

Ravenna



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In partnership with



**Bloomberg
Philanthropies**



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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 CO₂e, 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 Ravenna 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.



Ravenna in context

Number of cities responding per year

48

2011

73

2012

110

2013

207

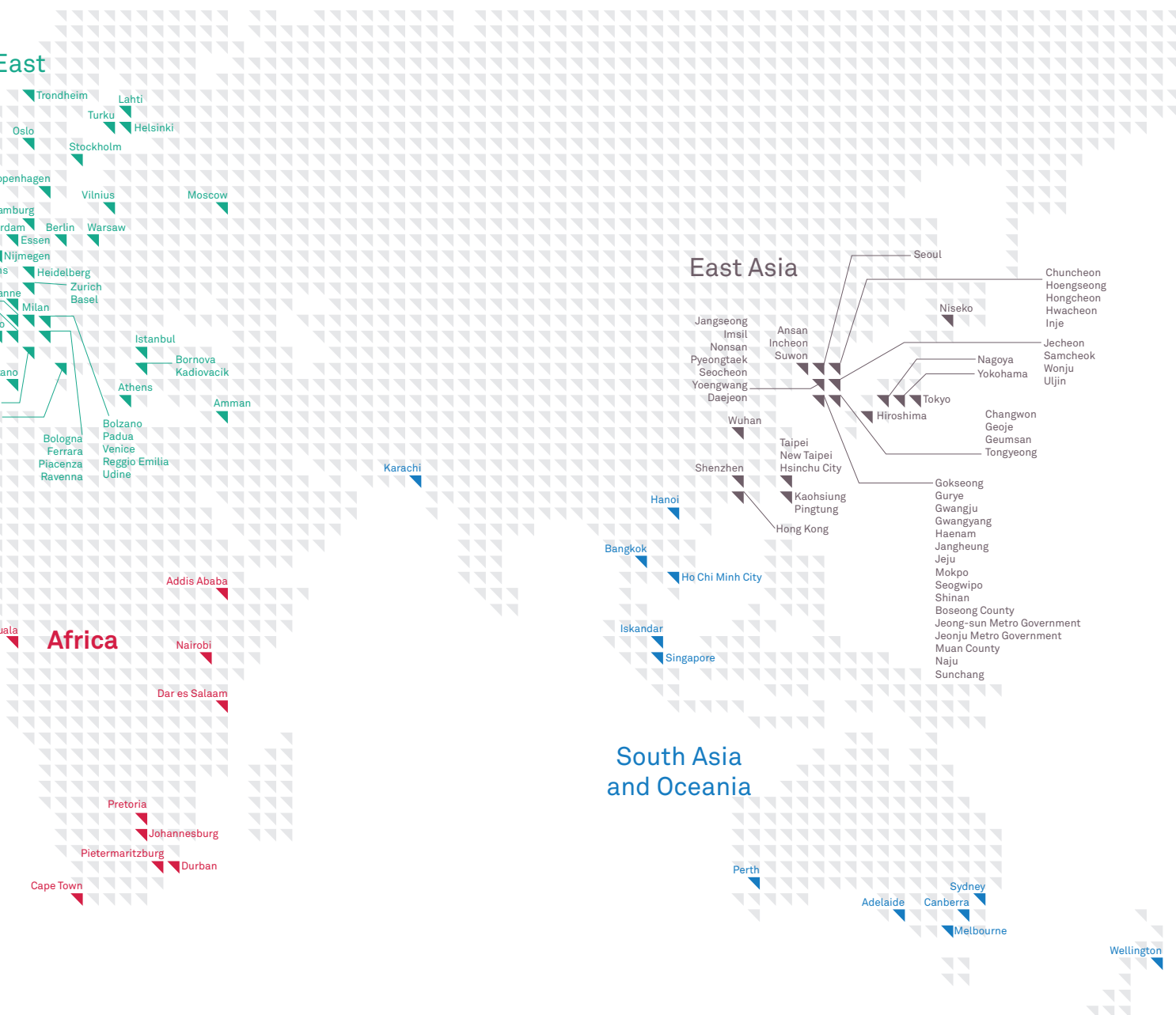
2014

308

2015

Ravenna participation





Total population of cities responding in 2015

446,186,833

Ravenna (city proper)

