcity/

City operations:
http://vancouver.ca/sustainability/sustainable.htm

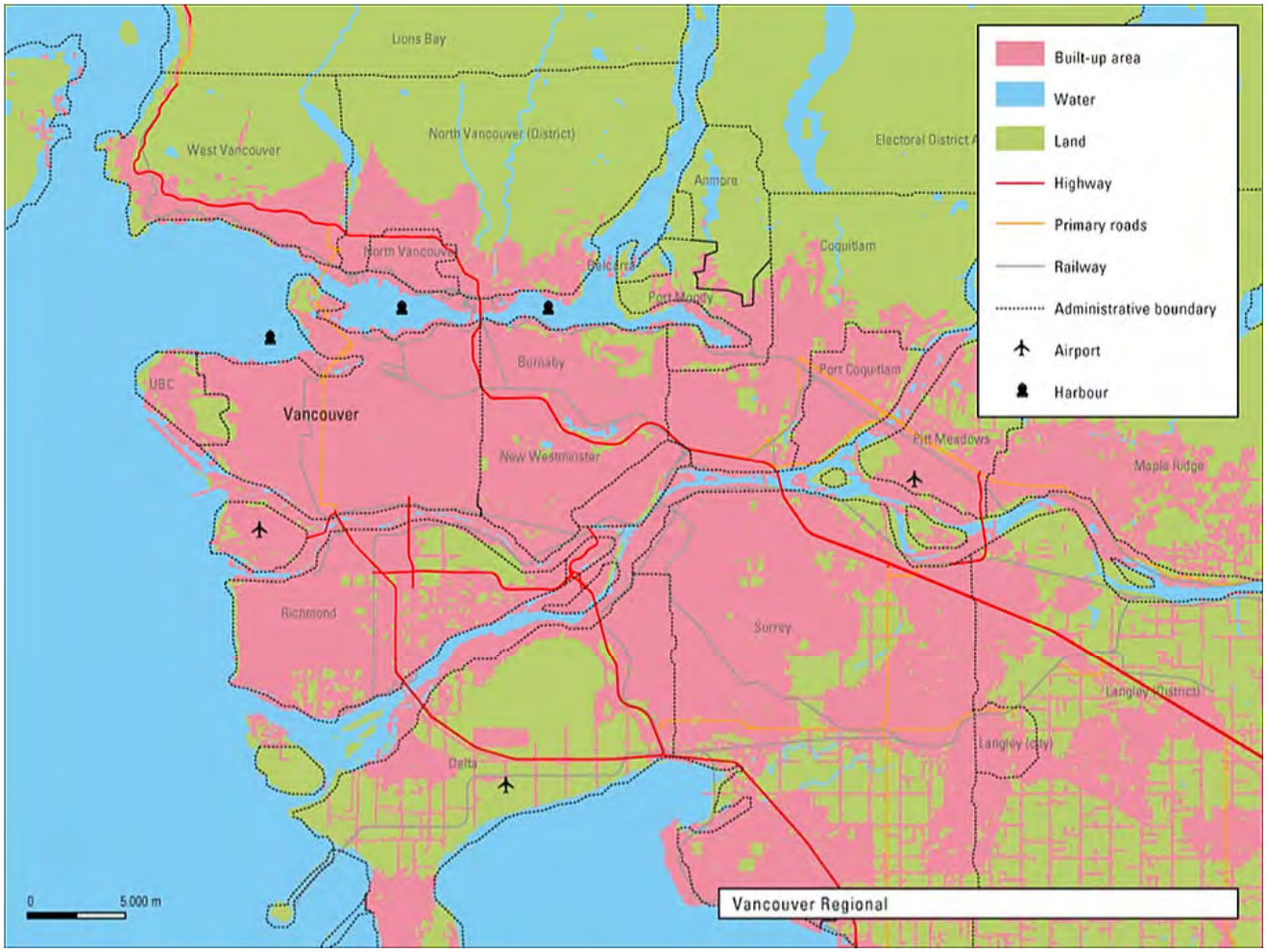
Mandate:
http://vancouver.ca/sustainability/about_principles.htm

