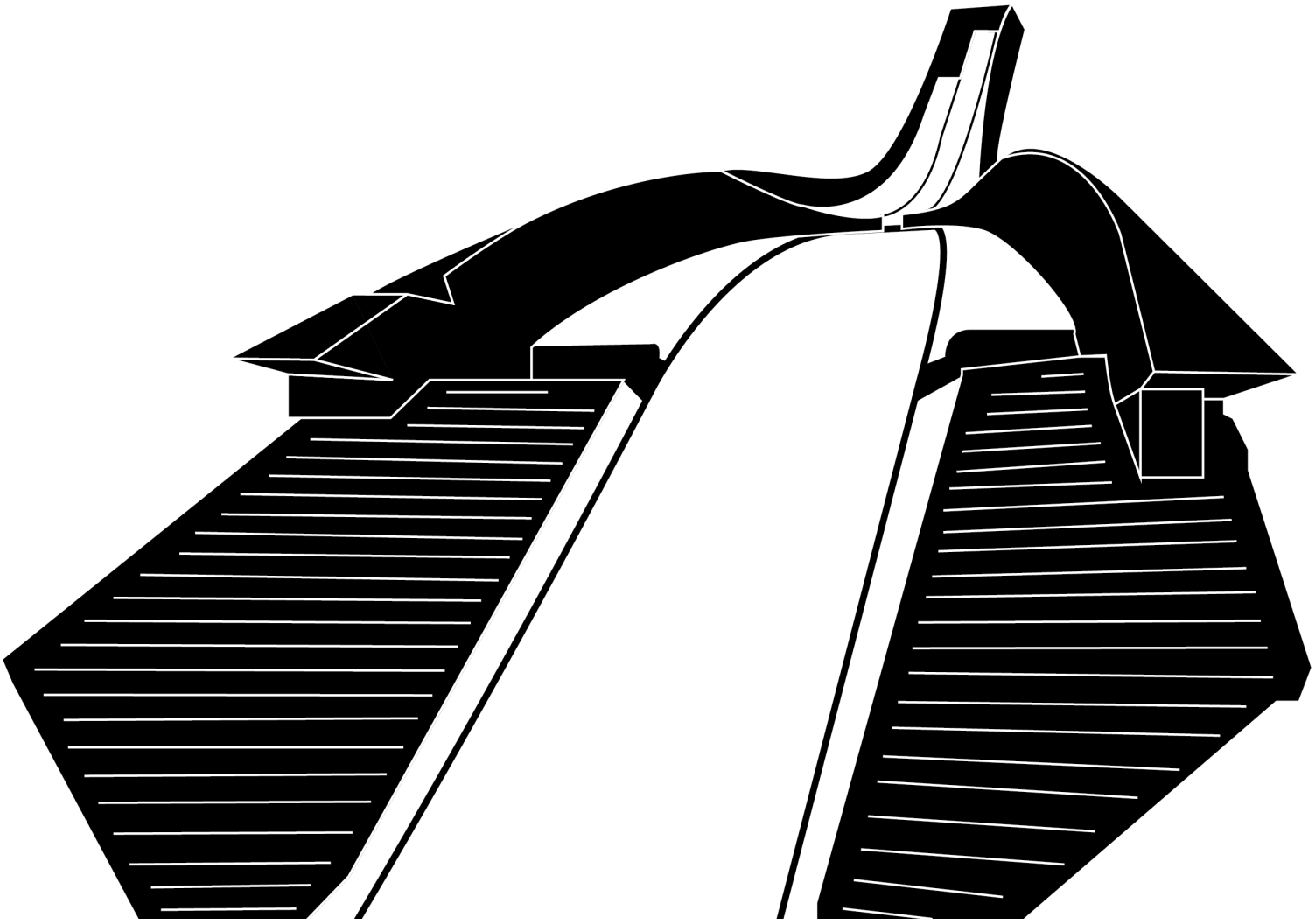
Data provided for the
CDP Cities 2015 Report

www.cdp.net

City of Oslo



Written by

CDP
DRIVING SUSTAINABLE ECONOMIES

Report analysis & information design for CDP by

AECOM

In partnership with

C40 CITIES

Bloomberg Philanthropies

CDP, C40 and AECOM are proud to present results from our fifth consecutive year of climate change reporting for cities. It was an impressive year, with 308 cities reporting on their climate change data (six times more than the number that was reported in the survey's first year of 2011), making this the largest and most comprehensive survey of cities and climate change published to date by CDP. City governments from Helsinki to Canberra to La Paz participated, including over 90% of the membership of the C40 – a group of the world's largest cities dedicated to climate change leadership.

Approximately half of reporting cities measure city-wide emissions. Together, these cities account for 1.67 billion tonnes CO_2e, putting them on par with Japan and UK emissions combined. 60% of all reporting cities now have completed a climate change risk assessment. And cities reported over 3,000 individual actions designed to reduce emissions and adapt to a changing climate. CDP, C40 and AECOM salute the hard work and dedication of the world's city governments in measuring and reporting these important pieces of data. With this report, we provide city governments the information and insights that we hope will assist their work in tackling climate change.

This document contains the questionnaire data provided to CDP from Oslo as part of its 2015 CDP submission.

To see all of the results for all participating cities, visit https://www.cdp.net/cities.

The graphics in this document are from the 2015 CDP Cities infographic.

