CARBON DISCLOSURE PROJECT

Seven Climate Change Lessons from the Cities of Europe

CDP Cities 2012

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Foreword

“The adaptation challenge for Europe is a reality”

20 years ago, ‘Agenda 21’ was adopted at the Earth Summit in Rio. It reaffirmed the improvement of our knowledge base as a key element for environmental decision-making. Citizens around Europe have been active at the local level in implementing this action plan to support sustainable development over the years. We have greatly improved our understanding of the earth’s atmosphere at the same time. We have also begun to recognise that we have to start adapting to our changing climate immediately, while maintaining our efforts to reduce greenhouse gas emissions. Challenges such as heat waves, flooding and water scarcity are expected to be faced in European regions that did not experience similar phenomena before. Acting early at local level will allow us to reduce costs, to respond appropriately and ultimately to improve the quality of our lives.

The European Union supports the development of adaptation strategies. The European Environment Agency (EEA) published a comprehensive report on urban adaptation in Europe in May. The Agency also presented together with the European Commission CLIMATE-ADAPT (http://climate-adapt.eea.europa.eu/), a tool enabling those involved at a local level in adaptation strategies and policies to share knowledge on their efforts. The European Commission recently initiated a complementary project, building local capacities on adaptation (http://eucities-adapt.eu/). Full implementation of European environmental legislation will be needed if we are to tackle climate change and its impacts. Information reported under law allows us to track progress on the effects of environmental policies whilst voluntary disclosure of information, as provided with this report, contributes to understand what works and what doesn’t when European legislation is implemented locally, helping also to complement our overall picture.

The European Environment Commissioner last year proposed that the EEA and the European Commission should collaborate on pilot projects on implementation. One of the pilot projects will look into the knowledge base on the implementation of air legislation. Eight cities across Europe will carry out the ‘air pilot’. Together we will assess different aspects of controlling air pollution at the city scale, such as the ability of emission inventories at the local level to inform the development of air quality management plans, the siting of monitoring stations and the development of air quality trends.

Smart mitigation measures implemented at a local level can achieve co-benefits, keeping our air clean and fighting climate change. I am therefore particularly pleased to see that several cities participating in the ‘air pilot’ contributed to this year’s CDP Cities Europe report. This report and the air pilot will allow these cities and their citizens to better understand their local environment without losing sight of the global challenges we face.

Prof. McGlade
Executive Director of the European Environment Agency

Foreword

“European cities are leading the way in taking action on climate change adaptation and mitigation”

With its regional focus, this report is the first of its kind for CDP. Of the 73 cities that responded to CDP’s global information request, 22 are European and their responses form the basis of this report. Despite the current economic climate, European cities are leading the way in taking action on climate change adaptation and mitigation, and many best practice examples can be drawn from city responses. From London’s annual city-wide greenhouse gas emissions inventory to Rotterdam’s efforts to attract new types of green commerce to the city, European cities are coming up with innovative solutions in the face of climate change. Of the 22 European cities that responded to this year’s information request, 82% have set city-wide emissions reductions targets.

This report provides an opportunity not only for interested parties to gain insight into city actions on climate change, but also for cities to learn from their European peers. As noted by Benjamin Barber, ““Cities share so many challenges, functions and purposes...It is vital that mayors and their staffs understand not just what they share with other cities, but the challenges they face from a distinctive global environment that include pandemics, climate change, global financial markets, immigration and terrorism.” By communicating openly about their reactions to climate change-related challenges, European cities provide a blueprint for others to learn how to manage climate change, and to work on understanding these challenges from their own individual city perspectives.

This year CDP is delighted to partner with Accenture SpA, a global management consulting, technology services and outsourcing company. In addition to Accenture’s global partnership with CDP, Accenture SpA is a strategic partner in Italy for the second time this year. Accenture SpA’s expertise in Smart Cities makes them especially well-equipped to analyse and draw key findings from the European city responses.

Paul Dickinson
Executive Chairman, CDP

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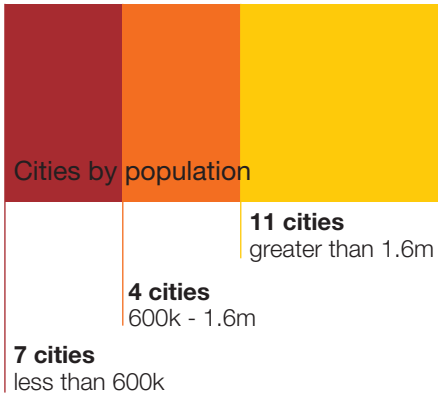


Executive summary

European cities have shown a strong commitment to climate change action. The EU's Covenant of Mayors agreement now counts over 4,000 signatories. Each signatory pledges to utilise renewable energy and implement energy efficiency measures, with the goal of meeting or exceeding the EU's GHG reduction target of 20% reduction by 2020. In addition, European cities have had an impact on global climate change efforts. The C40 Cities Climate Leadership Group, an organisation of cities dedicated to reducing GHG emissions, was founded by London Mayor Ken Livingstone in 2005. C40 currently counts 17 member cities in Europe, more than in any other region of the world, comprising 29% of total C40 membership.

Furthermore, these commitments have translated into action. Twenty-two European cities report to CDP in 2012, and of these, 82% have set a city-wide reduction target, compared to the global average of 70% across all cities. Two-thirds of reporting European cities engage with their suppliers on climate change, compared to 47% across all cities. Across all regional groupings of cities reporting to CDP in 2012, European cities outperform in many categories[1].

