C40 CITIES

Cities leading the way:
Seven climate action plans to deliver on the Paris Agreement

The Paris Agreement

In 2016, nations ratified a global agreement on climate change, the Paris Agreement, committing to ambitious efforts to keep global average temperature rise to well below 2°C above pre-industrial levels, and to pursue efforts to limit temperature rise to 1.5°C. The Paris Agreement also commits to increasing the resilience of countries to the impacts of climate change.

Cities can help nations achieve their Paris Agreement commitment by supporting the implementation of transformational actions to increase the supply of renewable energy, improve building energy efficiency, increase access to affordable, low carbon transport options, and change consumption patterns.

Seventy per cent of C40 cities report that they are already experiencing the impacts of climate change[1]. Cities need to adapt and improve their resilience to climate hazards that may impact them, both in the short-term and in future climate change scenarios.

Long-term planning is crucial to prioritise the acceleration of evidence-based actions that will achieve emissions neutral and resilient cities, and a healthier, more sustainable and equitable future, in the shortest amount of time possible.

By 2050, over 65% of the world's population will live in cities[2]. As centres of population, consumption, buildings and transport infrastructure, cities present a unique opportunity to accelerate the transition to low carbon resilient systems.

The technologies are available, finance is increasingly accessible, and policies and programmes have been tried and tested. To transform our cities quickly and cost effectively, cities will benefit from stronger policy at the national and sub-national level to drive down emissions, improve resilience and support city and community action.

Cities are already leading the way with ambitious plans to accelerate action on climate change. With more political will, community support and collaboration, cities can make an even greater contribution to securing a climate safe future.

"Climate Change is one of the greatest challenges mankind has ever faced. In this ongoing race against time, the cities of the world have a key role to play – both as pioneers and prescribers."

"To achieve this, it is crucial to involve all territorial stakeholders - public and private entities, associations and citizens. Such is the challenge if we want to meet the targets set in the Paris Agreement at COP21."

Anne Hidalgo
Mayor of Paris and Chair of C40

[1] Climate Action in Megacities 3.0.

[2] The Future We Don't Want - How Climate Change Could Impact the World's Greatest Cities, C40 Cities, 2018

Ambitious climate action plans and accelerated delivery

This report showcases seven cities with climate action plans that put the city on a path to become emissions neutral by 2050 and more resilient to the impacts of climate change. All seven climate action plans have been deemed compatible with the C40 Cities Climate Action Planning Framework, which sets out the essential components of a climate action plan to deliver low-carbon resilient development consistent with the objectives of the Paris Agreement[3]. The framework includes four key components as outlined below.

A climate action plan will:

1. Develop a pathway to deliver an emissions neutral city by 2050 at the latest, and set an ambitious[4] interim target and/or carbon budget;

2. Demonstrate how the city will adapt and improve its resilience to the climate hazards that may impact the city now and in future climate change scenarios;

3. Detail the social, environmental and economic benefits expected from implementing the plan, and improve the equitable distribution of these benefits to the city's population;

4. Outline the city's governance, powers[5] and the partners who need to be engaged in order to accelerate the delivery of the city's mitigation targets and resilience goals.

The plan will do this by:

a. Considering adaptation and mitigation in an integrated way, identifying interdependencies to maximise efficiencies and minimise investment risk;

b. Setting an evidence-based, inclusive[6] and deliverable plan for achieving transformational mitigation and adaptation, centred on an understanding of the city's powers and wider context;

c. Establishing a transparent process to monitor delivery, communicate progress and update climate action planning in line with governance and reporting systems.

[3] The C40 Cities Climate Action Planning Framework (CAP Framework) was developed in collaboration with the cities that participated in C40's Deadline 2020 Climate Action Planning Pilot Programme. The iterative and collaborative development process ran throughout 2017 and 2018 at the same time as the cities in the pilot programme were updating their climate action plans. The CAP Framework has since been peer reviewed by key external organisations dedicated to climate change.

[4] 'Ambitious' is defined as resulting in a steep/steady decline or early/late peak depending on a city's GHG per capita and gross domestic product (GDP) per capita.

[5] 'Powers' means the degree of control or influence that mayors (or other elected city leaders) exert over assets (e.g. buses, cycle lanes) and functions (e.g. economic development, land-use planning) across all city sectors.

[6] An 'inclusive' plan ensures that diverse stakeholders are involved in the planning process, that policy design and delivery is fair and accessible, and that the benefits of action are distributed equitably.

The value of climate action planning

Engaging stakeholders (government, business and communities) in the development of climate action plans is important to foster collaboration and partnerships. This will facilitate the transition from planning to delivery and enable the benefits of climate action to be distributed as equitably as possible.

The seven cities showcased here report that the planning process is an opportunity to engage internal and external stakeholders on the level of ambition needed and the roles different players can take. Co-creating the vision for the city and collaborating on the development of solutions ensures stakeholders have ownership of the process, support the long-term vision and take action themselves.

The climate action plan's intrinsic value lies in the city's public commitment to the targets, objectives and actions proposed in the plan. The plan is an opportunity to unite city government, business and communities on the vision and their role, as well as individual and collective responsibility to take action. The city takes on the role of convenor and facilitator, tracking progress and ensuring that the environmental, social and economic benefits that come with climate action are fully realised.