Oslo in context

Number of cities responding per year

48	73	110	207	308
2011	2012	2013	2014	2015
■	■	✓	✓	✓

Oslo participation

Total population of cities responding in 2015

446,186,833

Oslo (city proper)
647,676
people

Where Oslo fits

171 small
<600k population

77 medium
600k-1.6m population

60 large
1.6m+ population

Year reported

2013

Area

454

km²

Population

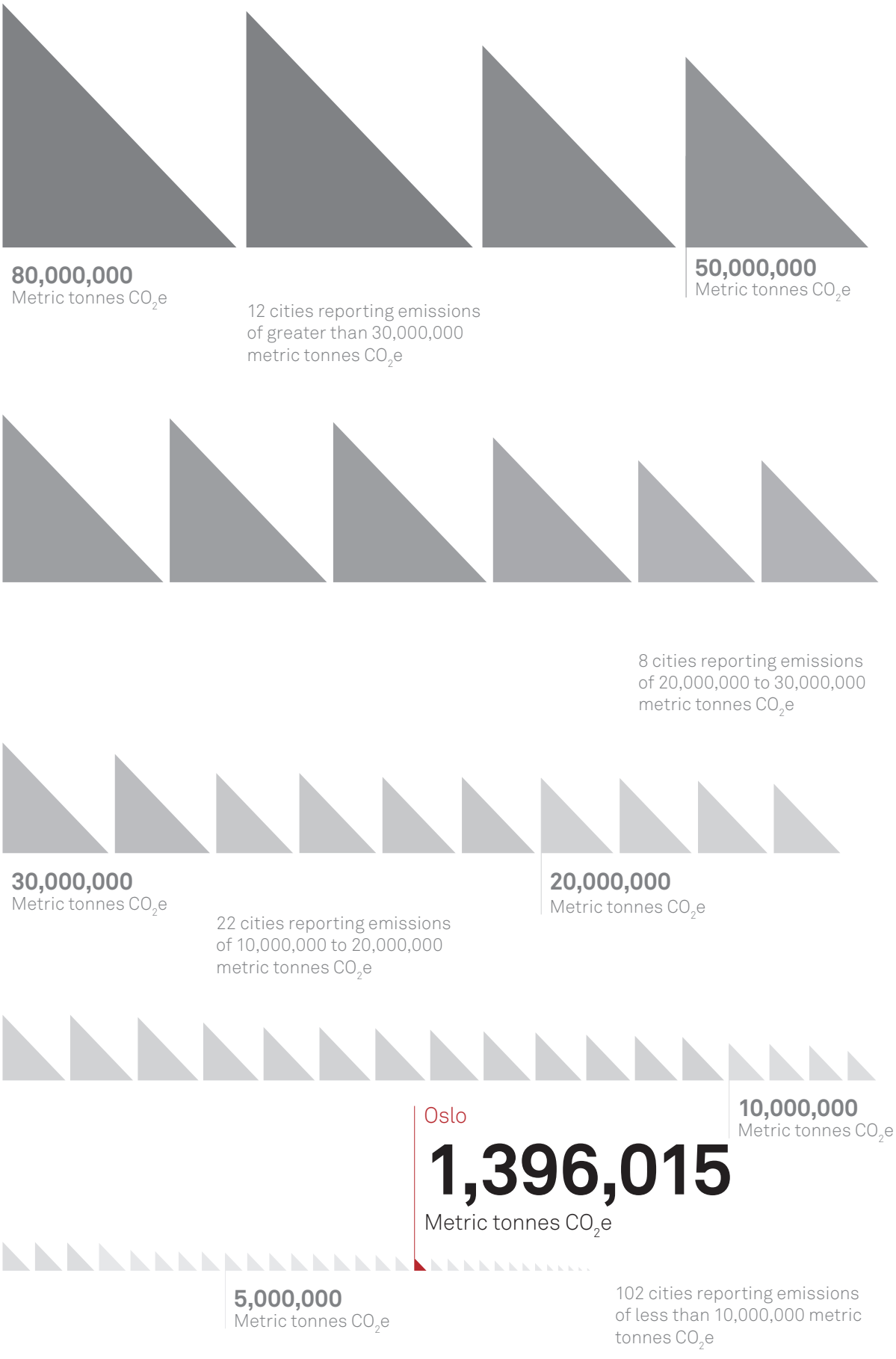
647,676

Oslo in focus

Inventory method

Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories (GPC)

144 cities reporting emissions in 2015



0 **Introduction**

The geographical area of Oslo covers 454 km^2. Two thirds of the area is green, either as protected forest or as green recreational areas. The city centre is surrounded by woods, lakes and 40 islands in the fjord. The city has a blue-green image, as it is surrounded by the blue Oslo fjord, is cross-cut by 8 blue rivers and has green hills and forests. The city of Oslo has a population of 647,676 inhabitants. The Oslo region has 925,228 inhabitants (1.1.2013).

The majority of dwellings in Oslo are apartments; these are concentrated in a few dense areas while other types of dwellings such as single family houses and townhouses dominate the landscape. Direct carbon emissions (scope 1) in Oslo are 2.1 tons CO_2

Introduction

equivalent per capita in 2013 and this is very low compared to other European cities. This is due to the use of predominantly clean hydropower for heating and power consumption and the fact that approximately 63% of everyday travels in Oslo are made by public transport, walking and cycling. There is a comparative absence of GHG intensive industrial production in Oslo and this also contributes to the low emissions rate.

The City of Oslo has committed to taking action against global warming and has set up a goal of reducing GHG emissions by 50% from the 1991 level by 2030 and to become climate neutral (without offset trading) by 2050. Because of the low per capita emissions (scope 1) and high population growth, achieving the 50% reduction target necessitates the implementation of substantial decarbonising measures. Furthermore, Oslo has initiated activities to show-case zero emission solutions for cities, such as large scale roll-out of zero emission vehicles, introducing biofuel for the bus fleet, large scale production of biogas, and piloting FC hybrid busses. Oslo is a compact city with short distances and a well functioning public transport system offering frequent departures.

1.1 **Governance**

Oslo's process for managing progress and responsibility for climate action:

Emissions Reductions

In 2005, The City Council adopted the target of 50% reduction in greenhouse gas emissions compared to 1991 levels. The implementation of the overall climate mitigation target is integrated in the Oslo Urban Ecology Program 2011 - 2026, which was adopted by the council in 2011. Climate mitigation actions are further incorporated in the sector plans and specific programs relevant for GHG emission, and in the Action Plan for Cities of the Future Oslo that describes strategies and policy instruments in order to achieve the overall reduction target of the city. The Action Plan

Governance

for Environment and Climate 2013 to 2016 was adopted by the City Government in 2013. It states the prioritized measures and strategies to implement the Urban Ecology Program for the next 4 year period. This Action Plan is followed up in the budget process and through the management of the municipal entities and companies. The City of Oslo has recently developed a new Climate Change Mitigation and Energy strategy, which sets out the programme to reduce the greenhouse gas emissions by 50% in 2030 and to become a zero-emission city in 2050. The strategy covers transport, buildings, resources and energy production and distribution. The strategy is not yet adopted by the city government.

Adaptation

The adaptation targets are integrated in the Oslo Urban Ecology Program 2011 - 2026, which was adopted by the council in 2011. The Action Plan for Environment and Climate 2013 to 2016 was adopted by the City Government in 2013. It states the prioritized measures and strategies to implement the Urban Ecology Program. This Action Plan is followed up in the budget process and through the management of the municipal entities and companies. The City Council regularly evaluates to what extent targets have been achieved, adjusting strategies to enhance the programme.

Oslo has committed to adapting to climate change.

Urban Ecology Programme is the environmental policy of Oslo passed by the City Council.

Oslo has a plan that addresses climate change adaptation:

Climate change adaptation strategy for Oslo, 2014.

Oslo anticipates that national and/or regional climate change activities will have impacts on Oslo's own climate change activities.

In 2008, Oslo signed Cities of the Future, an agreement with the state, KS (the Municipal Sector Organization) and 13 city municipalities to reduce greenhouse gas emissions. Oslo is implementing a ten-year program (2010-2020) called FutureBuilt, with a vision of developing carbon neutral urban areas and high-quality architecture. In September 2013, Oslo obtained status as a C40 innovator city. The City of Oslo and the Akershus County have made a regional land use and transport plan, that incorporates the principle of an integrated land use and transport plan at regional level in order to avoid urban sprawl in the Oslo region and in order to secure land use development along with

the public transport nodes. Climate change is included as a major challenge and concern in the planning process. Oslo is also cooperating with Akershus County on the FC bus pilot and has developed a hydrogen strategy, with the aim of securing and developing hydrogen infrastructure. The city has set up clear and ambitious targets such as fossil fuel free heating by 2020. Thus, the city is in clear need of empowerment and collaboration with the state level. The City Council has asked the national government to permit a local tax on heating oil in order to reach the city target of phasing out all oil heating by 2020. This was rejected by the state, but a better regulatory and investment scheme may allow for a more rapid phasing out of oil heating. Financing public transport investment and operations through city packages based on road pricing is another example of state - local cooperation needed to initiate climate change activities. The City of Oslo has asked the national government to permit the introduction of low emissions zones. This authority was given to the local level recently.

Oslo incorporates sustainability goals and targets into the master planning for the city.

The main strategies from different Sector Action Plans are integrated in The Municipal Master Plan. The Municipal Master Plan includes a strategy for densification around public transport nodes, improving the public transport system and cycle network, introducing parking restrictions and protecting the blue-green structure. In addition, building in the green belt surrounding the city is strictly prohibited. It is an essential instrument in order to limit the increase in road traffic. The Municipal Master Plan is up for revision, with the title: Oslo - Smart, Resilient and Green.

Oslo has a climate change action plan for reducing GHG emissions:

Action Plan for the Cities of the Future, Oslo, 2010.

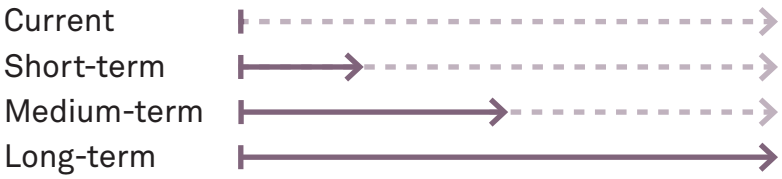
2.1 **Physical risks**

Current and/or anticipated effects of climate change present significant physical risks to Oslo:

Seriousness

Less Serious ! ! ! Serious ! ! ! Extremely Serious ! ! !

Timescale



Risks & Adaptation

More intense rainfall

Risk: !!! Timescale: 

Sea level rise

Risk: ! Timescale: 

Hotter summers

Risk: !! Timescale: 

Compounding factors may worsen the physical effects of climate change in Oslo.

The City of Oslo could be described as less vulnerable than other Norwegian Cities. However, urban densification and rapid growth of population (i. e. 36 % population growth from 2012 to 2040) will increase stress on infrastructure and increase vulnerability that will be further aggravated by climate change.