158,911

people

Where Ravenna fits

171 small

<600k population

77 medium

600k-1.6m population

60 large

1.6m+ population

Year reported

2015

Area

683

km²

Population

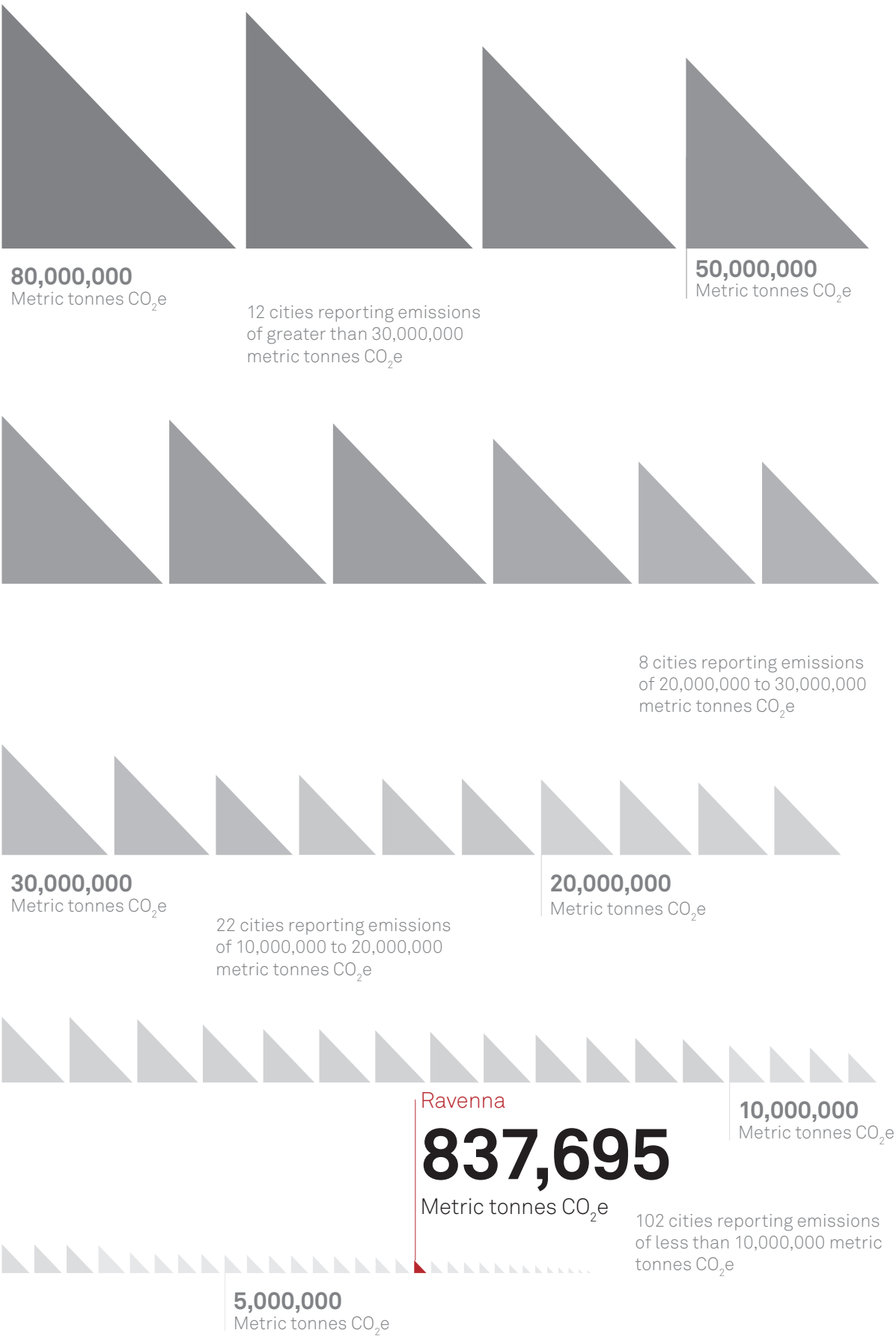
158,911

Ravenna in focus

Inventory method

**2006 IPCC Guidelines for National Greenhouse
Gas Inventories (NGGI)**

144 cities reporting emissions in 2015



0 Introduction

Ravenna municipality is a local autonomous entity that exercises administrative functions conferred by national and regional laws. The organization of the municipality is structured by functional areas.

It's located in the north-east of Italy within Emilia-Romagna Region on the Adriatic Coast, with a surface of 683 Km² and 35km of coast, along which there are 9 seaside villages, several natural reserves including the Po Delta Regional Park.

From a climatic point of view you two units can be distinguished: the coast and the inland plain. The narrow coastal strip, with north-south orientation, is significantly affected by the influence of the sea, with frequent to accentuated ventilation, rather low rainfall

Introduction

and marked thermal mitigation. The inland has a more continental climate, with higher daily temperature, frost and more frequent, smaller ventilation.

The economic context is characterized by multisectoral activities including tourism, commercial and industrial port, commercial and manufacturing activities and all the connections with them, small and medium-sized enterprises, agriculture, agro-industrial and livestock enterprises, highly developed tertiary activities.