While each city has taken a different approach to the style and structure of their climate action plan/s, all of them demonstrate ambition and accelerated delivery as core objectives. The approaches highlighted in this report are intended to inspire other cities across the C40 Cities Climate Leadership Group and beyond to follow suit and play their part in delivering the objectives of the Paris Agreement.

Rather than attempt to summarise each city's plan, the case studies presented in this report highlight a particular aspect that could be of interest to other cities.

The focus of the case studies are:

1. Barcelona:
Putting climate justice and citizen action at the heart of climate action planning

2. Copenhagen:
Achieving a carbon neutral city by 2025

3. London:
Zero carbon transport network and clean air for Londoners

4. New York City:
Accelerating and prioritising transformational action

5. Oslo:
Implementing climate budgets

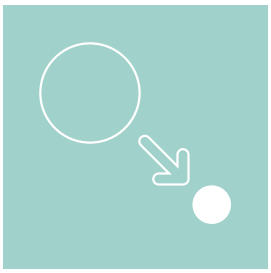
6. Paris:
A fair, equitable and resilient transition to carbon neutrality by 2050

7. Stockholm:
Achieving a fossil-fuel free city by 2040

Barcelona:

Putting climate justice and citizen action at the heart of climate action planning

Citizens are at the heart of Barcelona's new climate action plan which aims to help deliver a carbon neutral and resilient city by 2050. The Climate Plan 2018 – 2030 is organised around four strategic action areas: mitigation, adaptation and resilience, climate justice and promoting citizen action, as shown below.



Mitigation, because we cannot allow a context of economic recovery to lull us into consuming in an unsustainable way again.

Adaptation and resilience, because we can already see the effects of climate change and we have to prepare ourselves.

Climate justice, because we need to put the most vulnerable people at the centre of climate policies.

Promoting citizen action, taking into account the Barcelona Climate Commitment while promoting co-creation projects.

Climate Justice

From a climate justice perspective, one of the biggest challenges Barcelona will face is a significant increase in the vulnerable population impacted by climate change and energy poverty. The city has conducted analysis to understand how different socioeconomic groups and neighbourhoods may be differently impacted by rising temperature, reduced water availability, and energy poverty, taking into account their location, socioeconomic background or building characteristics.

Barcelona has set a zero-energy poverty target by 2030, and started implementing a series of actions by 2020, targeting the most vulnerable citizens. As well as providing grants, subsidies and expert advice for making homes more habitable and energy efficient, from 2019, up to 20,000 homes will also have access to locally produced, sustainable energy supplied by BE: Barcelona Energia, the electricity supply company set up by the city in 2017. The public company also supplies and manages electricity to Barcelona City Council's municipal buildings and facilities totalling approximately 160 GWh/year, with a view to ensure supply at the metropolitan scale.

The city also plans to strengthen mobility services for vulnerable citizens (e.g. on demand mobility services for people with health problems), as well as to improve Citizens Help and Information Offices services for those most vulnerable to heat and other extreme climate events.

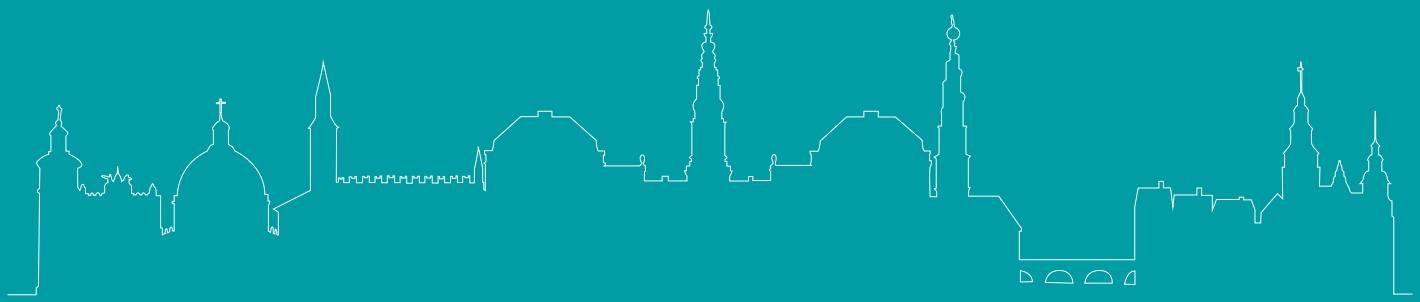
Citizen Engagement

In addition to putting vulnerable people at the centre of its climate policies, Barcelona places a strong emphasis on co-creation in order to achieve its mitigation, adaptation and resilience objectives. The plan builds on different participatory and citizen engagement processes such as the Citizen Commitment to Sustainability which included commitments from more than 1000 institutions, professional associations, unions, universities, schools and businesses to achieve a more equitable, prosperous and self-sufficient Barcelona. Specific goals cover a range of areas such as biodiversity and accessible public spaces, environmental quality, well-being and health for all citizens, as well as responsible governance and an efficient, productive and resilient zero-emissions city.