Oslo considers that the physical impacts of climate change could threaten the ability of businesses to operate successfully.

Extreme rain and storm floods could, combined with sea level rise, cause temporary impact on transport systems in periods, and may even lead to major incidents such as electricity grid breakdown that could have impacts on communications systems, public transport and energy supply. However, we estimate

Oslo as relatively resilient compared to other Norwegian cities. This could then also make Oslo more attractive for business settlement.

A climate change risk or vulnerability assessment has been undertaken for the Oslo area.

Oslo used an agency specific vulnerability and risk assessment methodology to undertake a preliminary hazard analysis.

2.2 **Climate Hazards**

Oslo currently experiences the following climate hazards:

More intense rainfall - Flash/surface flood

Sea level rise

Hotter summers

Oslo expects the following hazards to affect the city in the future:

Rain storm

Heavy snow

Heat wave

Forest fire

Flash/surface flood

River flood

Storm surge

2.3 **Adaptation**

Actions Oslo is taking to reduce risks to infrastructure, citizens, and businesses from climate changes include the following:

Crisis management including warning and evacuation systems

Currently in effect (city-wide): Central emergency preparedness plan(2011), Risk and vulnerability- analysis 2012 etc.

Flood mapping

Hazard: Flooding due to more intense rainfall

Still under consideration or awaiting final authorisation: More detailed mapping.

Sea level rise modelling

Hazard: Wave action due to sea level rise

Still under consideration or awaiting final authorisation: Master Plan of City Oslo.

Landslide risk mapping

Hazard: Mass movement due to more instense rainfall

Still under consideration or awaiting final authorisation: More detailed mapping and ground investigations.

Soil retention strategies

Currently in effect at a significant scale across most of the city: Green belts etc.

Storm water capture systems

Hazard: Flooding due to more intense rainfall

Currently in effect and being piloted: storm water drainage and storage system.

Resilience and resistance measures for buildings

Hazard: Flooding due to more intense rainfall

Currently in effect and being piloted: Flood risk mapping and green roof strategies, including development of methodo logies for mapping existing green roofs.

Air quality initiatives

Hazard: Extreme heat

Currently in effect (city-wide): Studded tyre tax, road dust reducing measures, el. mobility, coordinated transport and urban developement measures etc.

Green roofs/walls

Hazard: Extreme heat

Still under consideration or awaiting final authorisation: Analysis of potential green roof technologies appropriate for Nordic climate.

Additional reservoirs and wells for water storage

Currently in effect (city-wide): Drinking water.

Optimizing delivery fuel mix of water supply

Currently in effect (city-wide): No use of fossil fuel for water delivery other than emergency power supply, where old oil has to be replaced and some use of fuel to heat the sludge when biomethane or heat pump can not be used. Alternatives for fossil fuel is planned.

Improve water supply distribution method

Still under consideration or awaiting final authorisation: Optimizing energy use from drinking water through energy production in reduction valves.

Promoting and incentivizing water efficiency

Currently in effect (city-wide): Fee for water deliverance 743 NOK /inhabitant.

Water efficient equipment and appliances

Still under consideration or awaiting final authorisation: Project-plans.

Water smart metering

Currently in effect and being piloted: Project-plans.

Water use audits

Currently in effect and being piloted.

Storm water capture systems

Hazard: More intense rainfall

Currently in effect (city-wide): Strategy for stormm water management in Oslo.

Analysis of stormwater damage

Hazard: Flood

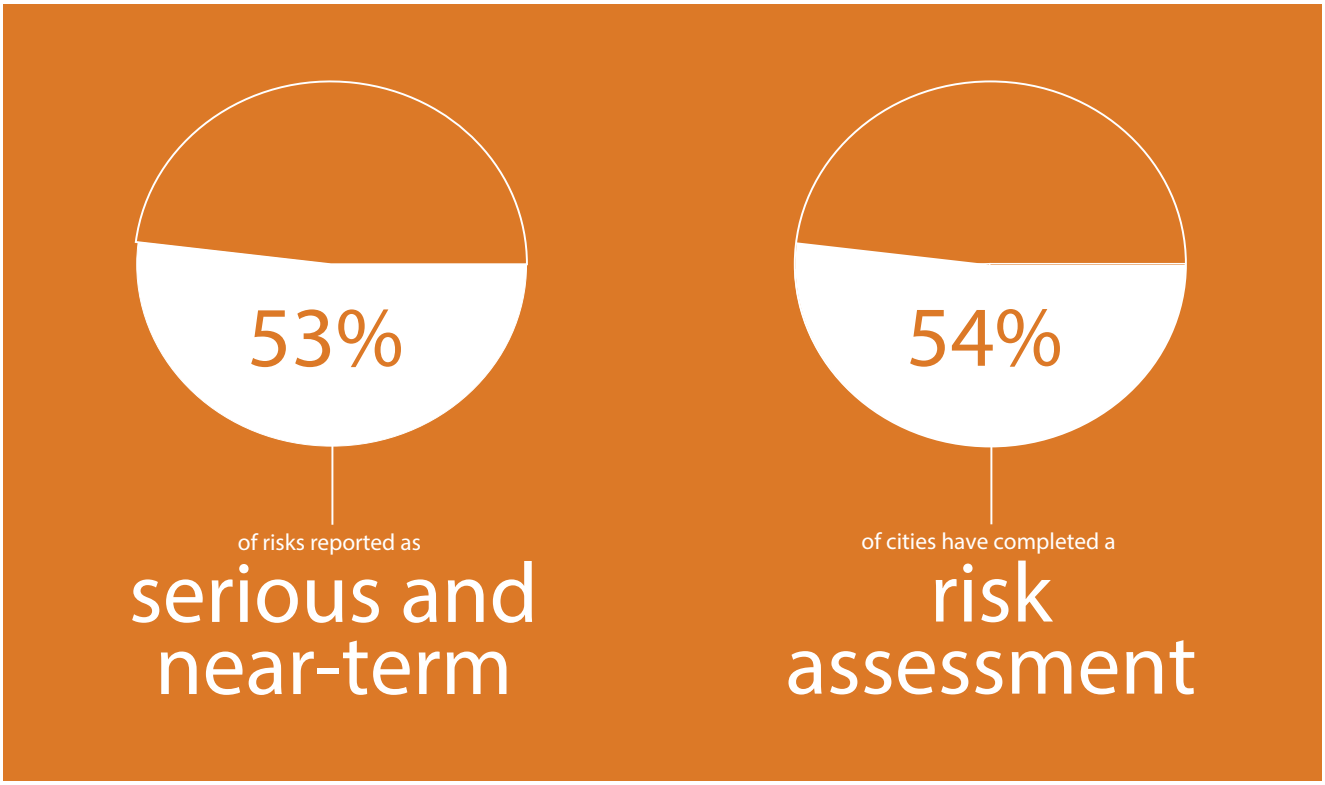
Currently in effect and being piloted: Hot spot analysizes of storm water damage based on insurance payments.

2.4 Social risks

Oslo does not face social risks as a result of climate change.

The impacts from climate change in Oslo as a city may be considered as moderate, so that there is no significant impact that causes relevant social risks. However, Norwegian society may be affected by international migration and poverty caused by climate change.

Cities are at risk from climate change



3.1 **Opportunities**

Climate change action presents economic opportunities for Oslo.

Opportunities

Oslo is positioning itself to take advantage of opportunities from taking climate change action.

Development of new business industries (e.g. clean tech)

Norway produces most of its electricity from hydropower. However, over the last decade many new initiatives and companies have developed in the renewable energy sector, and the Oslo region has approximately 90 companies involved in developing components for or delivering solar, wind, bio energy and other clean energy.

Improved efficiency of operations

There has been an increased focus on both energy and resource efficiency at many levels. Two examples are: Future Built, a program for testing and realizing new technologies in constructionn in order to create more environmentally friendly and energy efficient buildings. Second - the development of bacteria that helps speed up and increase the quality of transformation of food waste to high quality biogas for buses. The local company that developed the technology, now exports their know- how globally.

Increased infrastructure investment

The need for reduction of emissions from cars has led to a sharp increasee in building infrastructure for electric cars which benefits all the suppliers in this market e.g. charge infrastructure, smart charge points, electric car manufacturers etc. More income producing businesses create better tax income to the city, either through increased employment, increased revenues/profits or both.