Ravenna territory is characterized by urban sprawl and the consequent waterproofing of urbanized areas. As well as natural and anthropic subsidence, coastal erosion and marine ingression.

The municipal government has set targets for the sustainable management of its territory highlighted as elements of preventive care in planning tools and at the base of the management of its assets and operations. Recently Ravenna implemented several urban regeneration projects. Over the next few years, the Administration is preparing to focus on the means of implementation and management to achieve the objectives of development and redevelopment of existing areas, with respect to the consumption of territory.

1.1 Governance

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

Emissions Reductions and Adaptation

Ravenna has a monitoring network to continuously measure air quality parameters. The network and the data are managed by the Regional Environmental Agency (ARPA). Data are available online and ARPA processes an annual report of air quality assessment. Through its EMS and its yearly Environmental Budget the Administration keeps record of its emission trends. Under the Covenant of Mayors, Ravenna has developed a Sustainable Energy Plans with a baseline inventory and a Monitoring Action Plan.

Governance

The EMS is the main tool of reviewing and controlling of the implemented and foreseen actions of the Municipality in terms of climate change adaptation. SEAP and its monitoring action plan also include review of adaptation actions taken place by the Municipality. EMS and the Yearly Environmental Budget are also main instruments of review and recording of adaptation strategies.

Ravenna has committed to adapting to climate change.

Ravenna's Mayor signed the Covenant of Mayors voluntarily, committing to increase energy efficiency and use of renewable energy sources on his territories. The aim is to meet and exceed the European Union 20% CO₂ reduction objective by 2020. In order to reduce CO₂ emissions, adaptation policies are put in place. Ravenna is also planning to join the Mayor's Adapt program.

Ravenna does not have a plan that addresses climate change adaptation.

Ravenna Municipality has not yet developed a specific climate change adaptation plan, but adaptation actions are included in strategy plans, such as the Sustainable Energy Action Plan within the Covenant of Mayors (subscribed by Ravenna's Mayor in 2013), the Regulation

for Urban Constructions, and the Operational Municipal Plan for the renovation of the Docks neighborhood.

The Municipality is planning to sign the Mayor's Adapt and it will therefore act towards this commitment, adopting a specific plan or strengthening adaptation measures in its existing plans.

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

Impacts on Ravenna's activities include: air quality for the reduction of emissions from traffic and heating systems, sustainable mobility planning and the implementation of electric mobility.

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

The approval procedure of Ravenna Master Plan (Piano Strutturale Comunale) included an SEA procedure that analysed the sustainability and environmental impacts of the plan. The plan defined a set of environmental sustainability goals that have been assessed towards the Master Plan actions and towards goals and actions of the higher-level territorial plan for the provincial coordination.

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

Piano d'azione per l'energia sostenibile (PAES) 2012.

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.

2.1 Physical risks

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

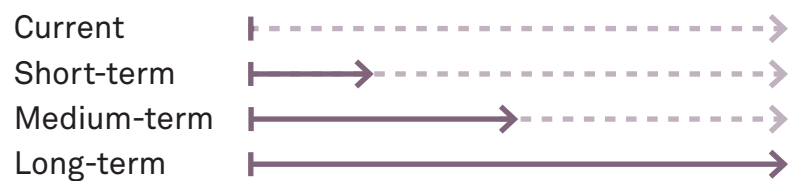
Seriousness

Less Serious !!!

Serious !!!

Extremely Serious !!!

Timescale



Risks & Adaptation

More frequent heatwaves

Risk:  Timescale: 

Impact on population health

More intense rainfall

Risk:  Timescale: 

Flooding

Sea level rise

Risk:  Timescale: 

Flooding

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

Factors that may worsen the physical effects of climate change include: industrial emissions, and gas emissions from vehicles and heating systems

Flooding risk is increased by the beach erosion which is increased by the subsidence, which is increased in turn by the underground gas exploitation.

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

Particularly on the seaside, businesses are strongly threatened by flooding, which increases costs for protection and recovery of structures, and are often destroyed during coastal storms.

More frequent extreme conditions during summer seasons, such as increased rainfall or variable temperatures, may also negatively affect business related to beach tourism.

Agriculture is affected by flooding as well, which increases the risk of crop destruction. Drought periods or too intense rainfall may also threaten crops, reducing business profitability due to low production.

A climate change risk or vulnerability assessment has not been undertaken for the Ravenna area.

2.2 Climate Hazards

Ravenna currently experiences the following climate hazards:

More frequent heat waves

River flood due to more intense rainfall

Coastal flood due to sea level rise

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

Heat wave

Forest fire

River flood

Coastal flood

Salt water intrusion

2.3 Adaptation

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

Crisis management including warning and evacuation

Hazard: Heat wave

The municipality has an emergency plan for heat waves that has been developed on the base of event scenarios and risk scenarios and mapping. The plan includes an intervention procedure in case of emergency.