D.6.3 Data

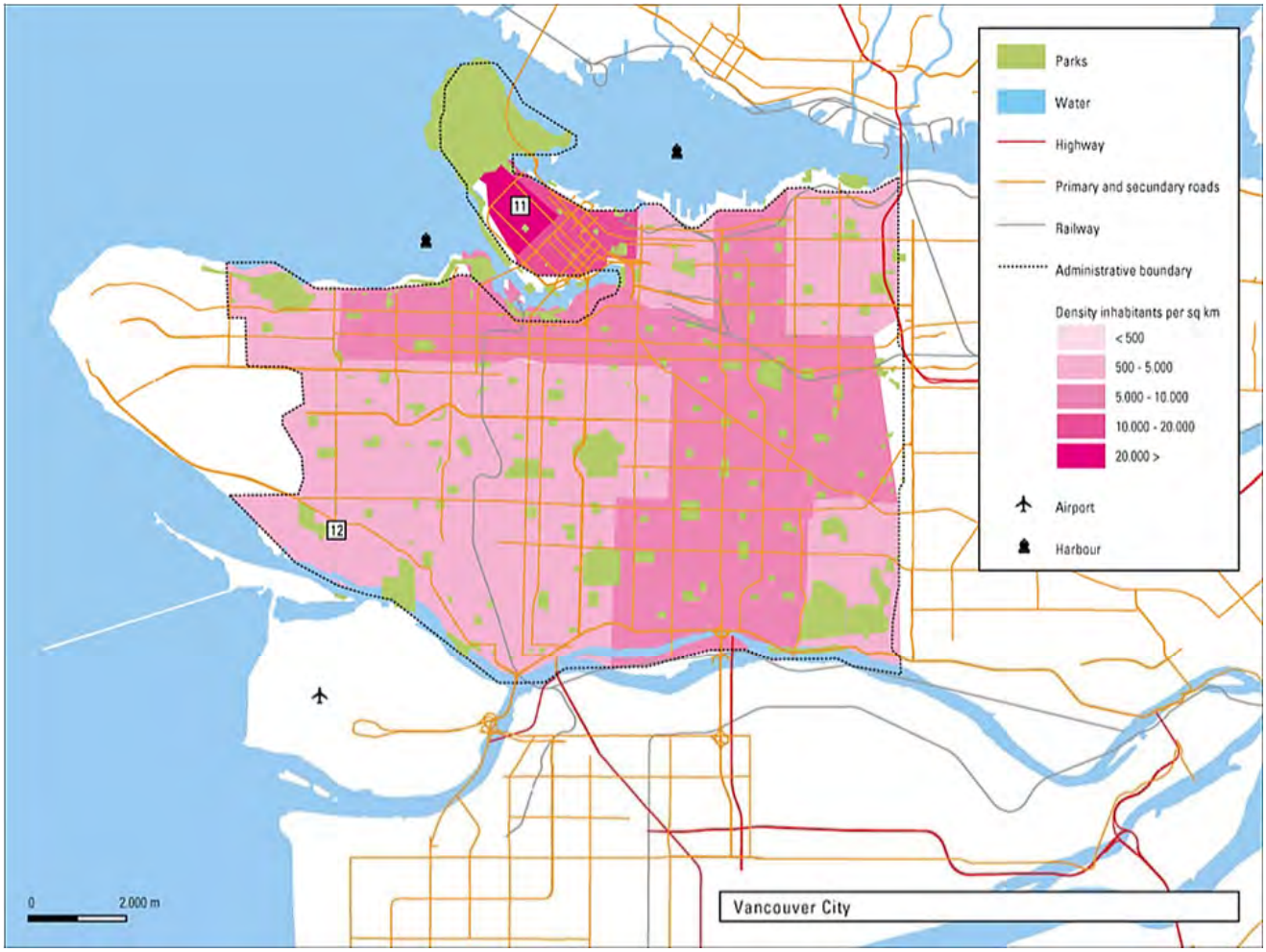
Vancouver				
General parameters				
Population		2006	578,000 (estimation)	
	Change	*2000-2006*	*6%*	
		1990-2006	*24%*	
Households		2006	253,000 (estimation)	
	Change	*2000–2006*	*7%*	
Density		2006	4,980 (est.)	Inhabitants/km^2
	Change	*N/A*	*N/A*	
Ecological parameters				
Total GHG emissions		2006	2.8	Million ton/year
	Change	*1990–2006*	*5%*	
Residential GHG emissions			1.6	Million ton/year
	Change		*3%*	
GHG emissions/capita		2009	4.9	Ton/year
	Change	*1990-2009*	*-18%*	
Residential GHG emissions/capita			2.7	Ton/year
	Change		*-16%*	
Residential energy intensity BC				
	Change	*2000–2007*	*-6%*	*GJ/household*
Residential energy use share		2007	46%	Gas
Canada		2007	41%	Electricity
		2007	6%	Renewables/waste
		2007	7%	Oil
	Change	*N/A*	*N/A*	
Solid waste production		2006	594	Kg/capita/year
	Change	*2001–2006*	*-13%*	
Recycling		2007	55%	
	Change	*2000–2007*	*20%*	
Residential water use BC			448	Liters/capita/day
	Change	*No significant trend*		
Travel to work trend		1996-2005	-10%	By car
		1996-2005	20%	By public transport
		1996-2005	180%	By bicycle
		1996–2005	44%	By foot
	Change	*N/A*	*N/A*	
Air quality trend – NO_2		2000–2006	-11%	
	Change	*N/A*	*N/A*	
Air quality trend – $PM_{2,5}$		2004–2007	-32%	
	Change	*N/A*	*N/A*	