The Citizens Commitment to Sustainability has also given rise to Barcelona's Commitment to the Climate (CBC) initiative, an effort reaffirming the city's commitment to international and local climate change goals. As part of CBC, more than 140 organisations have been working on developing the city's roadmap to tackling climate change and defining nine collaborative projects, with significant project training and support provided by the City Council.

> ***"... We need to move towards a model that fosters the social and solidarity economy, prioritises satisfying people's needs over profit, based on fairness, solidarity, sustainability, participation, inclusion and community commitment, values which also drive social change. What this means is a radical transition to a new social and economic model that has to be determined and fair, and which we need to accelerate."***
>
> **- Barcelona Climate Plan 2018 – 2030**

Further information on the approach taken by Barcelona can be found on the **www.c40knowledgehub.org**



Copenhagen:

Achieving a carbon neutral city by 2025

Long before the Conference of Parties in Paris 2015 (COP21), Copenhagen had created and implemented an agreement to achieve carbon neutrality. This included an initial 20% CO2 reduction target for 2015 from 2005 levels, with a longer-term goal of becoming the first carbon neutral capital by 2025. The City has developed a pathway to deliver an emissions neutral city by 2025, assuming its share of responsibility for climate change. The CPH Climate Plan aims to combine growth with development and increase the quality of life for citizens while simultaneously reducing GHG emissions.

The CPH Climate Plan is divided into three phases:

1. 2013-2016: this phase focused on continuing measurement of relevant climate and emissions data, and incorporating new integrated City management and operational practices into everyday City business.

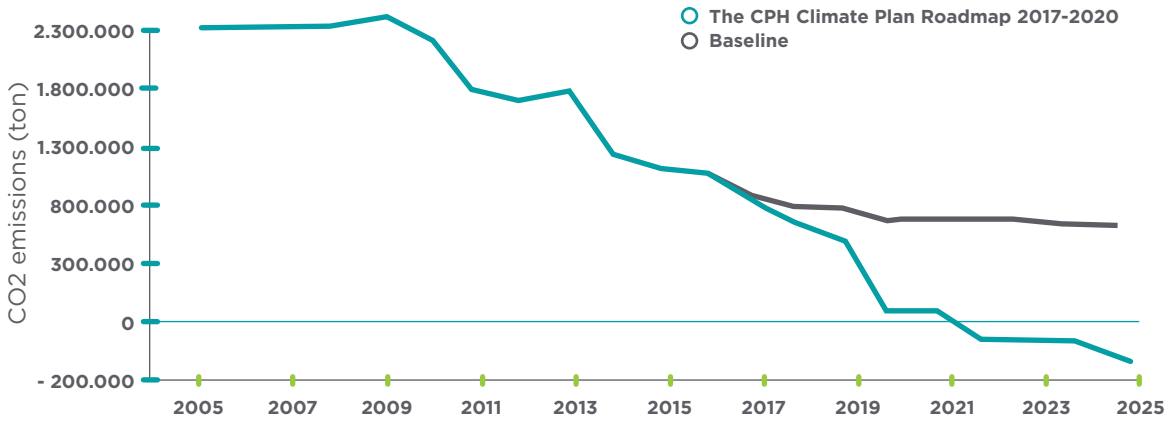
2. 2017-2020: this phase capitalises on lessons learned and goals achieved throughout the first phase, working to recalibrate future efforts and expectations based on real world results from the first phase. It also aims to further advance the full-scale integration of climate change practices into the City's regular business parameters.

3. 2021-2025: this phase will once again include a process of review and revision. This is followed by the incorporation and amendment of strategies necessary to achieve the stated goal of city-wide carbon neutrality by 2025.

Accelerated action

The first phase has been completed, and a number of milestones have been achieved, including a 38% reduction in annual CO2 emissions compared to 2005 levels, despite population growth of 16% over the same period. Most savings were achieved through increasing the share of green energy from biomass used in the city's combined heat and power plants and wind energy. Furthermore, the conversion of a power plant unit from coal to sustainable biomass is underway and is expected to be completed by the end of 2020; 20,000 streetlamps have been replaced with LED, resulting in an energy saving of 57% compared to 2010; and the majority of the 66 initiatives in the first CHP 2025 Climate Action Plan Roadmap have been implemented with significant results achieved. This highlights the good progress made towards Copenhagen's stated target of achieving carbon neutrality by 2025.

Projected CO2 emissions with CPH Climate Plan implementation (green) and without (black)



Monitoring and evaluation

To track the progress of the CPH Climate Action targets, the Municipality of Copenhagen maps and calculates CO2 emissions on an annual basis. Targets are set and revised annually based on updated information, with the intention of providing both a realistic and ambitious delivery schedule.

"In Copenhagen we want to become the world's first carbon neutral capital by 2025. We are already well on our way. Almost every building in Copenhagen has eco-friendly district heating, we introduced our first electric buses and in the near future we will build more bicycle lanes to make even more Copenhageners choose the bike or public transport instead of the car. We have reduced carbon emissions by 42% since 2005. Cities play a key role in ensuring a green and sustainable future – let's act now."