Crisis management including warning and evacuation systems

Hazard: Flooding due to more intense rainfall

The municipality has an emergency plan for hydraulic flood risk that has been developed on the base of analysis of flooding time series, event scenarios and risk scenarios. The plan includes an intervention procedure in case of flooding alert.

Crisis management including warning and evacuation systems

Hazard: Flooding due to sea level rise

The municipality has an emergency plan for marine flood risk that has been developed on the base of hazard mapping, event scenarios and risk scenarios. The plan includes an intervention procedure in case of flooding alert.

2.4 Social risks

Ravenna faces social risks as a result of climate change.

Fluctuating socio-economic conditions

Timescale: 

Potential risks in agriculture and tourism

Increased risk to already vulnerable populations

Timescale: 

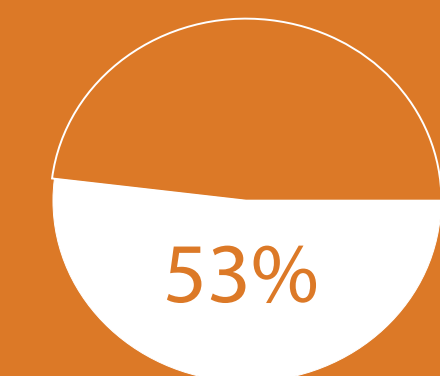
Vulnerable populations are at risk in case of heat wave

Increased resource demand

Timescale: 

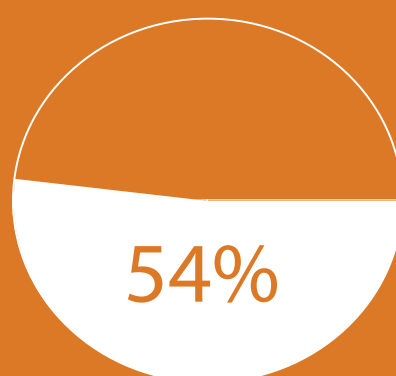
Flooding and coastal erosion need resources to recover damages due to flooding and storm events and to implement actions to reduce the potential damages

Cities are at risk from climate change



of risks reported as

serious and
near-term



of cities have completed a

risk
assessment

4.1 **Date and boundary**

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

Fri 01 Jan 2010 – Fri 31 Dec 2010

Boundary typology used for Ravenna's GHG emissions inventory:

Departments, entities or companies over which financial control is exercised.

Emissions – Local Government

4.2 GHG emissions data

Ravenna uses the IPCC methodology for estimating international standard (bottom-up approach, based on end-use sector fuels), EMEP-CORINAIR (for the regional inventory).

The Emission Inventory (MEI) is updated within the Sustainable Energy Action Plan. It is based on the methodology and toolkit developed by ARPA ER (Environmental Protection Agency of Emilia-Romagna Region) within the instrument IPSI (Inventory of greenhouse gas emissions for the Covenant of Mayors - Italian version). The methodology was improved and adapted by a specific working group “Climate Plan” at regional level including the main cities and Provinces. The background knowledge is based on the Regional Greenhouse Gas Emissions Inventory realized by the Region with the support of ARPA ER, following standard estimation methodologies, internationally recognized (IPCC, CORINAIR). The MEI includes: direct emissions of the Municipality considered as an organization with its own consumptions; indirect emissions, generated by activities within the Municipal area estimated by ARPA ER as a breakdown of the regional inventory. According to the European and Regional methodology, activities within ETS (Emissions Trade System) are not taken into account.

Gases included in emissions inventory:

CO₂

Total (Scope 1 + 2) emissions for Ravenna:

16,809

Metric tonnes CO₂e

Breakdown of Ravenna's
GHG emissions by scope:

Scopes are a common categorisation method. Scope 1: All direct GHG emissions (with the exception of direct CO₂ 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

6,124

Metric tonnes CO₂e

Total Scope 2 activity

10,685

Metric tonnes CO₂e

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

Buildings - Diesel/Gas oil

207,963_L

Buildings - Natural gas

2,688,773_{m³}

Buildings - Liquefied Petroleum Gas (LPG)

28,138_L

Municipal Vehicle Fleet - Motor gasoline (petrol)

40,593_L

Municipal Vehicle Fleet - Diesel/Gas oil

33,756_L

Municipal Vehicle Fleet - Liquefied Petroleum Gas (LPG)

818_L

Municipal Vehicle Fleet - Methane

18,132_{m³}

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

Electricity (buildings)

8,017_{MWh}

Electricity (Street lighting and traffic signals)

19,950_{MWh}

Ravenna does not measures Scope 3 emissions.