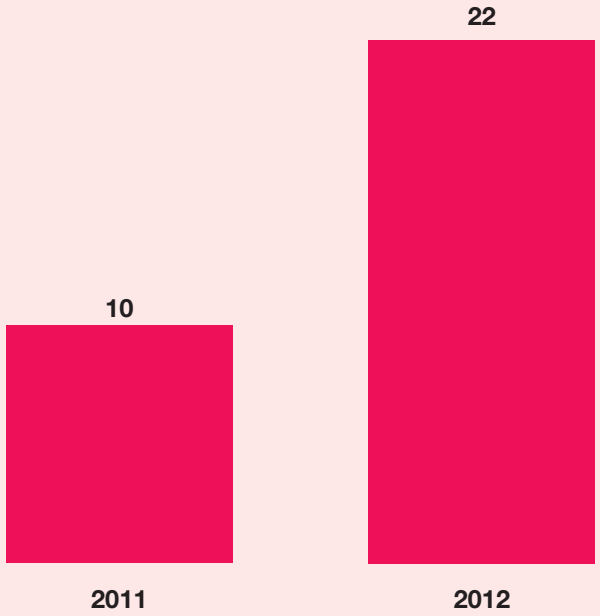
This action—and Europe's historic growth patterns—means that European cities are squeezing more wealth out of every tonne of GHG emitted. Analysis by AECOM and CDP in a recent report showed that European cities are more economically efficient per tonne of GHG emitted than North American cities. European cities manage to produce $9,200 US dollars (€7,247) worth of economic activity per tonne of GHG, while North American cities report just over half that amount[2]. In a world where, according to UNFCCC Executive Secretary Christiana Figueres, "every tonne of carbon from now until 2020 has to grow at least five times in its economic output," the efficiency displayed by European cities is important.

A number of factors underpin the leadership of European cities. First, Europe is one of the most highly developed regions on earth, with an average per capita GDP of $32,000 dollars (€25,204)[3]. In addition, the European Union has been aggressive in pushing for climate change action.

Europe was the first region to establish an emissions trading scheme for high-emitting facilities, and the EU has passed legislation aimed at everything from improving the region's installed base of renewable energy to increasing the number of compact fluorescent lights (CFLs) in houses. Emissions for the EU have steadily declined over the last decade, and the region is on target to meet its commitments under the Kyoto Protocol[4]. These factors all support climate change leadership by city governments in Europe.

This report presents and examines seven actions that leading European cities are taking to manage climate change in their cities. The data is based on the responses of 22 European cities and local governments to CDP in 2012.

1 NUMBER OF EUROPEAN CITIES REPORTING TO CDP, BY YEAR



2 KEY METRICS FOR REPORTING EUROPEAN CITIES

	EUROPE	ALL CITIES
Number of cities	22	73
Report municipal emissions	27%	45%
Report city-wide emissions	82%	70%
Report city-wide reduction targets	82%	62%
Report verified emissions	36%	19%
Engage with suppliers on climate change	64%	47%

These seven best practice actions are:

1. Measuring and reporting emissions annually: 50% of European cities are measuring their city-wide emissions annually. Annual measurement is already considered best practice in the private sector; these cities are following a similar track.

2. Setting targets: Setting GHG emissions reduction targets has become mainstream in leading European cities. 82% of reporting cities say that they are setting targets for reduction of their greenhouse gas emissions.

3. Reducing GHG emissions: One of the key goals of climate action is for a city to demonstrate year-on-year reduction of emissions at a city-wide level. Two European cities show GHG reductions from their last CDP response—London and Copenhagen.

4. Completing risk assessments: Climate change risk assessment is another key area of climate action of cities, and one that has become mainstream in Europe. 77% of cities have completed or are in the process of completing risk assessments to understand how climate change will affect their local jurisdictions.

5. Developing an adaptation plan: Once the risks have been identified, cities are moving to establish action plans to adapt. 64% of reporting cities (14) report that they have an adaptation plan, and two additional cities are in the process of developing these plans.

6. Using sustainability to drive competitiveness: European cities show high awareness of the economic opportunity from climate change. Thirteen cities (59%) anticipate that addressing climate change will lead to development of new business industries in their cities.

7. Extending the city's reach through voluntary agreements: An emerging trend is the establishment of voluntary agreements between the city and private sector companies. A small number of leading cities are utilizing voluntary agreements with local businesses to further the city's climate protection goals.

1. For a detailed look at all cities who reported to CDP in 2012, see Measurement for Management: CDP Cities Global Report 2012. Available at www.cdproject.net
2. Analysis includes North American and European cities who reported to CDP in 2012.
3. http://data.worldbank.org/data-catalog
4. European Environment Agency http://www.eea.europa.eu/pressroom/newsreleases/higher-eu-greenhouse-gas-emissions.

1. Measuring and reporting emissions annually

A critical part of climate change action for cities is to understand the city's individual contribution to the accumulation of greenhouse gases in the atmosphere. This analysis can be a difficult exercise. City governments must, for instance, track two separate but parallel inventories—emissions from municipal government operations and emissions from the geographic city as a whole (known as city-wide or community emissions). City-wide emissions in particular present multiple challenges, primarily around data collection. City-wide inventories include multiple sources that are not owned by the city, making reliable data sometimes difficult to find. It is a further challenge to update this labour-intensive inventory every year.

Despite the challenges, completing an annual emissions inventory has become best practice in many European cities. Eleven out of 22 cities (or 50%) say that they are now measuring city-wide emissions annually. Four cities measure and report new city-wide emissions inventories from last year's CDP process: Copenhagen, London, Berlin, and Rotterdam. These four cities—all C40 members—have embarked on a process of annual measurement and reporting that is best practice in carbon management.

London's annual inventory, called LEGGI (The London Energy and Greenhouse Gas Inventory), is a database of geographically referenced datasets of energy consumption within the Greater London area. The methodology is based on reporting guidance from the UK national government and from the GHG Protocol[5].

Rotterdam's inventory is part of a wider process for dealing with sustainability goals. Alongside GHG emissions, Rotterdam's efforts also cover air quality, noise and other environmental topics. The deputy mayor responsible for this program has delegated the day to day governance to a city official, the Sustainability Director. This Director provides an official project progress report three times per year to the city government. The program's impacts (CO_2 reduction, air quality indicators, sustainable investments, noise complaints) are monitored and reported in an annual report.