– Frank Jensen, Lord Mayor of Copenhagen

Further information on the approach taken by Copenhagen can be found on the **www.c40knowledgehub.org**

London:

Zero carbon transport network and clean air for Londoners

The Mayor of London's new Environment Strategy outlines how London will transition to a zero carbon future and, together with the Mayor's Transport Strategy, sets the target for a zero emission transport network by 2050. Both have a particular focus on tackling poor air quality, ensuring that Londoners' health is improved and that inequalities in access to clean air are minimised.

As rapid demographic expansion is set to propel the UK capital's population to over 11 million by 2050, London's infrastructure and public places are under increasing pressure. To meet the ambitious goals in the Strategy, fundamental changes to the way Londoners move around the city are needed. The Mayor's Transport Strategy sets the vision for 80 per cent of all trips in London to be made on foot, by cycle or using public transport by 2041.

The city has already started taking action to reduce car use and promote walking, cycling and higher-quality public transport services by embedding its Healthy Streets Approach across all of the Mayor's plans and strategies (e.g. Health Inequalities Strategy, London Environment Strategy, London Plan).

Strategies

London's strategies include a roadmap to accelerate the shift to ultra-low and zero emission vehicles where vehicle journeys are required, thereby improving local air quality and increasing health benefits to Londoners compared to the more common diesel and petrol vehicles:

- London will introduce the Ultra-Low Emission Zone (ULEZ) in April 2019 to deter the most polluting vehicles from entering London, as well as establishing five Low Emission Neighbourhoods (LENs) in the most polluted areas.
- All new double-deck buses will be hybrid, electric or hydrogen from 2018. In central London, all double-deck buses will be hybrid by 2019 and all single-deck buses will emit zero exhaust emissions by 2020. These are the first steps towards a carbon neutral and zero emission bus fleet by 2037.
- Reducing emissions from London's famous black cabs by no longer licensing new diesel taxis and making sure all new taxis are zero emission capable. The city is aiming for an entirely zero emission capable taxi and private hire fleet by 2033.
- The city is undergoing a major expansion in electric vehicle charging infrastructure, with plans for at least 300 rapid charge points to be installed by 2020. A special Electric Vehicle Infrastructure Taskforce has been created, in partnership with industry, dedicated to planning and increasing the infrastructure needed by developing a shared plan for the city to make it easy to use electric vehicles.
- London is exploring the next generation of road user charging systems. This could involve an integrated 'per mile' charging scheme that would take into account both congestion and emissions objectives. Any such scheme would consider the likely impact on health, the economy, the environment, safety, fairness and social inclusion.

Cleaning the Bus Fleet

	NOW	2020	2025	2030	2035	2037
Bus procurement and retrofit	Retrofit of existing double decks to Euro VI standards	TfL will buy only electric or hydrogen single decks	TfL will buy only electric or hydrogen single decks			
	TfL will buy only electric or hydrogen single decks					
Bus fleet in central London	Single deck	All single decks electric or hydrogen				All TfL buses electric or hydrogen
	Double deck	All double decks Euro VI and hybrid			80% of double decks electric or hydrogen	
Bus fleet in inner and outer London	Single deck		50% of single decks electric or hydrogen	90% of single decks electric or hydrogen	All single decks electric or hydrogen	
	Double deck	All double decks meet Euro VI standard as a minimum	More than 85% of double decks hybrid, electric or hydrogen	60% of double decks hybrid; 40% electric or hydrogen	20% of double decks hybrid; 80% electric or hydrogen	

> ***"With our unprecedented focus on walking, cycling and clean public transport, our ambitious Transport Strategy can act as a crucial driver for new homes and jobs, but also improve quality of life for everyone living in London."***
>
> **-Sadiq Khan, Mayor of London**

Further information on the approach taken by London can be found on the www.c40knowledgehub.org

New York City:

Accelerating and prioritising transformational action

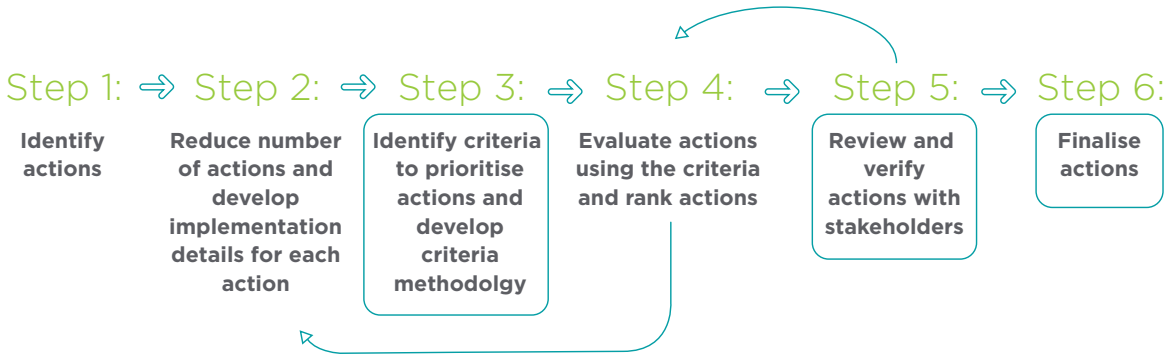
On June 1st, 2017, President Trump announced his intention to withdraw the United States from the Paris Agreement. On June 2nd, Mayor de Blasio signed Executive Order 26, affirming New York City's commitment to advance the Paris Agreement goal of limiting global temperature rise to 1.5 degrees Celsius above pre-industrial levels.