It is now difficult to quantify other data.

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

Municipal buildings - heating

5,876

Metric tonnes CO₂e

Municipal building - electricity

3,063

Metric tonnes CO₂e

Municipal fleet

248

Metric tonnes CO₂e

Ravenna's emissions have decreased.

CO2 emissions due to Municipality activities decreased between 2007 (baseline year) and 2010 (1° Inventory update) by 2.8%. Within the Covenant of Mayors, Ravenna Municipality is implementing a series of measures and actions aimed at reducing CO2 emissions by at least 20% by 2020 over its entire territory. In its complex, the emissions directly generated by the Municipal organization are just less than 2% of the total. However the Municipality is implementing actions, such as the conversion of public light to LED system, the conversion of the municipal fleet to less impacting fuel systems, including electrical vehicles, and improving of energy efficiency of its buildings.

4.3 External verification

Ravenna's emissions have been externally verified.

Name of Verifier: Ernesto Oppici CERTIQUALITY Srl





5.1 Date and boundary

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

Fri 01 Jan 2010 – Tue 21 Dec 2010

Boundary typology used for Ravenna's GHG emissions inventory:

Administrative boundary of a local government.

Emissions – Community

5.2 GHG emissions data

Ravenna has used the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

The Emission Inventory (MEI) is updated within the Sustainable Energy Action Plan. It is based on the methodology and toolkit developed by ARPA ER (Environmental Protection Agency of Emilia-Romagna Region) within the instrument IPSI (Inventory of greenhouse gas emissions for the Covenant of Mayors - Italian version). The methodology was improved and adapted by a specific working group “Climate Plan” at regional level including the main cities and Provinces. The background knowledge is based on the Regional Greenhouse Gas Emissions Inventory realized by the Region with the support of ARPA ER, following standard estimation methodologies, internationally recognized (IPCC, CORINAIR). The MEI includes: direct emissions of the Municipality considered as an organization with its own consumptions; indirect emissions, generated by activities within the Municipal area estimated by ARPA ER as a breakdown of the regional inventory. According to the European and Regional methodology, activities within ETS (Emissions Trade System) are not taken into account.

Gases included in emissions inventory:

CO₂

Total (Scope 1 + 2) emissions for Ravenna:

837,695

Metric tonnes CO₂e

Breakdown of Ravenna's
GHG emissions by scope:

Scopes are a common categorisation method. Scope 1: All direct GHG emissions (with the exception of direct CO₂ 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 (excluding emissions from grid-supplied energy generation)

399,132

Metric tonnes CO₂e

Total Scope 2 activity

438,562

Metric tonnes CO₂e

Total Scope 3 activity

510,598

Metric tonnes CO₂e

Breakdown of these emissions by end user,
economic sector, IPCC sector, GHG
or any other classification system used:

End user: buildings, water, waste, transport. Economic sector: residential, commercial, industrial, institutional. IPCC sector: stationary combustion, mobile combustion, industrial processes, waste. Greenhouse gas: CO₂, CH₄, N₂O etc.

Tertiary (non municipal) buildings, equipment/facilities –
Scope 1

144,684

Metric tonnes CO₂e

Tertiary (non municipal) buildings, equipment/facilities –
Scope 2

138,703

Metric tonnes CO₂e

Residential buildings – Scope 1

187,982

Metric tonnes CO₂e

Residential buildings – Scope 2

73,228

Metric tonnes CO₂e

Industry non-ETS – Scope 1

66,467

Metric tonnes CO₂e

Industry non-ETS – Scope 2

226,632

Metric tonnes CO₂e

Waste – Scope 3

123,985

Metric tonnes CO₂e

Transport (private and commercial) – Scope 3

386,613

Metric tonnes CO₂e

Breakdown of the total amount of fuel (referring to Scope 1 emissions) consumed in Ravenna during the reporting year:

Methane

1,743,460_{MWh}

Diesel/Gas oil

1,208,862_{MWh}

Motor gasoline (petrol)

360,238_{MWh}

Wood or wood waste

67,440_{MWh}

Liquefied Natural Gas (LNG)

65,032_{MWh}

Other fossil fuel

20,318_{MWh}

Coal (Lignite or Brown coal)

1,003_{MWh}

Kerosene

451_{MWh}

Breakdown of electricity, heat, steam, and cooling (referring to Scope 2) consumed by Ravenna during the reporting year:

Electricity

1,147,978_{MWh}

Ravenna's emissions have decreased.

According to the Covenant of Mayors a series of actions have been implemented and are still on going in order to reach the goal of a reduction of CO2 emissions by at least 20% by 2020.