5. The GHG Protocol is jointly published by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). See www.ghgprotocol.org

"During working days, Rome has about 7.1 million trips (about 6.15 million made by residents). Each resident makes 2.4 trips per day"

Rome

How to Measure City-Wide Emissions

While a large number of European cities are measuring city-wide emissions, the methodologies that they follow remain varied. The most common methodology reported was "Other" (seven cities), followed by six cities who based their assessments on the IPCC's Guidelines for National Greenhouse Gas Inventories. The lack of standardisation in city measurement makes comparability between cities difficult.

However, as of this year, city governments now have access to a strong, clear methodology for measuring city-wide GHG emissions. On 14 May 2012, C40 and ICLEI (Local Governments for Sustainability) in collaboration with the World Resources Institute (WRI) and the Joint Work Programme of the Cities Alliance between the World Bank Group, UN-HABITAT, and UNEP announced the publication of the Global Protocol for Community-scale Greenhouse Gas Emissions (GPC). The GPC provides a consistent and transparent system for cities to plan for and finance climate change action. It will allow cities who have followed the GPC guidance to compare their emissions to other cities.

For more information about the GPC, please contact GPC@C40.com.

"Overall progress towards the objective of reducing GHG emissions is reported in the city's annual green account, which includes an inventory of the CO_2 emissions from the community"

Copenhagen

2. Setting targets

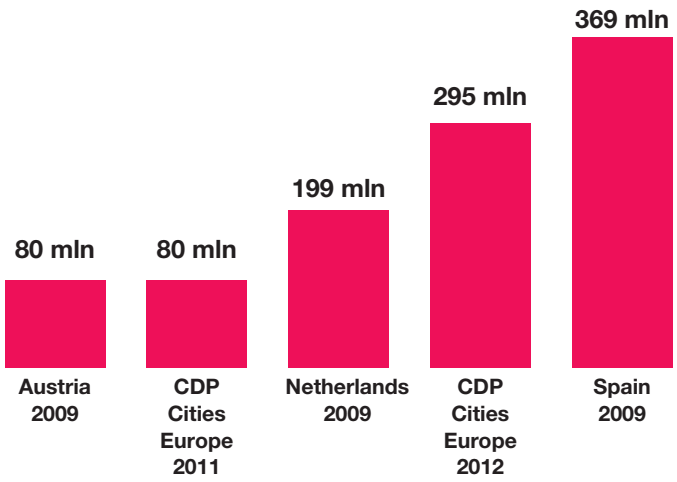
Winston Churchill believed in the power of setting goals to achieve objectives: “He who fails to plan,” he said, “plans to fail.” This quotation holds true even in the world of cities and climate change.

High-performing city governments set clear targets for reduction of GHG emissions and other indicators, then strive to meet those goals. Nearly three-quarters of the C40 Cities Climate Leadership Group, for instance, sets reduction targets for city-wide GHG emissions. And recent research from CDP and AECOM demonstrated that cities that set emissions reduction targets report three times as many emissions reduction activities as those that do not[6].

In Europe, city governments seem to agree with Churchill’s advice. 82% of cities (18) report setting targets for reducing city-wide emissions. These include aggressive goals, like Copenhagen’s 100% reduction target by 2025. Stockholm has set a target to be fossil fuel free by 2050, as well as a goal to avoid exceeding 3.0 tonnes of GHG emissions per capita between now and 2015.

The two German cities—Hamburg and Berlin—both report three separate targets, covering short, medium, and long term perspectives. Many cities mention the Covenant of Mayors as the driving force behind their target-setting.

4 **TOTAL EMISSIONS REPORTED BY EUROPEAN CITIES COMPARED TO REPRESENTATIVE EUROPEAN COUNTRIES (METRIC TONNES CO_2E)**



United Nations Framework Convention on Climate Change, Greenhouse Gas inventory data, detailed data by party. 2009. http://unfccc.int/di/DetailedByParty.do As seen on 15 June 2012.

6. Measurement for Management: CDP Cities Global Report 2012. Page 51.

"The Climate Change Work Programme was approved by Berlin's cabinet in July 2008. With this programme Berlin has committed itself to reducing its CO_2 emissions by more than 40 % by 2020 compared to the baseline of 1990"

Berlin

City to watch

Amsterdam is a leading sustainable city in Europe and has achieved impressive targets to date:

• Nearly 99% of over 1.4 million tonnes of processed waste every year is recycled;

• In the young, dynamic market of electric mobility, Amsterdam has taken a leadership position, with the planned rollout of 1,000 charging stations and the ambition of 10,000 electric cars by 2015;

• Amsterdam already has the highest density of charging points in the world, with 350 public charging stations in the city, 1000 by February 2013;

• The City of Amsterdam supported the policies and infrastructure behind Daimler's November 2011 launch of the 100% electric car sharing program car2go, involving investment in 300 electric cars available for daily use.

Based on an interview with Ger Baron, project manager within Amsterdam Innovation Motor (AIM)

"Only through coordinated and harmonised activities can we achieve the aim of carbon dioxide emissions reduced by 20% by 2020 in accordance with the Covenant of Mayors"

Warsaw

3. Reducing overall city-wide GHG emissions year on year

Annual measuring and reporting on GHG emissions allows cities to track their progress, adjust their strategies, and aim for a year-on-year reduction in GHG emissions. Indeed, while world GHG emissions continue to rise, some of the cities in Europe are showing reductions in city-wide emissions. Of the four cities that report new city-wide emissions inventories, two of them—Copenhagen and London—show reductions. London's emissions dropped by 3.6% between its 2008 inventory and its 2010 inventory, to 43,400,000 tonnes CO_2e. Copenhagen's emissions dropped 5.2% between 2009 and 2010, to 2,515,250 tonnes CO_2e.