The 1.5°C – Aligning New York City with the Paris Agreement addendum presents the actions that will be implemented by the city in order to deliver the Paris Agreement. To limit global warming to 1.5°C, it is crucial to accelerate GHG emissions reductions in the short-term. The plan includes over 30 near-term actions to be initiated by 2020 which will result in more than 10 million metric tonnes of CO2e reductions by 2030.

Action prioritisation

Priority actions were identified from a list of 160 potential actions based on an understanding of the order of magnitude of the associated GHG emissions reductions and through consultation with agencies and stakeholders.

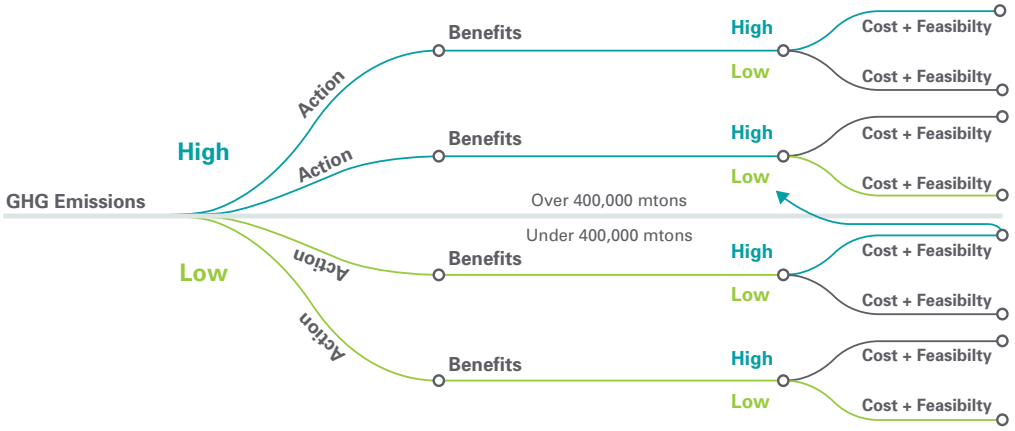
Action prioritisation process followed by New York City as part of 1.5°C – Aligning New York City with the Paris Agreement



New York City evaluated and ranked actions based on their performance across four criteria: GHG emissions savings potential, benefit potential, cost and feasibility. Once the actions were compared and organised by near-term GHG emissions reduction potential, they were then ranked based on the expected benefits, estimated investment cost and feasibility score.

The city's OneNYC goals – Growth, Equity, Sustainability and Resiliency – were used to help assess thirteen potential benefits (e.g. quality jobs, workforce development, resilience). Those actions that consistently provided benefits in addition to major GHG emissions reductions were prioritised. For instance, the City prioritised actions in the building sector that improve local air quality in neighbourhoods bearing the greatest burden from localised air pollution. By 2030, through reduced fossil fuel use in large buildings, 40 premature deaths could be avoided and 17,000 construction-related jobs will be created per year. By 2050, 100 premature deaths could be avoided each year.

Prioritisation process for ranking actions



A case study on the approach taken by New York City can be found online.

Transformational near-term actions

Buildings:

- Mandating building energy performance – pursuing legislation that requires all large buildings limit energy use and greenhouse gas emissions below intensity targets by 2030.
- Strengthening building codes – new energy code requirements have recently been passed into law, and could realise 40% to 70% energy intensity reduction over existing standards.

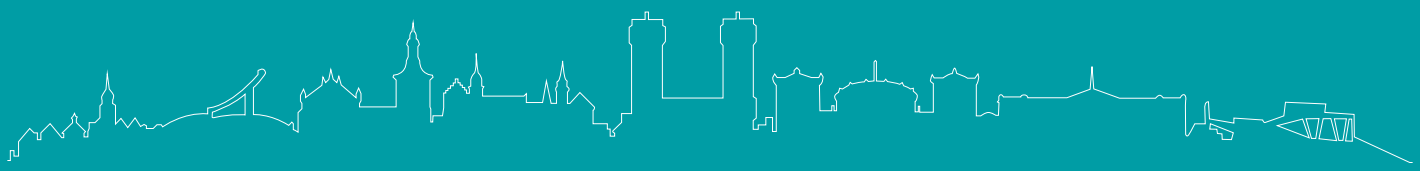
Transport:

- Investing in electric vehicle (EV) infrastructure - a minimum of $10 million will be invested toward the installation of 50 fast charging hubs across all five boroughs by 2020, with at least one in each borough by 2018.
- Supporting improvements to the subway and bus systems and creating new miles of protected bike lanes and expanding bike share schemes to double the number of active cyclists by 2020.

"Together, we are capable of reinventing our city to be climate-safe, more equitable, prosperous, and exciting. New Yorkers must be empowered and are an important part of the solution if we are to succeed in meeting our ambitious goals."