Increased infrastructure investment

New state programs, especially within the clean energy sector have been developed and have been in effect for almost a decade, and when the city wanted to phase out all of its oil-based heating in its buildings from 2008 and onwards, there was a large pool of local suppliers that together were able to deliver the required sustainable energy solutions.

96 CITIES

or 1/3 of cities that reported are taking action to de-carbonize their energy supply.

86%

of these cities see an ECONOMIC OPPORTUNITY in climate change.

Increased infrastructure investment

The increased infrastructure investment for electric cars is now also beneficial for the city administrations that have launched a program to change all the city service cars to electric cars by the end of 2015, allowing the city the benefit from lower CO2 emissions, less NO2, particles and noise and also less money spent on fuel. (Electric cars are much cheaper to run).

Oslo is hoping to attract private sector involvement for the following climate-related projects:

Establish infrastructure for renewable fuel (“energy stations” instead of gas stations); biofuel, hydrogen, electricity.

Carbon capture of the emissions from the energy recovery plant.

4.1 **Date and boundary**

Oslo is reporting a GHG measurement inventory for a period of one year.

Tue 01 Jan 2013 - Tue 31 Dec 2013

Boundary typology used for Oslo's GHG emissions inventory:

Departments, entities or companies over which operational control is exercised

Emissions – Local Government

4.2 **GHG emissions data**

Oslo uses integrated internal municipal report to inventory GHG emissions.

The City of Oslo has used a bottom-up reporting system linked with the annual reporting system. The focus has been on scope 1 (fossil fuel oil for heating, fuel oil for processes, the agencies transport vehicles, operating construction machinery, emissions from wastewater treatment). Scope 2 emissions are also a part of the accounting and the district heating has an emission factor of 129 g CO2/Kwh and the electricity has an emission factor of 108g CO2/Kwh ("a Nordic mix") . This emission factors are under debate, and will probably be changed in the 2014-reporting. The data is evaluated and controlled by the Agency of Urban Environment. The emissions from public transportation are calculated and are part of the City of Oslo´s annual report on environment and climate, but they are not integrated in the carbon accounting for the local government operations. The reason is partly that the emissions for the buses have another system boundary than the other local government emissions (Oslo and the surrounding county Akershus). It is hard to make a reasonable split of the numbers.

The City of Oslo owns 60% of the public transport company, Ruter. There was previously a top down calculation of all municipal GHG emission based on the MiSA Klikmakost model that covers scope 1, 2 and 3. The calculation is made based on account data from the Norwegian reporting system KOSTRA and combined with life cycle emissions data for the different consumption areas. The City of Oslo has made a detailed analysis for 2010 and 2011, but has not updated the numbers for 2012 and 2013.

Gases included in emissions inventory:

CO_2
CH_4
N_2O

Total (Scope 1 + 2) emissions for Oslo:

98,015

Metric tonnes CO_2e

Breakdown of Oslo's GHG emissions by scope:

Scopes are a common categorisation method. Scope 1: All direct GHG emissions (with the exception of direct CO_2 emissions from biogenic sources). Scope 2: Indirect GHG emissions associated with the consumption of purchased or acquired electricity, steam, heating, or cooling.

Total Scope 1 activity

39,338

Metric tonnes CO_2e

Total Scope 2 activity

58,677

Metric tonnes CO_2e

Total amount of fuel (direct/Scope 1 emissions) consumed in Oslo during the reporting year:

Buildings: Distillate fuel oil No 1

2,157,703 L

Municipal vehicle fleet: Diesel/Gas oil

1,365,957 L

Municipal vehicle fleet: Motor gasoline (petrol)

415,052 L

Building: Wood or wood waste

18.9 GWh

Electricity, heat, steam, and cooling (indirect/ Scope 2 emissions) consumed by Oslo during the reporting year:

Buildings: Electricity

465.7 GWh

Buildings: District heating

120.8 GWh

Process related energy use: Electricity

110.8 GWh

Street lighting and traffic signals: Electricity

37 GWh

Municipal vehicle fleet: Electricity

65,000 kWh

Oslo does not measures Scope 3 emissions.

We have measured Scope 3 emissions earlier and it might be measured in the future. But it has been challenging to get numbers with a quality that can help the decision-making process. It has been useful though, to be reminded of the size of our emissions with a carbon footprint approach and to have a picture of which consumption areas lead to a larger carbon footprint. Oslo's main target is to reduce direct emissions by 50%, but we also have a target stating: "All indirect greenhouse gas emissions from the inhabitants of Oslo are to be as low as possible". Although we do not have updated figures, we have measures for some Scope 3 emissions; for instance we have measures for low emissions building materials, measures to reduce food emissions etc.

Breakdown of Oslo's GHG emissions by department (total):

Electricity for buildings and other electricity use

49,900

Metric tonnes CO_2e

Waste water and waste water handling

29,000

Metric tonnes CO_2e

District heating for buildings

8,800

Metric tonnes CO_2e

Oil for buildings and processes

5,739

Metric tonnes CO_2e

Oil for buildings and processes

3,100

Metric tonnes CO_2e

Diesel and gasoline of construction machinery

1,500

Metric tonnes CO_2e

Oslo's emissions have decreased.

The main reason for the decrease is an increased use of certified green electricity.

4.3 External verification

Oslo's emissions have been externally verified.

The inventory is based on reported data from the different municipal agencies of Oslo. A consultant company has put the inventory together and is also having dialogue with the agencies if they find logical errors (external verification). The Agency for Urban Environment has audited the inventory.

5.1 **Date and boundary**

Oslo is reporting a GHG measurement inventory for a period of one year.

Tuesday 01 Jan 2013 – Sunday 01 Dec 2013

Boundary typology used for Oslo's GHG emissions inventory:

Administrative boundary of a local government.

Emissions – Community

5.2 **GHG emissions data**

Oslo has used the Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories (GPC), (WRI, C40 and ICLEI).

The GPC has been combined with the IPCC 2006 guidelines. Oslo gets the GHG-data from Statistics Norway and they make the data based on the IPCC guidelines, but Oslo has in this reporting made some adjustments to the GPC. Scope 2 emissions is not part of our emission accounting, partly because we get our number from Statistics Norway and their focus has been on scope 1 emissions since they are also the ones responsible for the national inventory. They work to get the numbers in the counties (Oslo is both a municipality and a county) consistent with national level GHG-reporting so that you can aggregate the numbers from the counties and get the national numbers. It`s therefore important for us to be loyal to these numbers. The second reason is that the mitigation targets with a 1991 baseline year are based on Scope 1 boundaries. The third reason why we don't measure the Scope 2 emissions, is that we have a very special energy situation. We produce as much renewable electricity (from water power) in Norway in a normal year than what is consumed. We therefore find it more useful to have an energy consumption target: A kWh is a kWh while emission factors on electricity leads to confusion and maybe wrong decisions.

Gases included in emissions inventory:

CO_2
CH_4
N_2O

Total (Scope 1 + 2) emissions for Oslo:

1,298,000
Metric tonnes CO_2e

Breakdown of Oslo's GHG emissions by scope:

Scopes are a common categorisation method. Scope 1: All direct GHG emissions (with the exception of direct CO_2 emissions from biogenic sources). Scope 2: Indirect GHG emissions associated with the consumption of purchased or acquired electricity, steam, heating, or cooling.

Total Scope 1 activity

1,298,000
Metric tonnes CO_2e

Excluding emissions from grid-supplied energy generation;

1,216,000
Metric tonnes CO_2e

Emissions from grid-supplied energy generation within the city boundary;

82,000
Metric tonnes CO_2e

Breakdown of these emissions by sector and scope as defined in the Global Protocol for Community Greenhouse Gas Emissions Inventories:

End user: buildings, water, waste, transport. Economic sector: residential, commercial, industrial, institutional. IPCC sector: stationary combustion, mobile combustion, industrial processes, waste. Greenhouse gas: CO_2, CH_4, N_2O etc.