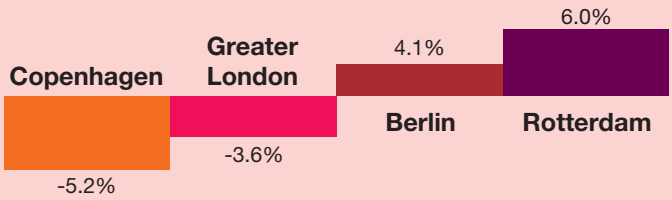
A wide range of activities across all sectors underpins London and Copenhagen's emissions reductions. In the buildings category, for example, London completed energy retrofits of 55,000 homes in April 2012. The city has set building standards for CO_2 performance that go beyond national building regulations. And Mayor Boris Johnson implemented a cycle hire scheme beginning in 2010, now featuring over 6,000 bicycles. Cycling, according to the Greater London Authority, "has doubled in the capital since 2000." Copenhagen's efforts also include energy efficiency and cycling, as well as transforming its wastewater into electricity. The city is in the process of considering major projects for the future, including developing a smart grid and decarbonising its energy supply.

It is important to note that it is extremely difficult for cities to show steady reductions every year. Population growth, economic activity, weather patterns, and other factors that are outside the city government's direct control can make it difficult, if not impossible, to show steady reductions in emissions. For instance, two other cities—Berlin and Rotterdam—show slight increases. However, both these cities are taking significant steps to reduce emissions[7]. Together Berlin and Rotterdam report seven individual actions to reduce emissions at the city-wide level. Both cities are core members of the C40 and leaders on climate change.

One city—Dublin—reports reductions in its municipal government operations emissions. Dublin's emissions for its municipal government operations fell 7.5% between 2009 and 2011. The city is working across multiple sectors to bring down its emissions, reporting 14 individual actions that are currently in effect, being piloted or being considered. The city council is expanding green space, creating and enforcing building codes, and piloting a number of energy efficiency retrofit initiatives.

7. For a case study on the challenges of annual reduction, see http://green.blogs.nytimes.com/2012/04/26/a-daunting-emissions-quest-for-u-s-cities/

5 CHANGE IN EMISSIONS REPORTED, BY CITY (% CHANGE 2011 VS 2012)

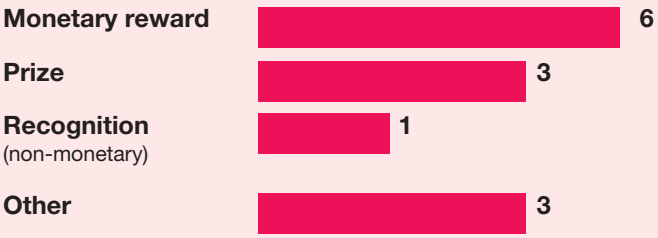


2011 and 2012 refer to the year the data were submitted to CDP. The actual reporting year varies by city.

"Emissions are calculated by a National Tool called the Carbon Management Tool provided by the Irish Environmental Protection Agency. It calculates its CO_2 emissions from the GHG Protocol. Energy values (kWh, Litres of fuel etc) are inputted and converted to CO_2"

Dublin

6 INCENTIVES FOR CLIMATE CHANGE MANAGEMENT AWARDED BY EUROPEAN CITIES, BY TYPE (# OF CITIES)



Cities can report more than one type of incentive.

7 INCENTIVES FOR CLIMATE CHANGE MANAGEMENT AWARDED BY EUROPEAN CITIES, BY RECIPIENT (# OF CITIES)

Change in emissions reported, by city (% change 2011 vs 2012).

Do incentives work for reducing GHG emissions?

Some cities—including Paris, Hamburg, Berlin, and Riga—believe they do. In order to facilitate the achievement of their emissions goals, 45% of reporting municipalities (10 cities) have established a plan of incentives for municipal departments or individuals or other subjects.

Monetary rewards prevail over other kinds of prize. Hamburg's "Fifty-Fifty" program refunds Hamburg schools that reduce energy costs through behaviour changes by pupils and teachers. This award is both monetary and non-monetary, since the schools achieving the highest energy savings are also honoured in an annual ceremony.

The Financing Challenge

Cities are developing a number of innovative approaches to finance the additional cost of low-emission development pathways and projects. Recent work by CDC Climat Research has identified urban governments worldwide, including a number of European cities, taking advantage not only of international carbon and voluntary credit markets to both fund and offset GHG emissions, but also the issuing of “green bonds” to leverage financing.

A joint study between CDC Climat Research and the OECD of 10 urban governments using the offsetting mechanisms established by the Kyoto Protocol (the Clean Development Mechanism and Joint Implementation) suggests that urban authorities are leveraging these financial flows to augment project financing. For example, the North Rhine-Westphalia region in Germany has used the Joint Implementation mechanism to finance fuel switching and energy efficiency of boilers and other heat-producing systems[8].

Urban governments are equally tapping voluntary carbon credit markets, by either purchasing carbon credits to offset their own emissions or by selling generated voluntary credits in order to create a source of financial income for mitigation projects. For instance, in 2008, the Ile-de-France Regional Council was the first council in France to commit to offsetting the emissions linked to its officials’ and representatives’ travel[9].

Urban governments are equally turning to bond markets to raise financing through “green bonds” or those aimed at financing investments with an environmental benefit or a focus on reducing vulnerability to environmental changes. This definition also includes bonds known as “climate bonds”, which focus on investments relating to mitigating or adapting to climate change. The Ile-de-France Regional Council’s environmentally and socially responsible bond issuance was a first for the European bonds market. The bond’s subscription rate reached 175% in the space of half-an-hour. Ultimately, €350 million was raised for energy, low-energy social housing, and dedicated biodiversity as well as social and solidarity economy initiatives. Investors are increasingly interested in extra-financial criteria where bond issuers are concerned. The Ile-de-France regional council was therefore able to use both the green aspects of its bonds to entice investors[10].