– 1.5°C - Aligning New York City with the Paris Climate Agreement

Further information on the approach taken by New York City can be found on the **www.c40knowledgehub.org**



Oslo:

Developing and implementing climate budgets

The Norwegian capital aims to cut total city emissions by 36% by 2020, by 50% as soon as possible after 2020 and by 95% by 2030. To successfully meet such ambitious climate goals, Oslo made a commitment to count carbon the same way money is counted. Therefore, one of the key initiatives highlighted in Oslo's Climate and Energy Strategy is to effectively integrate climate budgets into the municipal budgeting process.

In a similar way to financial budgets expressing maximum financial expenditure for the year, climate budgets propose a maximum emissions volume. Oslo has developed climate budgets up to 2020, with the first climate budget implemented in 2017. Budgets are revised each year as part of the annual reporting process. Sector specific performance data is published on a quarterly basis and plays an important role in determining the allocation of funds for the coming year. There is regular review of progress, allowing for the revision of targets and appropriate amendments to budgets so that funding is used in the most efficient way.

The 2017 Climate Budget consists of 42 measures, distributed across three sectors: transport; energy and buildings; and resources (landfill, waste and wastewater). Each sector has specific CO2e reduction targets.

Transport

Transport in the city accounts for more than 60% of total emissions and provides the greatest emissions reduction opportunities. Oslo aims to reduce 352,000 tonnes of CO2e from this sector by urban development investments, making walking, cycling and public transport more attractive, phasing out fossil fuels for public transport and introducing road user payment systems such as the toll ring. As part of the 2017 climate budget, 93% of the revenue generated from the toll ring has also been earmarked for reinvestment into public transport up to 2036.

Energy and buildings

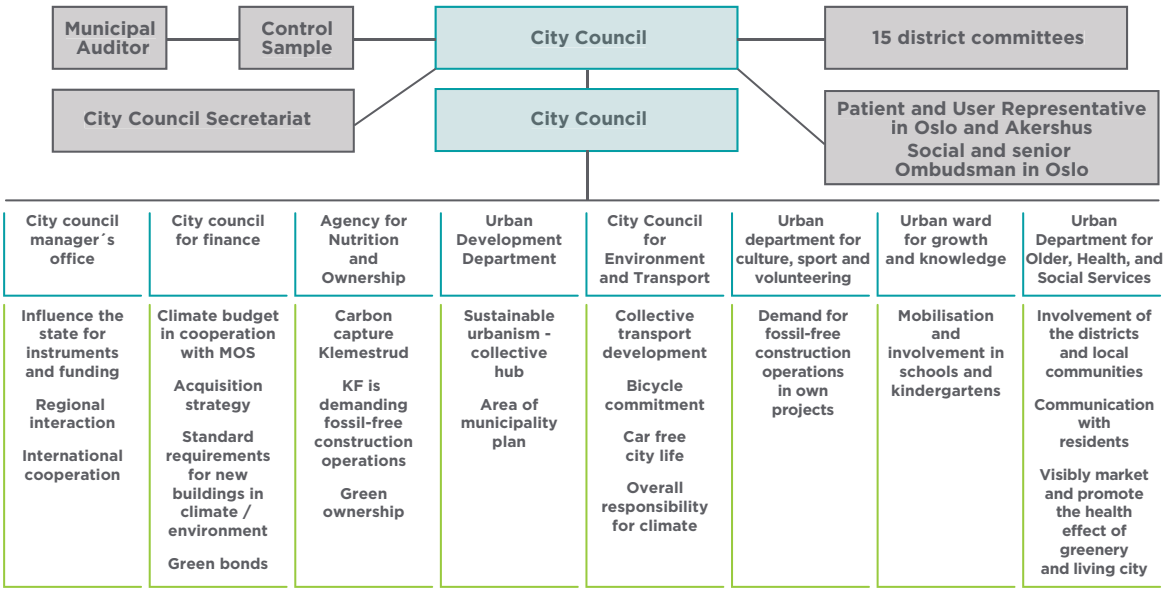
Over the next four years, Oslo aims to reduce 284,000 tonnes of CO2e from the energy and buildings sector, which accounts for 20% of total emissions. This will be achieved by phasing out fossil oil for heating through national and local support schemes and a national ban by 2020. Fossil fuels (fossil oil and natural gas) are almost phased out from Oslo's district heating system. 99% of the energy sources now consists of heat from the sewer system, recovered heat from waste, bioenergy (pellets and bio-oil) and electricity from hydro power. The key concept of the district heating system is utilising local resources, mainly waste that cannot be reused or recycled. Through the FutureBuilt collaboration, the city will also work to demonstrate the feasibility of climate-neutral buildings and the development of high-quality urban space.

Resources

Concerning waste management, 200,000 additional tonnes of CO2e are expected to be avoided by increasing reuse, recycling and sharing, and by investing in carbon capture and storage technologies to be applied to Oslo's waste-to-energy plants. A pilot project has already demonstrated that 90% of CO2e emissions can be captured.

Oslo's Climate Budget also provides a clear administrative structure, providing oversight and governance on climate change within the city. The figure below outlines the responsibilities and actions for each department. As part of the climate budget implementation process, all departments are encouraged to propose measures for the forthcoming climate budget and to use the funding they receive to achieve the specific goals they are responsible for. An assembly conference and a final budget conference then occur before the City Council provides the final propositions.