5.3 External verification

Ravenna's emissions have not been externally verified. The emission inventory is based on tools and methodology developed at regional level. Emission and energy data at municipal level are provided by the Regional Air Emission inventory, the Regional Energy Information System, by energy producers and providers companies.

Ravenna Municipality is always trying to improve its control over the consumptions and emission that occur within its territory. This is part of the improvement program included in its Environmental Management System and of the Monitoring Action Plan of the SEAP. However, at the moment, specific external audit actions are not yet foreseen.



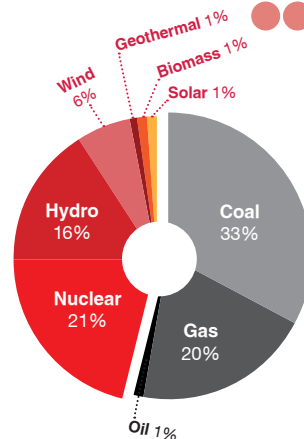
CAN CITIES QUIT FOSSIL FUELS?

162 CITIES REPORTED THEIR ENERGY MIX,

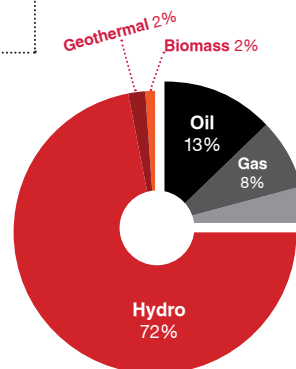
revealing a diversity of
responses, for cities large and
small across all regions.