Based on an article written by Ian Cochran, CDC Climat[11]

“In Paris, where the Department of Energy manages 66% of heating boilers, municipal workers are incentivized to reduce energy consumption by 1% per year. For the remaining 34% of boilers, operated by private companies, the same requirement applies and also penalties for failure to achieve the objective are applied”

Paris

8. See Clapp C., A. Leseur, O. Sartor, G. Briner, J. Corfee-Morlot (2010), “Cities and Carbon Market Finance: Taking Stock of Cities” Experience with Clean Development Mechanism (CDM) and Joint Implementation (JI)”, OECD Environmental Working Paper No. 29, OECD Publishing.

9 See Kebe A., V. Bellassen, and A. Leseur (2011), “Voluntary Carbon Offsetting by Local Authorities: Practises and Lessons”, CDC Climat Research Climate Report No. 29, CDC Climat.

10 Morel, R. and C. Bordier (2012), “Financing the transition to a green economy: their word is their (green) bond? ,” CDC Climat Research Climate Brief No. 14, CDC Climat.

11 Ian.cochran@cdcclimat.com /+33 1 58 50 85 17

Interview with Connie Hedegaard
European Commissioner for Climate

1. How do cities and local governments fit in to the EU's climate change strategy?

Urban areas are where four out of five Europeans live, so cities are obviously key both to reducing our greenhouse gas emissions and to making our societies more resilient to climate change. We want to see urban development and climate action go hand-in-hand. The EU is providing support for climate action by cities through a range of initiatives and in various forms, from regional development funding to promoting networking and the sharing of best practices among local governments and stakeholders.

2. European cities are some of the most efficient in the world per tonne of GHG. How can cities in Europe drive their efficiency to the next level?

Are there new technologies or best practice policies that cities can look forward to implementing? Building a low-carbon society is essential to achieving the deep cuts in greenhouse gas emissions needed to prevent dangerous climate change, and smart cities will be at the heart of this process. Their efforts will be driven by their own initiatives – the Covenant of Mayors, for example, has shown that there is widespread appetite for ambitious action at local level – but also by EU and national climate policies more generally.

We have already seen how many cities aim to go beyond our 20% emissions reduction target by 2020. Soon we will need to set concrete EU climate and energy targets for 2030 to guide the transition towards meeting our objective of an 80-95% emissions cut below 1990 levels by 2050. The low-carbon economy is going to require far more renewable energy, the building of smart grids, and the mainstreaming of electric and hybrid cars and passive houses. These are some of the technologies and best practices that cities will need to implement.

3. What EU policies are on the horizon which will help cities and local governments to drive sustainability?

I would expect our future climate and energy targets to be among the major drivers. For the 2014-2020 budget period the Commission has proposed 'mainstreaming' climate action into all the major spending areas and earmarking at least 20% of the overall budget for climate-related expenditure. One of the ways we propose to do this is by requiring regions to invest a certain proportion of the EU funding they receive in energy efficiency and renewable energy. This will benefit urban areas in particular.

The European Initiative on Smart Cities is another potentially important supporting policy. It aims to promote the dissemination of the most efficient models and strategies for making the transition to a low-carbon economy by 2050. This especially concerns buildings, energy networks and transport systems.

4. What is the most important thing for cities in creating an attractive investment climate?

To drive the use of low-carbon technologies, one of the key things is to ensure the rules of the local planning and approval system work in their favour. A good example is the construction standards some cities have brought in which require new homes to have low energy consumption. It is also important for cities to share best practices when it comes to alternative financing models, such as that used by Energy Service Companies or ESCOs. These firms make a business out of developing, installing and funding projects that improve the energy efficiency of buildings and reduce their operation and maintenance costs.

They earn their money from the cost savings resulting from the buildings' reduced energy consumption, which are passed back to the ESCO.

5. What will the EU focus mostly on when setting future incentives related to smart cities (i.e. energy, mobility, buildings, consumers' behaviour)?

EU programmes will help cities become smarter in a number of areas. A technology pillar comprised mostly of research and innovation activities will link ICT, energy and mobility issues to develop intelligent and flexible solutions for reducing cities' energy bills, carbon footprints and pressures on the environment. This will be supported among other things by Horizon 2020, the proposed new EU research and development programme for the period 2014-2020.

The EU will also support energy efficiency in cities by encouraging the deep, energy-saving renovation of buildings. As well as dedicating a share of regional spending for energy efficiency we propose to set up energy efficiency funds with the EIB and possibly other public banks. On top of this, the energy efficiency of appliances will be further increased by the continued development of our eco-design legislation and energy labelling initiative. This will be a major plus for energy consumption in cities.

Transport is responsible for a large share of the greenhouse gas emissions and air pollution in cities, as well as most noise nuisance, so more sustainable mobility patterns can bring benefits in all of these areas. City authorities have considerable powers to push mobility in a more sustainable direction.

The EU runs the ELTIS website to promote exchanges of knowledge and experience in this field. One of the most important tools for local authorities is Sustainable Urban Mobility Plans, which provide a framework for achieving their chosen goals. We run a dedicated website which helps city authorities develop and implement such plans.

The EU also funds demonstration activities in transport under the STEER part of the Intelligent Energy Europe programme.

A major aim of projects in that programme is to reduce energy use in transport. This year's call for proposals requested projects in areas such as developing urban mobility plans, promoting car and bike sharing, and encouraging a shift to public transport.