D.6.4 Graphic material

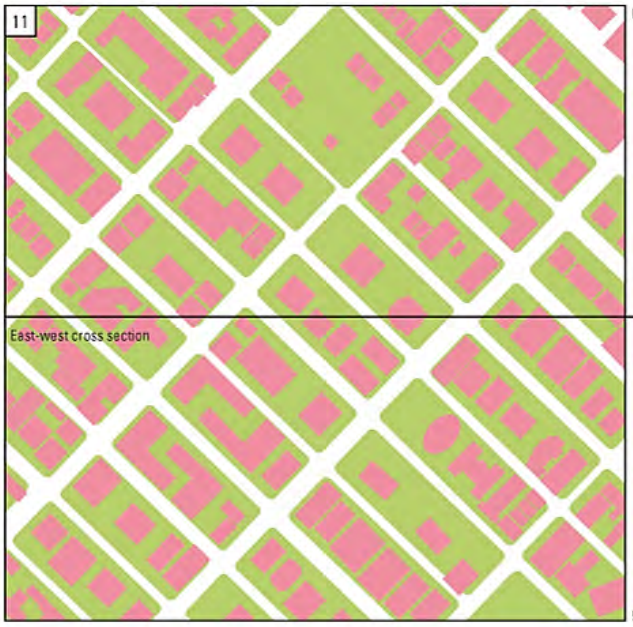

0
5 000 m
Vancouver Regional


Lions Bay
West Vancouver
North Vancouver (District)
Electoral District A
Anmore
North Vancouver
Coquitlam
Port Moody
Burnaby
Port Coquitlam
UBC
Vancouver
New Westminster
Pitt Meadows
Maple Ridge
Richmond
Surrey
Langley (District)
Langley (city)
Delta
Built-up area
Water
Land
Highway
Primary roads
Railway
Administrative boundary
Airport
Harbour
0
5 000 m
Vancouver Regional


11
12
Vancouver City


Parks
Water
Highway
Primary and secundary roads
Railway
Administrative boundary
Density inhabitants per sq km
< 500
500 - 5.000
5.000 - 10.000
10.000 - 20.000
20.000 >
Airport
Harbour
11
12
0
2.000 m
Vancouver City

11



Built-up area
Water
Green*
Paved surface

* 5% of the green area is subtracted for the sidewalks and paved walkways

BUILT-UP AREA
30%

WATER
0%

GREEN
38%

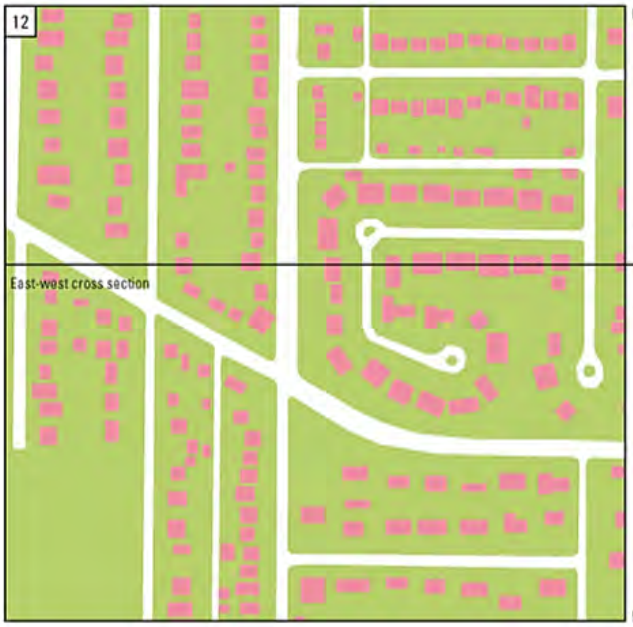
PAVED SURFACE
32%

POPULATION DENSITY (per sq km)
20 000 > inhabitants

TYPOLOGY
high rise apartments

Barclay Street, Vancouver-high density

12



Built-up area
Water
Green
Paved surface

BUILT-UP AREA
14%

WATER
0%

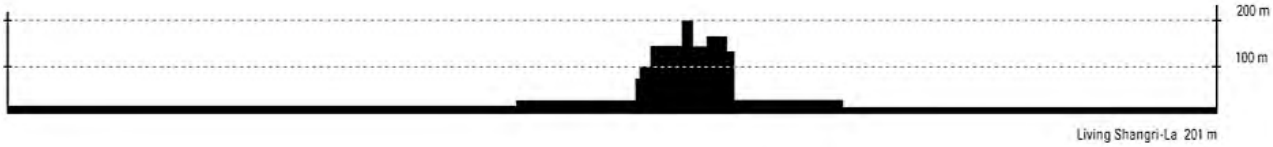
GREEN
71%

PAVED SURFACE
15%

POPULATION DENSITY (per sq km)
500 - 5 000 inhabitants

TYPOLOGY
single family homes

SW Marine Drive, Vancouver-low density



TALLEST BUILDINGS

Living Shangri-La	201 m
One Wall Centre	150 m
Shaw Tower	149 m
Harbour Centre	146 m
Royal Centre	141 m

Vancouver Skyline

Vancouver - West End, highest density

Vancouver - Shaughnessy, lowest density

Vancouver, Olympic Village (South East False Creek)