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

55 NORTH AMERICAN CITIES

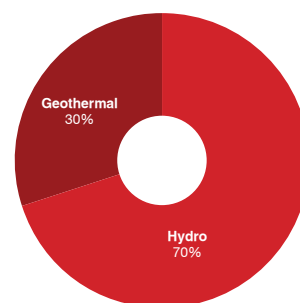


46 LATIN AMERICAN CITIES

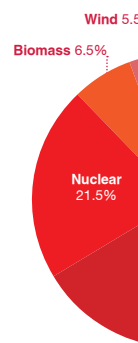


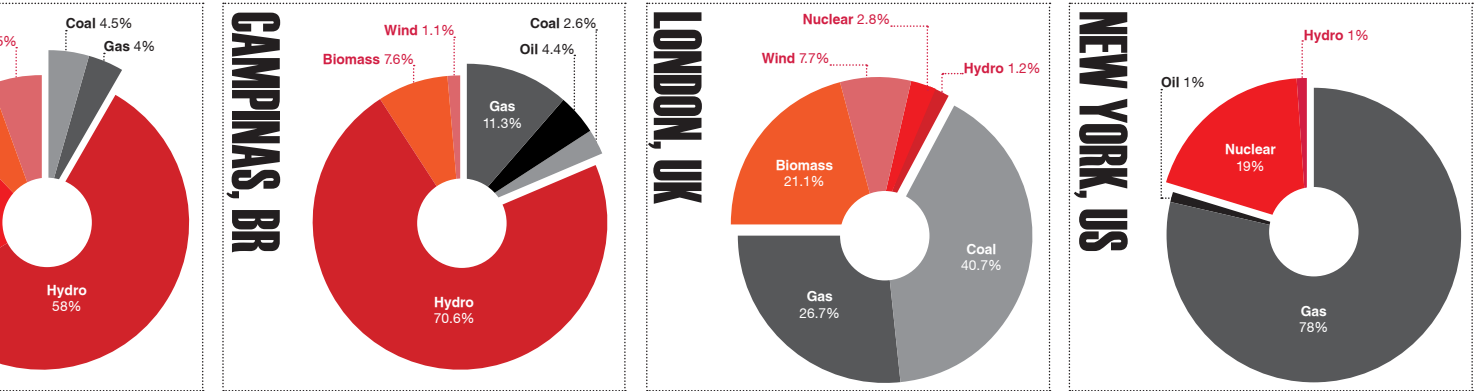
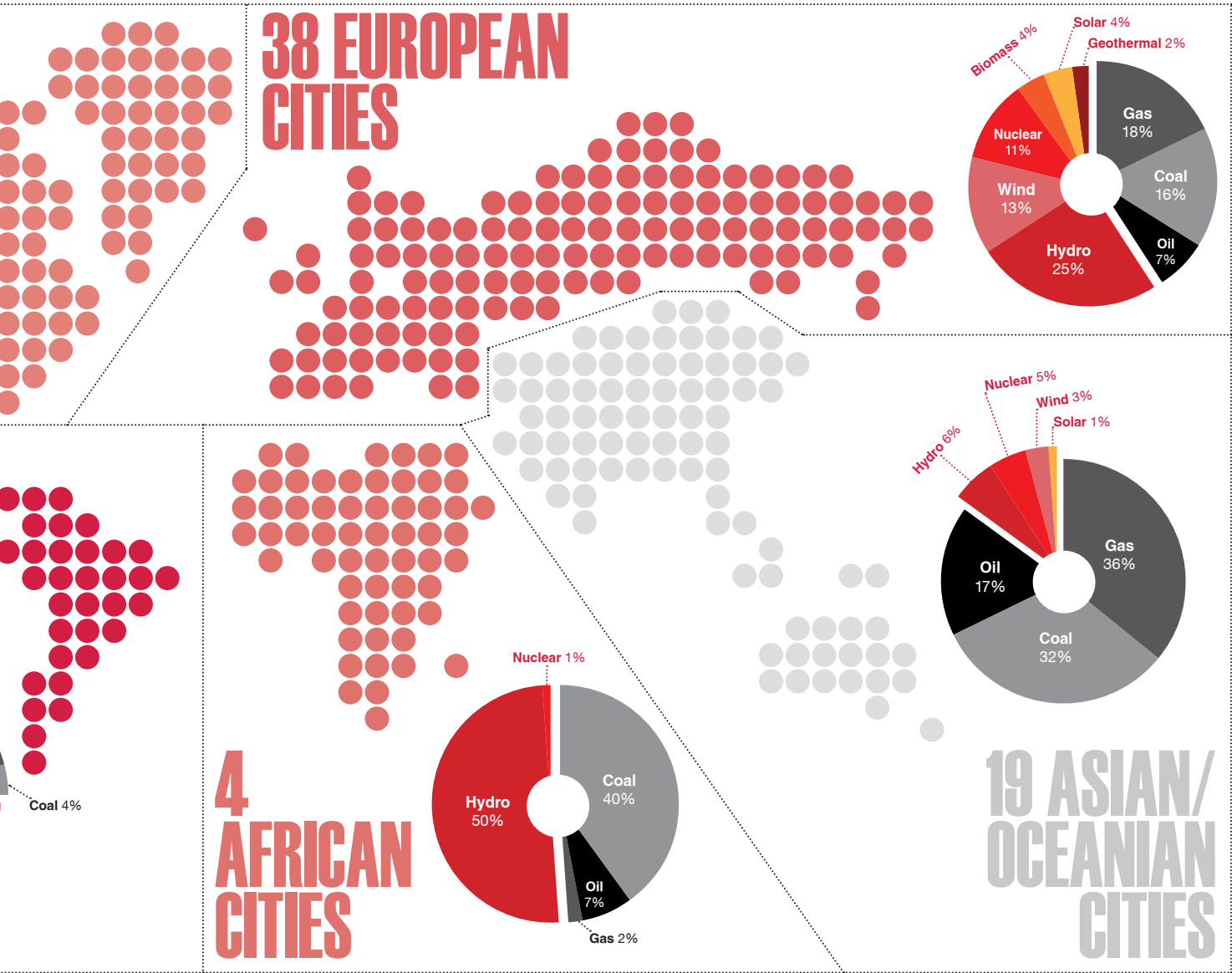
Energy mix by non-fossil %
76% 0%

REYKJAVIK, IS



STOCKHOLM, SE







Strategy

6.1 Local government operations – GHG emissions reduction

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

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

Baseline year

2007

Baseline emissions

17,295

Metric tonnes CO₂e

Percentage reduction target

Entire emissions inventory

23.9%

Target date

2020

This target is related to CO₂ emissions and was set in the Covenant of Mayors signed by Ravenna Municipality in 2012. This is a global target for the CO₂ emissions due to Local Government Operations and Community. As a result of the last monitoring program, carried out in 2015, global reduction target foreseen in 2020 is 23.8%, but it is mainly due to reduction in Community emissions.

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

Energy Supply

Low or zero carbon energy supply generation

Anticipated total reduction: 3,535.25 metric tonnes CO₂e

Purchase of electricity from certified 100% green energy source for all municipal buildings.

Buildings

Switching to low-carbon fuels

Anticipated total reduction: 0.05 metric tonnes CO₂e

Loggetta Lombardesca: replacement of thermal power plant.

Buildings

Energy efficiency/ retrofit measures

Anticipated total reduction: 868 metric tonnes CO₂e

Refurbishing of municipal buildings to improve energy efficiency and improvement of thermal plants.

Outdoor Lighting

LED / CFL / other luminaire technologies

Anticipated total reduction: 2226.4 metric tonnes CO₂e

Redevelopment and efficiency of public outdoor lighting.

Mass Transit

Improve fuel economy and reduce CO₂ from trucks

Anticipated total reduction: 50.3 metric tonnes CO₂e

Conversion of municipal fleet to natural gas and electric motor.