4. Completing risk assessments

“We have performed a risk analysis based on socio-economic calculations. The calculations are performed both for change in rainfall and seawater level. The analysis gives us the opportunity to evaluate the risk and construct a detailed comprehensive plan”

Copenhagen

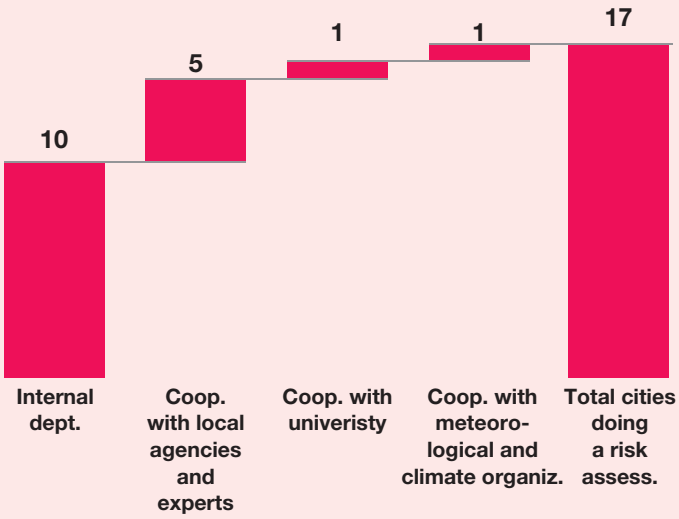
Even though climate change takes place on a global scale, its effects will have local consequences for each individual city. Over three-quarters of responding cities in Europe (17 cities) have assessed or are in the process of assessing the risks they face from climate change.

Risk assessments allow city governments to identify how the effects of climate change will manifest within their jurisdictions. Local differences mean that a general risk like rising temperatures might manifest itself in a particular city in the form of more heat waves, while in another city rising temperatures will lead to more droughts. In Moscow, for instance, rising temperatures may lead to more forest fires in the surrounding area, creating risks to the city and its citizens from heavy smoke. Risk assessment planning also allows cities to identify interventions that help both reduce emissions and adapt to climate change. Stockholm recommends green roofs, for example, for their ability to absorb storm water as well as reduce energy use.

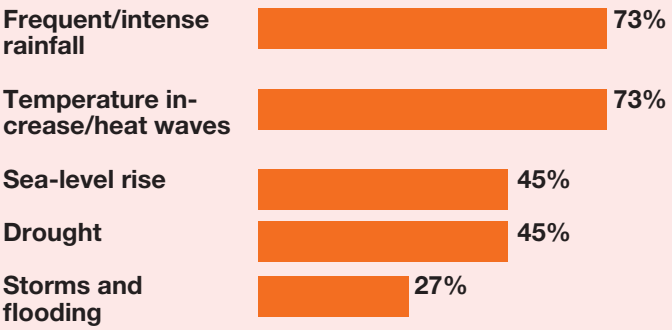
While risk assessments are common, the methods used vary significantly from city to city. Five cities out of 17 develop their risk assessments in cooperation with local agencies and experts. One city, Greater Manchester, utilises a partnership with the University of Manchester and a private company to complete its risk assessment and adaptation planning. Madrid cooperated with a national meteorological organization to complete its risk assessment, involving 15 experts from across Spain, who based their analysis in part on work completed by the IPCC and on a 2005 study by the Spanish Ministry of Industry. Ten cities completed their assessments internally.

Copenhagen and London, for example, have developed specific methodologies to assess specific risks from climate change, setting the stage for both city governments to develop a climate adaptation strategy. Helsinki and the Village of Kadiovacik both completed risk assessments annually as part of regular planning processes. And Oristano, a city of 32,000 in Italy, is in the process of creating a climate change management team within its Environment Division which will be responsible for climate change risk assessments.

8 RISK ASSESSMENT OWNER (# OF CITIES)



9 PHYSICAL EFFECTS OF CLIMATE CHANGE REPORTED BY EUROPEAN CITIES (% OF CITIES)



What are the most common risks for European cities?

68% of cities (15) say they face significant risks arising from climate change. Responding cities classify 53% of these risks as serious or very serious, also indicating that more than half of these risks are current or could occur in the short-term. More intense/frequent rainfall and temperature increase/heat waves are the most commonly identified risks.

Cities are divided over the question of whether these risks will have an impact on local business. Riga, for example, notes that flooding in low-lying areas of the city could have an impact on real estate prices. 50% of cities (11) say that climate change could affect local businesses, while 23% (5) say that there is no current or future risk to local businesses from climate change.

"We want to become the first village in the world which tries to increase awareness about climate change"

Kadiovacik

5. Developing an adaptation plan

Many European cities are responding to the risks from climate change by developing adaptation plans. Adaptation planning covers how the city will change to meet the new challenges posed by climate change. Planning might cover long-term infrastructure changes, like higher sea walls, more green space, or securing additional municipal water supply resources, as well as policy changes like restricting new development in flood zones. 64% of reporting cities (14) report that they have an adaptation plan, and two additional cities are in the process of developing these plans.

Berlin, for example, expects to suffer from hot days, which will occur more frequently. In anticipation of this Berlin's Urban Development Programme on Climate Issues is planning at a city-wide, sub-regional and location-specific scale to meet those challenges. Berlin's plan includes:

- Optimising heat-sensitive facilities such as retirement homes and hospitals;
- Greening of roofs, facades and courtyards;
- Planting of trees in selected areas;
- Monitoring of changes in urban densification;
- Creating fresh air corridors in inner-city areas, including the former Tempelhof airport and the still existing Tegel airport, which is to be abandoned next year.

Some adaptation plans arise out of existing plans to protect the city from water stress. Amsterdam and Helsinki both refer to their existing flood defense strategies as critical parts of their climate change adaptation plans. Amsterdam in particular has a long history of dealing with risks from flooding, and the city has built on this experience in creating its adaptation plan.

Paris is in the process of revising its adaptation plan. Currently, the city's plan focuses on heat stress and flood risk. This year, the city will expand the scope of its plan to additional risks, as well as to ensure "business and operational continuity" in the city in the face of extreme weather events.