Oslo Climate Governance and Administrative Structure



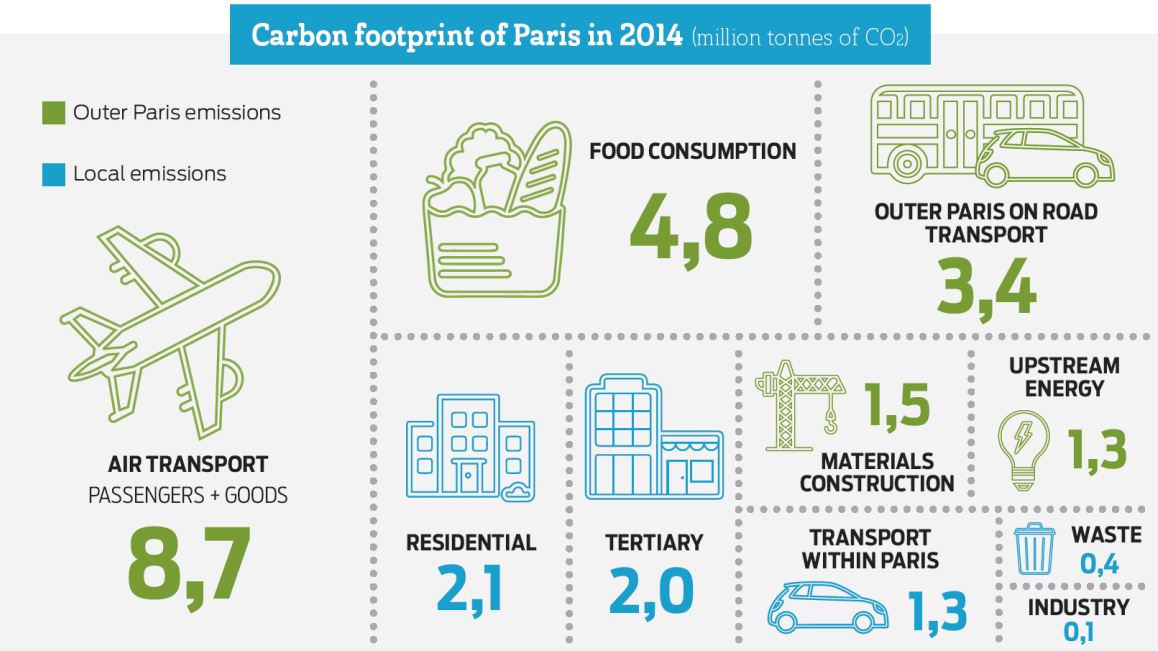
> ***"The changes we must undergo to avoid dramatic climate change give us a golden opportunity to create the liveable city.... We need close cooperation between the municipality, residents, the business community, organisations, academia, the state and other public enterprises."***
>
> **– Oslo, Climate and Energy Strategy**

Further information on the approach taken by Oslo, including webinars hosted by the city, can be found on the www.c40knowledgehub.org

Paris:

A fair, equitable and resilient transition to carbon neutral by 2050

In 2007, Paris adopted a proactive and ambitious Climate Action Plan with a target to reduce GHG emissions by 75% between 2004 and 2050[7] and by 25% by 2020.



In the last 10 years, Paris's carbon footprint[8] has decreased by nearly 10%. This means that the first step has been made: the increasingly steep curves of the city's GHG emissions and atmospheric pollutants have been reversed by the action taken by the City as set out in the first Climate Plans and Air Quality Plans.

On the strength of this commitment, the City of Paris started working on a new climate action plan in the Autumn of 2016 by launching a city-wide consultation with the Parisian community (residents, associations, companies, researchers etc.). In total, more than 500 proposals were received which enriched the City of Paris's climate action planning.

The new Paris Climate Action Plan outlines a common future for a carbon-neutral city by 2050, which is adapted to extreme climate events and resilient in response to crises and shocks.

[7] Based on 2004 levels.

[8] Carbon Assessment (Bilan Carbone®) methodology taking account of all emissions (direct and indirect) in the Paris area, including the city's scope 3 emissions (e.g. upstream energy production, food, aviation and construction, transport outside the city).

Achieving carbon neutrality

In line with the goals of the Paris Agreement, the City of Paris commits to the following by 2050:

- Reduce local emissions by 100%, achieving the goal of zero emissions in Paris.
- Promote an 80% reduction in the carbon footprint of the wider Paris area compared to 2004 levels and involve all local stakeholders in offsetting for residual emissions in order to achieve zero net emissions target for the Paris area.

To attain zero emissions at the local level, Paris's energy consumption will need to be halved and 100% of the energy consumed will need to come from renewable origin by 2050.

500 measures have been included in the city municipal investment programme, focused around key themes: thermal renovation of buildings; renewable energy supply; development of financing tools; and using available data to develop new solutions.

30 years is a very short time for such a major transformation of society. The Paris plan sets out initiatives that will be implemented over a long period (e.g. transforming food and energy systems) and the strategic choices that must be made now to ensure a successful outcome in 2050 (e.g. sending market signals to businesses so that they can prepare for, and support, this transformation in their long-term business strategy).