Transportation – Scope 1 (II.X.1)

745

Metric tonnes CO_2e

Stationary Energy: energy use – Scope 1 (I.X.1)

262

Metric tonnes CO_2e

Waste: waste generated within the city boundary – Scope 1 (III.X.1)

209

Metric tonnes CO_2e

Stationary Energy: energy generation supplied to the grid - Scope 1 (I.4.4)

82

Metric tonnes CO_2e

Stationary Energy: energy use – Scope 2 (I.X.2)

0

Metric tonnes CO_2e

Oslo's emissions have increased.

The scope 1 emissions have increased slightly, from 1259 million tonnes CO_2e in 2012 to 1298 million CO_2e in 2013. The main reason is growth in emissions from off road-transportation, from 184 000 tonnes in 2012 to 246 000 CO_2 in 2013. Emissions from stationary energy use in residential, commercial and institutional buildings decreased by 22 000 tonnes of CO_2.

5.3 **External verification**

Oslo's emissions have been externally verified.

Verification has been undertaken by The Norwegian Environment Agency.

CAN CITIES QUIT FOSSIL FUELS?

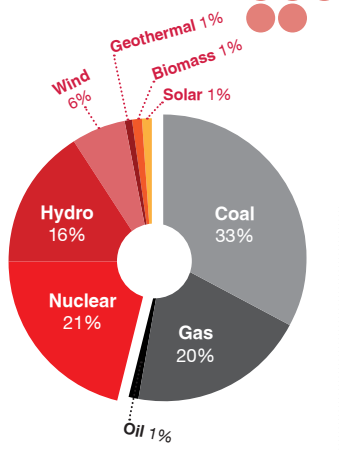
162 CITIES REPORTED THEIR ENERGY MIX,

revealing a diversity of responses, for cities large and small across all regions.

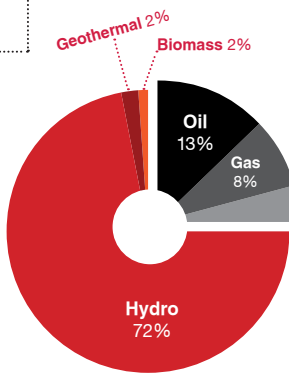
THE RESULTS ARE DIVERSE.

REVEALING MIXES FROM 100% NON-FOSSIL TO 100% CONTINUED RELIANCE ON FOSSIL AND MANY COMBINATIONS THEREOF.

55 NORTH AMERICAN CITIES



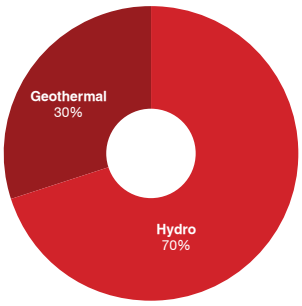
46 LATIN AMERICAN CITIES



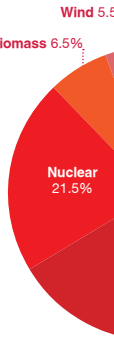
Energy mix by non-fossil %

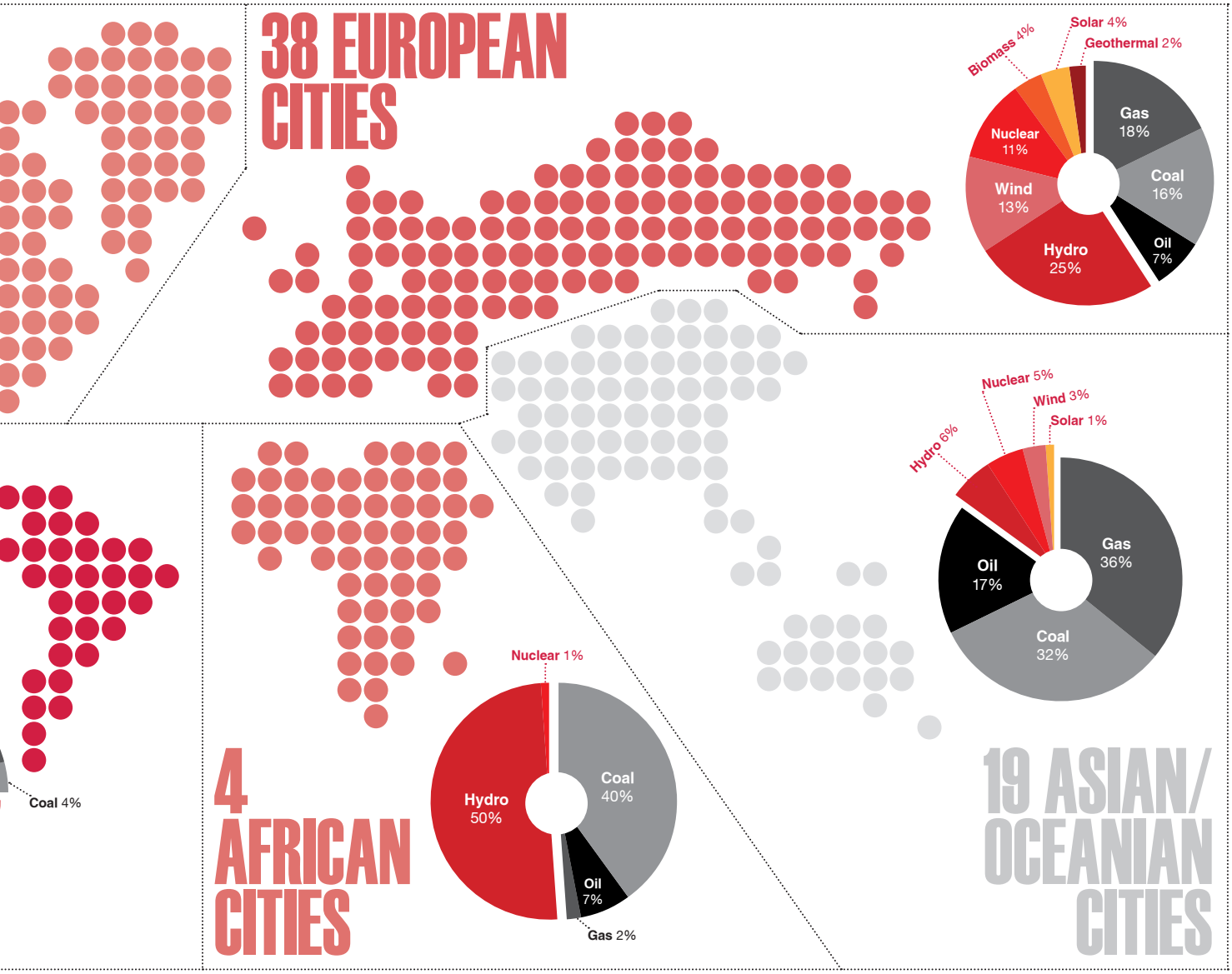
76% 0%

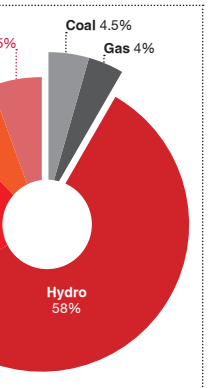
REYKJAVÍK, IS

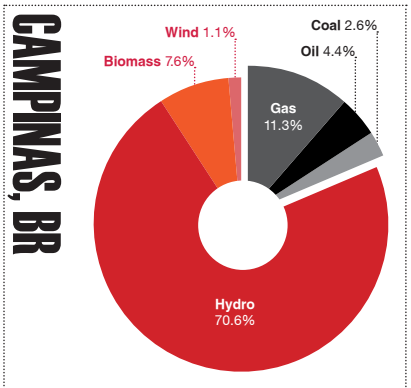


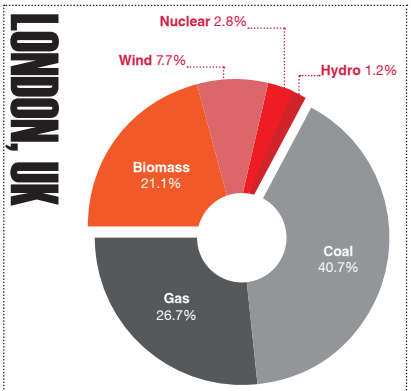
STOCKHOLM, SE

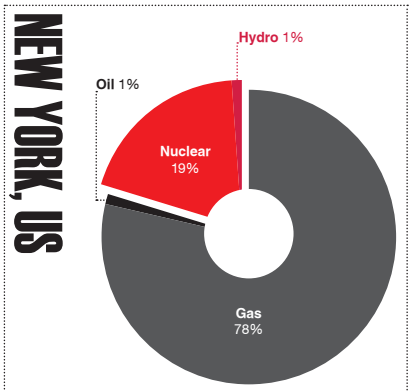



38 EUROPEAN CITIES
Biomass 4%
Solar 4%
Geothermal 2%
Gas 18%
Coal 16%
Oil 7%
Hydro 25%
Nuclear 11%
Wind 13%
Nuclear 5%
Wind 3%
Solar 1%
Hydro 6%
Gas 36%
Coal 32%
Oil 17%
Coal 4%
4 AFRICAN CITIES
Nuclear 1%
Coal 40%
Hydro 50%
Oil 7%
Gas 2%
19 ASIAN/ OCEANIAN CITIES