"Flood defences and additional measures to manage high storm surges are being planned and realised in cooperation with the neighbouring districts and the federal states of Lower-Saxony and Schleswig-Holstein"

Hamburg

"We have a special program called 'Amsterdam Water Resilience.' Due to the fact that Amsterdam lies below sea level, our city is well equipped to cope with changing of water levels"

Amsterdam

Water supply challenges and solutions

European cities—in the Mediterranean, in particular—are experiencing a progressive decrease in water availability due to climate change and inefficient water use in agricultural and industrial sectors. CDP's questionnaire invited cities to report specifically on the risks to their water supplies from climate change. 45% of reporting European cities foresee substantive risks to their city's water supply.

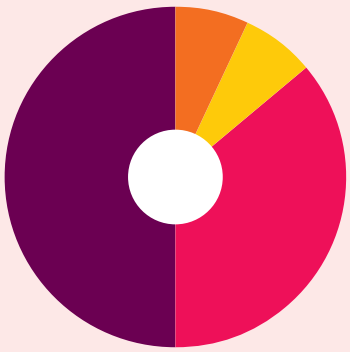
These cities are also taking steps to reduce these risks. The most common risk-reduction activity is for cities to educate and raise awareness among citizens and businesses about the importance of conservation. However, water, like carbon, does not have a set price in many locations, making it more difficult to control inefficiency. Several European countries combine high losses rates and low water prices. This combination leaves cities open to significant risk. Low water prices cause scarce availability of funding to reduce losses, while a poor service reduces the capability of firms to increase prices.

In Europe, we can already see the future of how better technology for cities can play a role in helping municipalities address their water supply risk. Electronic Water Demand Side Management Systems promise to improve efficiency in the same way that smart grids can help to optimise electricity flows. IT systems and e-water meters—combined with good policy—could allow cities to restrict water usage for irrigation during peak evaporation hours while imposing penalties for exceeding water allowance. Some water utilities are reducing water loss by providing households with a double distribution system: one with drinkable water and one with not-drinkable water for house cleaning and irrigation to reduce water treatments.

Based on Accenture research

10 **RISKS TO MUNICIPAL WATER SUPPLY REPORTED BY EUROPEAN CITIES (% OF RESPONSES)**

7	Inadeguate infrastructure
7	Flooding
36	Declining water quality
50	Inadequate infrastructure



6. Using sustainability to drive city competitiveness

European cities clearly see addressing climate change as a way to drive growth and competitive advantage in their jurisdictions. Thirteen cities (59%) anticipate that addressing climate change will lead to development of new business industries in their cities. This is the most commonly cited economic opportunity for European cities.

In the words of the Greater London Authority, "by adapting London to potential climate impacts, London will become a more attractive place to do business in, and invest in, than our economic competitors, and we will be able to use our adaptation skills and tools for economic advantage."

Cities have adopted a variety of strategies for attracting new business. Two strategies that cities frequently mention are clustering and incentivising new business. Dublin, Helsinki, Rotterdam, and Stockholm all see sustainability clustering as a mechanism for driving growth. Dublin's Clean Tech Cluster—the Greenway—serves as a hub for green economy businesses, including existing clean technology companies and start-ups. Dublin City Council joined with many other partners—including another local council, the chamber of commerce, academic institutions and the airport authority—to create the Greenway in 2010. Rotterdam is also making a push to attract companies in the clean tech space with a cluster of technology firms known as the Clean Tech Delta.

The cluster focuses on companies and technologies related to sustainable transport and sustainable energy, but also water and delta technology. Stockholm has established a clean tech cluster in Högdalen, one of the city's industrial areas.

Other cities—like Paris—are actively recruiting new companies with tax and other incentives. According to the city government, "the City of Paris offers to new or future green entrepreneurship companies (building, smartgrid, renewable energy services) 7,800 square meters for their headquarters." The office space offered by the city sits in a model green building: it is "the first very high energy performance building in the service sector in Paris with solar cells, green roofs, and very low energy consumption."

Other cities across Europe are using a range of tactics to attract new businesses. Hamburg, for example, is carving out a niche as a headquarters location for wind energy industry executives. The Village of Kadiovacik in Turkey, population 200, is looking to attract grant funding for the installation of renewable energy.
It is clear that, for European cities, attracting new businesses and investing in redevelopment, energy saving and sustainable transportation will improve the quality of life for the citizens, re-launch the economy, and create new green jobs.

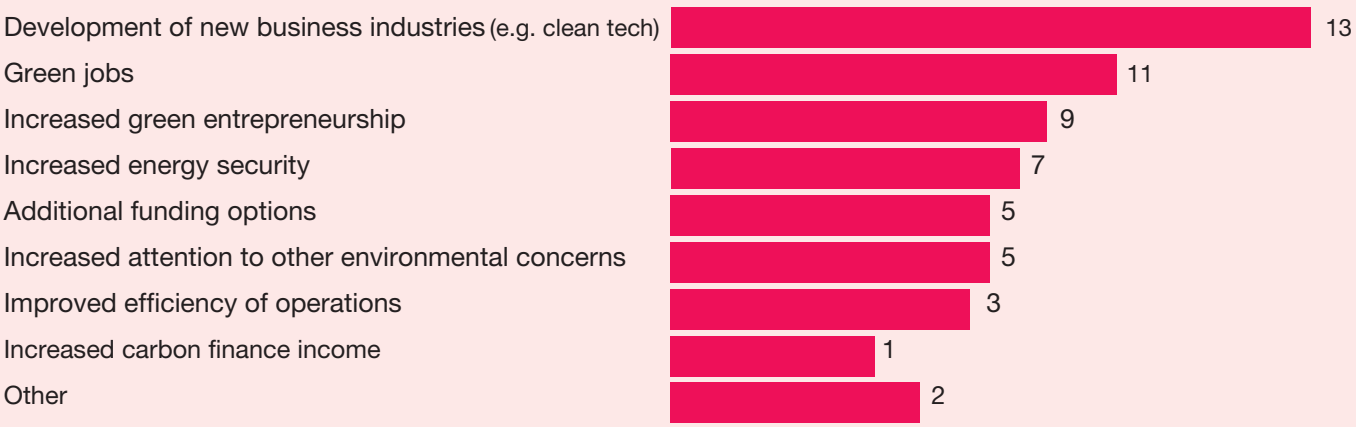
“The City of Helsinki currently supports the operations of five business incubators in the city as well as development of nine cluster fields within the Centre of Expertise programme in the region. One of the cluster fields is Environmental Technology”

Helsinki

59%

59% of European cities anticipate that addressing climate change will lead to development of new business industries in their cities.