Mass Transit

Smart public transport

Anticipated total reduction: 97.3 metric tonnes CO₂e

Discounted season tickets for municipal employees.

Mass Transit

Improve fuel economy and reduce CO₂ from trucks

Anticipated total reduction: 179 metric tonnes CO₂e

Conversion of public transport buses to natural gas.

Energy Supply

Low or zero carbon energy supply generation

Anticipated total reduction: 246.5 metric tonnes CO₂e

Installation of photovoltaic systems and solar thermic plants on municipal buildings (schools, sports facilities, offices).

Finance and Economic Development

Developing the green economy

Anticipated total reduction: 24.6 metric tonnes CO₂e

Green Public Procurement of the Municipality.

Community-Scale Development

Green space and/or biodiversity preservation and expansion

Anticipated total reduction: 2,666 metric tonnes CO₂e

New public parks and gardens and planting of new trees.

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

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

Ravenna's community GHG emissions reduction target in detail:

2007

Baseline emissions

1,683,318

Metric tonnes CO₂e

Percentage reduction target per source

Entire emissions inventory

23.9%

Target date

2020

This target is related to CO₂ emissions and was set by the Covenant of Mayors. The target is applied to the whole CO₂ emissions including Local Government Operations and Community.

Activities currently being undertaken to reduce emissions city-wide:

Buildings

Energy efficiency/ retrofit measures

Anticipated total reduction: 198.7 metric tonnes CO₂e

Improvement of the energy efficiency of public residential buildings, including European funded project FIESTA (Families Intelligent Energy Saving Targeted Action).

Water

Wastewater to energy initiatives

Anticipated total reduction: 474 metric tonnes CO₂e

Improvement of wastewater treatment plants.

Energy supply

Low or zero carbon energy supply generation

Anticipated total reduction: 837 metric tonnes CO₂e

Pilot plan of upgrading process of biogas obtained from wastewater treatment plants or waste disposals.

Energy supply

Low or zero carbon energy supply generation

Anticipated total reduction: 30,550 metric tonnes CO₂e

Energy recovery of the thermal load of the combustion fumes petrochemical plant.

Mass transit

Improve bus infrastructure, services, and operations

Anticipated total reduction: 1,113 metric tonnes CO₂e

Series of policies and measures included in the General Plan for Urban Traffic aimed at improving public transport e.g. car parking pricing policy, improvement of services to facilitate access to blind people, transport of bicycles on buses, new bus lines).

Private transport

Transportation demand management

Anticipated total reduction: 32,210.8 metric tonnes CO₂e

Sustainable Mobility Plan - bicycle and pedestrian mobility plans, parking plan.

Private transport

Improve fuel economy and reduce CO₂ from motorized vehicles

Anticipated total reduction: 5,635 metric tonnes CO₂e

Measures to improve transformation of motorized vehicles to low-emission fuels (LGP, Methane, Electric).

Energy supply

Low or zero carbon energy supply generation

Anticipated total reduction: 221,162.89 metric tonnes CO₂e

Photovoltaic power plants, aeolic plants, other renewable energy sources plants.

Waste

Recyclables and organics separation from other waste

Anticipated total reduction: 13,237.8 metric tonnes CO₂e

Reduction of non recyclable waste and improvements of reusable secondary raw materials from waste, including awareness campaigns.

Community-Scale Development

Building standards

Anticipated total reduction: 4,375 metric tonnes CO₂e

Implementation of new rules in the Urban Buildings Regulation Code in order to improve and facilitate building energy efficiency.

Community-Scale Development

Brownfield redevelopment programs

Anticipated total reduction: 7,360.8 metric tonnes CO₂e

Redevelopment plan of the former industrial dock area with energy efficiency and public green criteria.

Energy supply

Transmission and distribution loss reduction

Anticipated total reduction: 75,150 metric tonnes CO₂e

Application of European Directive 2012/77/UE about energy efficiency.

Water

Water metering and billing

Anticipated total reduction: 136.4 metric tonnes CO₂e

Online billing for water and waste services.

6.3 Planning

Ravenna has a renewable energy target.

The municipal energy mix for Ravenna's electricity by 2015:

Proportion of electricity from renewable sources:

100%

Since 2009, the electricity from Ravenna Municipality's buildings are 100% sourced from renewables.

6.4 Water

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

The Municipality of Ravenna has two different sources of drinking water. One from the Apennine provided by the Ridracoli dam, and the other from the Po river through the artificial canal called Canale Emiliano Romagnolo, therefore there's a diversification of sources. Due to this diversification the city has never faced the need of rationing the use of water or the need to apply emergency measures due to water scarcity.





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