Coal 4.5%
Gas 4%
Hydro 58%


CAMPINAS, BR
Wind 1.1%
Coal 2.6%
Biomass 7.6%
Oil 4.4%
Gas 11.3%
Hydro 70.6%


LONDON, UK
Nuclear 2.8%
Wind 7.7%
Hydro 1.2%
Biomass 21.1%
Coal 40.7%
Gas 26.7%


NEW YORK, US
Hydro 1%
Oil 1%
Nuclear 19%
Gas 78%

Strategy

6.1 **Local government operations – GHG emissions reduction**

Oslo has a GHG emissions reduction target in place for local government operations.

Oslo's local government operations GHG emissions reduction target in detail:

Baseline year

2008

Baseline emissions

9,084

Metric tonnes CO_2e

GHG sources to which the target applies:

Phasing out of oil heaters in municipal buildings

Percentage reduction target:

100%

Target date

2012

Baseline year

2011

Baseline emissions

4,480

Metric tonnes CO_2e

GHG sources to which the target applies:

Introduction of mainly zero emission vehicles for municipal operations

Percentage reduction target:

100%

Target date

2015

Baseline year

2011

Baseline emissions

63,426

Metric tonnes CO_2e

GHG sources to which the target applies:

Renewable public transport

Percentage reduction target:

100%

Target date

2020

Baseline year

2011

Baseline emissions

59,162

Metric tonnes CO_2e

GHG sources to which the target applies:

Phasing out of oil fossil fuel in district heating grid

Percentage reduction target:

100%

Target date

2016

Activities undertaken to reduce Oslo's emissions in its government operations:

Building performance rating and reporting

Institutional (municipal) buildings and facilities: Audits and advice

Currently in effect at a significant scale across most of the city.

The municipal building corporations in Oslo have different levels of in-house expertise on energy auditing.

Building performance rating and reporting

Institutional (municipal) buildings and facilities: Smart meters

Currently in effect and being piloted.

The municipal building corporation for health services buildings and nursery schools is participating in an EU project for smart buildings and energy management. Smart meters will be required for all electricity customers in Norway by 2019. Phasing in will occur gradually on a cost/benefit basis before then.

Building performance rating and reporting

Residential – Public housing: Benchmarking of energy use

Currently in effect at a significant scale across most of the city.

All of Oslo's municipal building corporations and building owners are expected to comply with national legislation requiring energy rating for public buildings. Additionally, all are required to submit yearly reports on types and amounts of energy used. The city is currently developing similar requirements for rented building spaces through the use of green rental contracts.

Building performance rating and reporting

Residential – Public housing: Energy performance certification

Currently in effect at a significant scale across most of the city.

See “Benchmarking”. Additionally, the city requires all new building and rehabilitation projects to fullfill the national passive house standard.

Building performance rating and reporting

Residential – Public housing: Smart meters

Currently in effect and being piloted.

National legislation requires that all electricity customers are supplied by the electric grid owners with smart metering within 2019. New building projects will phase in smart meters based on profitability assessments. We expect that municipal housing will at a minimum engage in pilot installations in the immediate future.

Energy efficiency/ retrofit measures

Institutional (municipal) buildings and facilities: Building energy management system

Currently in effect at a significant scale across most of the city.

Centralised remote management of energy systems is implemented in a significant number of the city’s schools, nursing homes, leisure facilities etc. Centralised energy management in public housing is lagging behind at present.

Energy efficiency/ retrofit measures

Institutional (municipal) buildings and facilities: Energy performance contracting

Still under consideration or awaiting final authorisation.

A strategy for energy efficient and climate neutral buildings, adopted by the City Government in 2014, recognized the important role EPC can play in energy improvements. The Climate and Energy Programme is mandated to develop a functional strategy and approach for the use of EPC in Oslo, both for municipal buildings and the private building stock.

Energy efficiency/ retrofit measures

Institutional (municipal) buildings and facilities: Insulation

Currently in effect (city-wide).

All municipal rehabilitation projects are expected to fulfill the national passive house standard. Oslo is presently exploring the possibility of utilizing Energy Performance contracting as a lever to increase the rate of energy rehabilitation of existing municipal buildings.

Energy efficiency/ retrofit measures

Residential - Public housing: Energy efficient appliance purchases

Currently in effect at a significant scale across most of the city, although there is probably a limited uptake.

Energy efficiency/ retrofit measures

IResidential – Public housing: HVAC operations & maintenance

Currently in effect at a significant scale across most of the city.

Energy efficiency/ retrofit measures

Institutional (municipal) buildings and facilities: Insulation

New projects, whether rehab or new build will all include high efficiency heat recovery and reuse from building ventilation systems. Implementation of central energy steering systems is lagging in the municipal housing corporation due to fragmented building mass. The municipal school building corporation and municipal nursing home/nursery building corporation are frontrunners in uptake of smart central steering systems and participate in EU projects for this.

Energy efficiency/ retrofit measures

Residential – Public housing: Installation of efficient lighting systems

Currently in effect (city-wide).

Incandescent lighting is gradually being phased out and replaced with halogen and LED solutions (LED currently in pilot phase but expected to be the norm within the near future).

Energy efficiency/ retrofit measures

Residential – Public housing: Insulation

Currently in effect (city-wide).

Rehabilitation projects must satisfy national energy class B standard (low energy). New public housing projects must satisfy national passive house standard requirements.

On-site renewable energy generation

Residential – Public housing: Biomass heating

Currently in effect at a significant scale across most of the city.

Biomass heating in private housing through biopellets is used as heating source on a fairly broad basis. Biomass is also used for energy production for the district heating (both in the form of waste with biogenic origin, and wood powder/pellets incineration).

On-site renewable energy generation

Residential – Public housing: Combined heat and power

Currently in effect at a significant scale across most of the city.

Combined heat and power part of incineration plan. Electricity delivered for public schools. No local uptake of CHP in public housing sector at present date.

On-site renewable energy generation

Residential – Public housing: Geothermal heating supply

Still under consideration or awaiting final authorisation.

Geothermal heat pump installed in district heating network Avantor in Oslo. Pilot for production of hot water directly from deep sources is currently under consideration, initiated by Rock Energy. Oslo's biannual energy survey reports around 1500 geothermal energy wells in 2008. Rapid growth in uptake has probably doubled the number of wells since 2008.

On-site renewable energy generation

Residential – Public housing: Heat pumps

Currently in effect at a significant scale across most of the city.

Grants have been given for water to water and wind to air heat pumps both from national grant Enova and the Oslo Climate and Energy Fund.

On-site renewable energy generation

Residential – Public housing: Micro wind

Still under consideration or awaiting final authorisation.

There has been no uptake yet.

On-site renewable energy generation

Residential – Public housing: Solar heating/ hot water

Currently in effect and being piloted.

Support through Climate and Energy Fund available for the private housing sector, but not for municipal building corporations (for example public housing).

Switching to low-carbon fuels

Institutional (municipal) buildings and facilities: Switching to biomass fuels

Currently in effect and being piloted.

This is especially relevant for public school buildings, especially where space constraints don't prohibit establishing silos for biomass storage.

Switching to low-carbon fuels

Residential – Public housing: Purchasing of ‘green’ electricity from the grid

Currently in effect and being piloted.

Purchase of green electricity has not been mandatory, but shall be extended according to Urban Ecology Program 2011 - 2026.