11 **ECONOMIC OPPORTUNITIES REPORTED BY EUROPEAN CITIES (# OF CITIES)**



“The focus on climate change activities like biochemicals, adaptive building, geothermal, exchange of industrial residual energy, and CCS creates new business opportunities”

Rotterdam

7. Extending the city's reach with voluntary commitments

City governments can be powerful drivers of change in their cities, but their power is sometimes limited by statutory constraints. Mayors or the city council may exercise direct control over some departments but not others, rendering direct action difficult[12]. Some European cities, however, are demonstrating that the city can use its influence and role to effect change across wide swaths of the city, even where mayoral or council statutory power is limited.

Cities like Helsinki, Berlin, Madrid, and Stockholm are working closely with private and public sector companies in their premises to set voluntary emissions reduction and other performance targets that help the cities achieve their climate change goals.
Berlin, for example, has concluded 12 partner agreements with different operating companies in the city, including the water company, the town cleaning company, and a municipal hospital. The city and the participating companies both make a mutually-binding agreement related to climate protection. Madrid's Pro-Clima Forum is a platform open to all companies in the city. The Forum allows exchange of best practice on climate change and provides companies with a place to disseminate the lessons learned from their own internal processes. Stockholm's Climate Pact is similar, with the city highlighting and working with 150 companies in the city to showcase good examples of how companies are reducing their environmental impact. According to the city government, "the network serves as a platform for members to inform others about their measures and to inspire each other."

Helsinki is planning a similar project. The city government reports that "the general idea is to commit together to further reduction of CO_2 emissions as well as to find new ways of doing it in cooperation between the city administration, local private sector, and support organisations." While only a few cities out of the total European sample mention these voluntary agreements, these agreements might be something for other cities to replicate.

"The Mayor of London has limited planning powers and financial control, so to adapt the city, we must work in partnership with a wide range of stakeholders. We believe that this has some positive aspects, as by engaging and working with these partners, we can mainstream adaptation in the preparation and delivery of their plans and strategies"

Greater London

"Madrid City Council has developed a voluntary program which allows companies to compensate their CO_2 emissions by planting trees in green areas of the city. The name of this program is 'Madrid Compensa'"

Madrid

Master planning: making our cities smarter

To date, projects and policies designed to reduce emissions have received much of the attention. Holistic master planning, however, is also an effective way to tackle climate change at the city level. 68% of reporting cities in Europe are incorporating GHG reduction into their master planning processes.

One example of holistic planning at work is the Eco-District, which is gaining popularity as a mean of addressing sustainable urban development. The model—tested in Yokohama and Portland, among other cities—allows scalability and has proven effective in addressing environmental concerns. The Eco-district involves the smallest building block of a city, often coinciding with a single section of the electric network (for example, the network supplied by one single substation), which can be isolated and treated as a real ecosystem. Each implementation is different, but strategic objectives of an Eco-District often include maximising CO_2 reductions and energy efficiency. Proponents argue that the Eco-District is a building block for a fully-realised Smart City as well as an appropriate size in which to assess the financial viability of creating a Smart City. Technologies and solutions within an Eco-District are the same as within an ideal Smart City, but on a smaller and more controllable scale.

Eco-Districts can also be effective at an even smaller scale. One example is the Water Eco-District, which is specifically designed to help water-stressed cities overcome the challenge of water management. For greenfields and new development, a Water Eco-District would include residential and commercial designs that are based on smart water withdrawal and treatment, with high rates of water recycling, reuse and desalinisation. The ultimate objective is to enable a decentralised water management approach. Smart water meters will play a key role, enabling the combination of demand-side water management with a decentralised water management approach.

Based on Accenture research

12. For a detailed assessment of the powers held by the mayors of the C40 cities, see Climate Action in Mega-Cities. Arup. 2011. http://www.arup.com/Publications/Climate_Action_in_Megacities.aspx

Conclusion

European cities demonstrate significant knowledge and on-the-ground experience in how to manage climate change at the local level. This collection of best practices in urban carbon management can serve as a model for other, less-experienced cities to draw from as they scale up their climate change efforts.
This year's CDP process in Europe has seen a large increase in the number of cities participating in annual measurement and reporting.

The process has also seen the participation of two small cities: Oristano in Italy and the Village of Kadiovacik in Turkey. These are small in terms of size and inhabitants, but they have big ambitions and aspirations: each thinks as an international metropolises and is eager to play on the global stage. Climate change is a global issue; we believe it will drive more and more cities to follow the example of Oristano and Kadiovacik and link their efforts to global efforts to monitor, track, and reduce greenhouse gas emissions.

The best practices that appear in this report are not unique to Europe. We are already seeing excellence from cities across the world, from the USA to Brazil, China, India, and Argentina.

European cities will need to continue innovating and striving for excellece in climate change management. This will require a fine tuning of incentives, new green technologies, establishing common standards for greenhouse gas measurement and other metrics, and continuing to show regular reductions of emissions. To this end, we hope this report encourages cities to work together, to define common strategies and to report annually on their progress.

Notes

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