Switching to low-carbon fuels

Residential – Public housing: Switching from a more carbon intense fuel to natural gas

Still under consideration or awaiting final authorisation.

Not relevant as use in commercial and private housing as not in accordance to the fossil free target of the City. However, natural gas is used to some extend as peak load in the district heating. This is planned to be phased out by 2016.

Switching to low-carbon fuels

Residential – Public housing: Switching to biomass fuels

Currently in effect and being piloted.

Support through national fund Enova available. At present use of biogenic heating is not reported by the municipal housing corporation. Uptake of wood pellets/powder is a challenge at existing building sites due to storage needs and space constraints.

JUST A LITTLE CHANGE WILL GO FAR.

43 cities reported that they want private sector support to deliver community renewable projects. CDP data indicates that less than half of these projects are located in the global south.

$57 TRILLION

will be invested in infrastructure through 2030. That means that less than 0.01% of this sum, or just

$1 OF EVERY $8K

spent is required to support delivery of renewable goals for all the CDP cities that report a target. At just over $7 billion in total, this is still a large price tag and represents a considerable challenge for cities, but with global focus it can be achieved.

6.2 **Community – GHG emissions reduction**

Oslo has a GHG emissions reduction target in place for its community.

Oslo's community GHG emissions reduction target in detail:

Baseline year

1991

Baseline emissions

1,200,000

Metric tonnes CO_2e

Percentage reduction target:

50%

Target date

2030

Baseline year

1991

Baseline emissions

1,200,000

Metric tonnes CO_2e

Percentage reduction target:

100%

Target date

2050

Activities currently being undertaken to reduce emissions city-wide:

On-site renewable energy generation

Commercial buildings and facilities: Combined heat and power

Currently in effect at a significant scale across most of the city.

Phasing out of oil heating and switching to district heating is supported by the Climate and Energy Fund of Oslo.

Low or zero carbon energy supply generation

District energy with renewable energy source

Currently in effect (city-wide).

The District heating system is converting to 100% renewables within 2016 and sufficient progress is being made.

Improve fuel economy and reduce CO2 from motorized vehicles

Incentives/ rebates to switch personal vehicles to electric vehicles

Currently in effect (city-wide).

There are many incentives for electrical vehicles in Oslo: Free parking, free access through the toll ring, access to the bus lanes and on a national level lower taxes.

Improve the efficiency of freight systems

Freight consolidation centers

Still under consideration or awaiting final authorisation.

Oslo currently manages the project “Green Urban Distribution” that include the development of environmentally friendly and efficient solutions for the distribution of goods in the city through better organization, new services and applications of technology. The main objective is to develop environmentally friendly and efficient solutions for freight distribution in the centre of Oslo.

Improve the efficeincy of freight systems

Low emission zones

Still under consideration or awaiting final authorisation.

Oslo has been working with the national authorities to be able to establish low-emission zones. Recently the Parliament gave the authority to decide this to the municipalities.

Improve fuel economy and reduce CO2 from motorized vehicles

Electric vehicle charging infrastructure

Currently in effect (city-wide).

Oslo has about 1000 charging points owned by the municipality by 2015.

Building performance rating and reporting

Performance ratings for all large buildings

Currently in effect (city-wide).

National legislation requires energy performance rating for all buildings sold, rented and for all large buildings in the country in compliance with the European Energy Performance in Buildings Directive. All municipal building corporations in Oslo are in compliance and this is expected to have a positive effect of the market for private sector performance rating.

Building codes and standards

Stricter building codes

Still under consideration or awaiting final authorisation.

National regulation for building codes is mandatory. The municipalities are not allowed to require higher standards for non-municipal buildings. The City of Oslo took initiative for a working group for local pilot scheme for early introduction of stricter building codes. As the national government has decided to introduce passive house levels in the building code for 2015, the national authority did not allow for local pilot. However, the Planning Agency is prioritizing projects with higher environmental standards. The FutureBuilt program also requires higher energy standards than the national regulation.

Energy efficiency/ retrofit measures

Commercial buildings and facilities: Heating and cooling efficiency

Currently in effect (city-wide).

The Oslo Climate and Energy Fund is the main financing mechanism for several energy efficiency measures offered by the City of Oslo.

Transmission and distribution loss reduction

Improving the efficiency of transmission and distribution networks

Hafslund nett has the local electricity grid concession. Both Hafslund and the national grid owner Statnett are working toward renewal of the high voltage and medium voltage distribution grid that serves Oslo. Additionally, Oslo is working to promote the development and uptake of smart grid technologies within the city.

Infrastructure for non-motorized transport

Developing new cycling routes away from motorized traffic within your City

Currently in effect (city-wide).

A city wide system of bike lanes is being built. The city tries to better maintain sidewalks and bike lanes in winter to promote more non-motorized transport.

Improve rail, metro, and tram infrastructure, services and operations

Public transport improvement plan

Currently in effect (city-wide).

A plan to speed up and make public transport flow more easily through the city was completed in 2013, and implementation of measures started.

Improve fuel economy and reduce CO2 from bus and/or light rail

Public transport required to use renewable energy

Currently in effect at a significant scale across most of the city.

All public transport in Oslo is required to only use renewable energy by 2020. In 2020 we believe in buses with a mixture of bio diesel, bio gas, hydrogen and electric. Sufficient progress is being made.

Smart public transport

Bike scheme systems that track availability of bikes and locations for drop off

Oslo has bike scheme systems that track availability of bikes and location for drop off, electrical vehicle station mapping, real-time information on public transit routes etc.

Transportation demand management

Restrict parking

Currently in effect (city-wide).

In the last three years 380 parking spaces in the streets have been removed in Oslo, and Oslo is working to remove more parking spaces. This is to speed up the public transport flow and to meet a target saying that all growth in transport will be done by public transport, walking and cycling.

Transportation demand management

Road tolls

Currently in effect (city-wide).

Oslo has had a toll ring for more than 20 years. Now almost 80% of the income goes to finance public transport. Since 2007 there has been a slight reduction in the number of cars that crosses the toll barrier, while the number of passengers on public transport has increased by more than 30%. Part of the explanation is probably a toll-price increase, combined with reduced fares on public transport and improvements of the public transport service.

Compact cities

Urban planning and new construction take place within a compact city framework

Current in effect (city-wide).

Integrated in City Master Plan and regional plans / strategies: Within the city, new developments should take place in the city centre, near the fjord, near stations and other public transport nodes, and along important public transport axes. In parts of the region outside Oslo, the city is also collaborating with planning authorities to produce strategic plans that will encourage both compact land use near the stations and increased capacity in public transport.

Transit orientated development

Prioritising development in areas well connected by transit

Currently in effect (city-wide).

Integrated in City Master Plan and regional plans / strategies: Within the city, new developments should take place in the city centre, near stations and other public transport nodes and along important public transport axes. In parts of the region outside Oslo, the city is also collaborating with planning authorities to produce strategic plans that will encourage both compact land use near the stations and increased capacity in public transport.

Transit orientated development

Using current transportation infrastructure projects as focus for new neighbourhood development

Currently in effect at a significant scale across most of the city.

There is an increased focus that public transport infrastructure must be in place when new neighbourhoods are developed, and that new neighbourhoods are planned where infrastructure projects are planned.

Developing the green economy

Host events/ conferences aimed at attracting green businesses or investment

Currently in effect (city-wide).

“Business for Climate” is initiated and owned by the Governing Mayor of Oslo. The local business community is invited to sign the Oslo Climate Pact, where they commit to helping the City of Oslo to reach their emission target and to report on their own progress. To date (April 2015), about 70 companies have signed the Climate Pact. Network meetings give local businesses an informal araena to discuss solutions with the city`s politicians. Some local companies have also been invited to monthly meetings to discuss the climate and energy strategy of Oslo.

Developing the green economy

Operate certification schemes to promote local green businesses

The city of Oslo has been actively involved in the development of a Norwegian Version of Breeam Communities.

Instruments to fund low carbon projects

Establish a revolving fund for low carbon or green projects

Still under consideration or awaiting final authorisation.

The Climate and Energy fund will probably be further developed towards supporting innovative green projects.

Encourage sustainable food production and consumption

Establish sustainable food plan

Oslo has made an action Plan for Sustainable Food.

Some of the actions proposed are to reduce food waste, reduce the consumption of meat and more ecological food.

LED / CFL / other luminaire technologies

More efficient luminaires (e.g. LED)

Still under consideration or awaiting final authorisation.

Oslo is not working towards the city centre where more efficient lighting is one of the components. It is also a high priority to phase out the mercury vapour lamp and replace it by LED.

Smart Lighting

Monitor electricity use for street lighting

Currently in effect at a significant scale across most of the city.

Smart lighting

Computerized lighting

Currently in effect at a significant scale across most of the city.

Almost 20% of the public lighting in Oslo are dynamic. Our target (not yet adopted) is that all street lights shall be dynamic and energy effiicient in 2025.

Brownfield redevelopment programs

Brownfield redevelopment, clean up or rehabilitation initiatives

Currently in effect (city-wide).

Transformation of former industrial sites has long been a key strategy in Oslo. Current developments of this kind are most visible at Bjørvika at the waterfront of Oslo – the new Fjord City. Public outdoor spaces, the waterfront promenade and the urban spaces will open up Oslo to the fjord and the sea beyond. The main concept in the town planning is the seven commons, pedestrian-based urban spaces. The common spaces make the seafront directly accessible to residents in the neighbourhoods behind and will be served by the Oslo Tramway.

Green space and/ or biodiversity preservation and expansion

Conservation or restoration of ecological corridors/connectivity

Greenbelt towards the City Forest and Hills “Marka” limit expansion of building zone.

There are also strategies to maintain the green corridors between the “Marka” and the Fjord. Oslo is one of the first cities in Europe to designate and map quiet areas in the city. Data on current noise levels in these areas has been collected.

Eco-district development strategy

Develop carbon neutral urban areas

FutureBuilt is a ten-year programme (2010-2020) with a vision of developing carbon neutral urban areas and high-quality architecture. The aim is to complete 50 pilot projects – urban areas as well as individual buildings – with the lowest possible greenhouse gas emissions. Requirement to be a FutureBuilt project is a reduction of GHG emission from energy use, transport and construction by 50% compared to business as usual.

Wastewater to energy initiatives

Methane recovery for re-use

Currently in effect (city-wide).

In February 2010, a biogas plant was opened at the Bekkelaget wastewater treatment plant. Here, biogas is produced from sewage sludge and upgraded for use as transport fuel. Biogas from sewage is climate-neutral. It is being used to fuel 45 buses and 100 heavy vehicles, mainly refuse collection trucks. Emission reduction based on 5400 tons/year x 20 years.

Wastewater to energy initiatives

Wastewater heat recovery

On the main sewage pipeline towards the Vestfjorden Sewage Plant (VEAS), one of the world's largest heat pumps produces around 90 GWh / heat / year. This energy is used as one of the sources for renewable base load in the district heating system.

Recycling or composting collections and/or facilities

Curbside collection of compost, recycling, and waste

Oslo has curbside collection of food waste, plastic packaging, paper/cardboard as separate fractions, in addition to residual waste. Food waste, plastic packaging and residual household waste is separated and deposited in differently coloured bags and transported at two optical sorting plants. Glass and metal packaging, textiles (used clothes) hazardous waste is brought to recycling points all over the city. Bulky and hazardous waste (in larger amounts) is brought to 9 local recycling centres and 2 large car based recycling centres.

Landfill management

Landfill gas management/ Landfill gas to energy

Currently in effect (city-wide).

There are no operating landfills in Oslo. At the closed landfills in Oslo, methane gas is captured and used for energy production. The plant consists of 221 gas wells connected to 11 'gashouses'. The gas is distributed to a combustion plant equipped with gas engines. The energy is converted into district heating and electricity distributed through the regular grids. As the landfill is phased out, existing gas wells will be upgraded and more wells will be installed.

Recyclables and organics separation from other waste

Residential organic waste: Source separation policies

All household food waste is collected for anaerobic treatment in the city's own biogas plant and production of bio methane, which fuels city busses, and soil enhancer which returns vital minerals and humus to farming soils. Garden waste from households, parks and professional gardeners are received for composting. The outcome from the composting is returned to private and professional gardeners.

Low or zero carbon energy supply generation

Conventional waste to energy

Waste incineration from The Waste to Energy Agency in two plants with a capacity of 410 000 tonnes of waste yearly. The two plants are producing district heating that equivalent of 83 200 households (832 GWh), and the electricity use of 26 400 households (132 GWh) in the City of Oslo.

Improve fuel economy and reduce CO2 from motorized vehicles

Switch taxi fleet to electric/ hybrid/ hydrogen

Still under consideration or awaiting final authorisation.

Oslo was earlier not allowed to require low-emissions taxis due to national legislation. A legal amendment has changed this and it is now up to the counties to decide if they will require green taxis.

Encourage sustainable food production and consumption

Community gardens or allotments

Currently in effect at a significant scale across most of the city.

Oslo has a long history of allotment gardens. The municipality owns the land and rents it out on long-term contracts to different allotment garden associations. During the past years (2011-2015) Oslo has got several new temporary user-driven allotment gardens, constituting hundreds of pallet grow boxes, most of which have been supported by the municipality.

Encourage sustainable food production and consumption

Community supported agriculture

Still under consideration or awaiting final authorisation.

CSA is increasingly on the agenda in Oslo. There are local groups promoting it, encouraging local farmers to start CSA. A new strategy on agriculture has proposed that the municipality investigates CSA on farms owned by the municipality. The strategy is not yet adopted.

Encourage sustainable food production and consumption

Education or community events focused on climate smart food

Still under consideration or awaiting final authorisation.

Oslo has an increasing movement of organizations and individuals who focus on climate smart Food. Intolife/Intofood teaches chefs and families to cook more climate friendly food. Intolife's family activities are supported by the municipality. The City of Oslo has just made a draft for an action plan for sustainable food 2015-2018.

Encourage sustainable food production and consumption

Rooftop farming

Not currently being considered.

Oslo is preparing a new strategy for green roofs which will include rooftop farming and vertical farming.

On-site renewable energy generation

Residential - Private housing: Solar electricity

Currently in effect (city-wide).

Oslo covers 40% of the investment costs when private housing wants to install solar electricity. This is done through the Climate and Energy Fund.

On-site renewable energy generation

Commercial buildings and facilities: Heat pumps

Currently in effect (city-wide).

Phasing out of oil heating and switching to heat pumps is supported by The Oslo Climate and Energy Fund.

Improve fuel economy and reduce CO2 from bus and/or light rail

Switch buses to hydrogen fuel cell

Currently in effect and being piloted.

Currently 2 fuelling stations for FCEV in Oslo, and 2 further stations in the Oslo region (Drammen and Lillestrøm Hynor). About 20 FCEVs in Oslo and the surrounding Akershus County. One filling station for the 5 pilot FCEV Hynor Bus project at Rosmersholm. Oslo has developed a hydrogen strategy together with Akershus.

6.3 Planning

The city-wide energy mix for Oslo's electricity:

Hydro

98%

Oslo has renewable energy targets.

Fossil-free district heating :

Target Date - 2016

Zero greenhouse gas emissions from fossil fuel oil:

Target Date - 2020

6.4 **Water**

Oslo does not foresee substantive risks to its water supply in the short or long term.

Oslo Water and Sewerage Works is a municipally-run utility responsible for the supply and treatment of drinking water and sewage to residents, businesses, and visitors in the municipalities of Oslo and Ski. All activity is financed through water-and-wastewater collection fees.

The agency has as a vision for sustainable water supply: infrastructure associated with water supply and wastewater collection must be handed over to the next generation in better condition than it was when it was handed to us. Water supply and wastewater services must be carried out in such a way that it does not harm the environment.

Norway has more water than most other countries and its quality is very good. The raw water used in Oslo comes from snow or rain precipitation fields in the forests and hills around Oslo. A network of streams and waterways fills up the water reservoirs we need in order to supply the population of Oslo. There are no major risks on short or middle term for substantive water related risk. There is however, medium and long term consideration for alternative water supply sources and treatment capacity for the reserve water supply. This is mainly in order to secure water supply for a rapid growing population.

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