Paris's plan notes that the energy transition is 'solidarity-based' and excludes no one, and that the new services, future forms of mobility and energy-efficient dwellings of tomorrow are within everyone's reach. Paris's blueprint for society also aims to generate jobs, innovation and career changes, improvements to the living environment and to the health of inhabitants, and that Parisians participate fully in this transition.

> ***"The process of developing the Climate Plan has fostered discussions with Parisians about carbon neutrality, sparking their imagination and creativity to jointly develop the vision of a desirable future."***
>
> **– Paris Climate Action Plan**

Further information on the approach taken by Paris can be found on the **www.c40knowledgehub.org**

Stockholm:

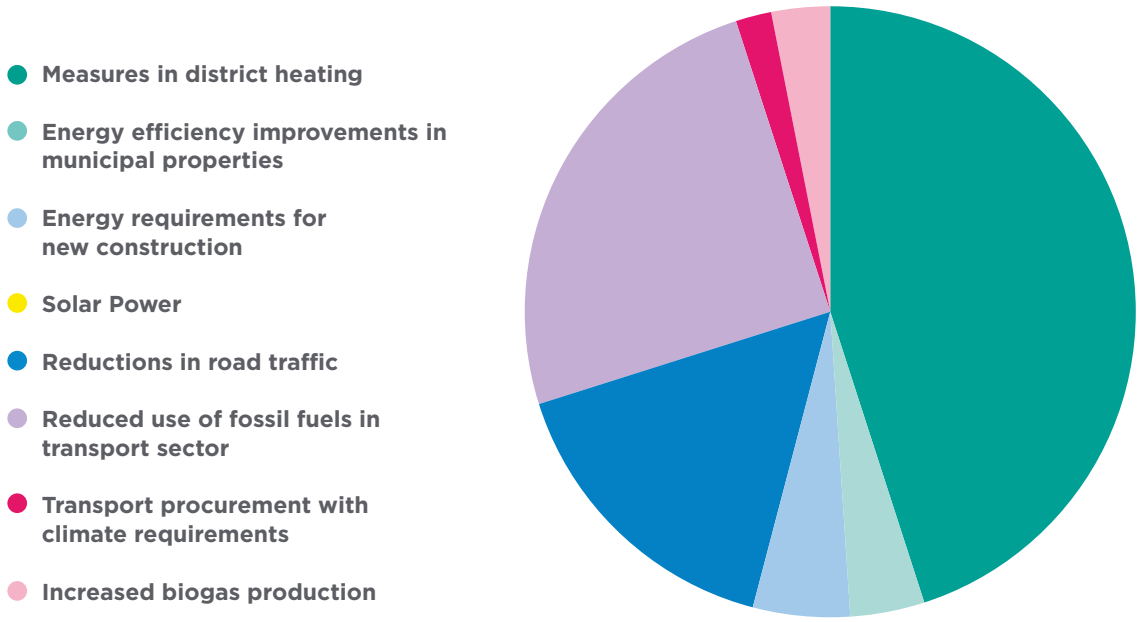
Fossil Fuel Free Stockholm

The Strategy for a Fossil-fuel Free Stockholm sets out Stockholm's ambition to be fossil-fuel free and achieve net zero emissions by 2040.

The City Council has also set a target of 2.2 tonnes of CO2e per resident by 2020, planning to phase out coal by 2022 and replace all fossil fuels with renewables. The strategy outlines specific sector targets for emissions reductions and the actions necessary to achieve them. The figure below illustrates the breakdown of expected emissions reductions and areas of focus. The highest emissions reduction opportunities are expected to come from heating and transport, specifically from cleaner and more efficient district heating, reduced use of fossil fuels in transport and restricted road traffic.

Of the total required emissions reduction, more than half must come from the building sector. Stockholm has imposed energy consumption ceilings of 55 kWh/m2 in new-builds on land owned by the city, with an ambition to achieve 45 kWh/m2 by 2020.

Measures up to 2020



Energy and buildings

The city will transition to a cleaner district heating system, reducing the use of fossil fuels, and generating its own renewable energy. There is potential for 10% of the power used by the city to be generated from solar power produced in buildings and 750 GWh from bioenergy in combined heat and power plants (CHP). A new bio-CHP plant was inaugurated in 2016, one of the largest in the world.

Transport

About 43% of emissions reductions must come from transport. The city wishes to introduce differentiated taxes for non-fossil fuel vehicles, providing economic benefits to residents, while also improving cycling infrastructure. In areas where municipal power is limited, such as shipping and aviation, Stockholm will collaborate with national government and global industries to introduce emissions reduction measures. The city itself is investing in charging infrastructure in ports for vessels.

Waste

Savings are also expected from the waste sector. By 2021, 70% of all food waste will be collected for conversion into biogas and automatically sorted in a plant using near-infrared technology.

Achieving net zero emissions

While such measures will help place the city on a trajectory towards meeting its 2040 goal, estimates show that remaining emissions will still be present. In particular, residual[9] emissions (~0.4 tonnes of CO2e per person) are likely from shipping, aviation and fossil-based plastics in waste incineration facilities. Stockholm plans to compensate for these emissions to become fossil fuel free. The city is investigating the opportunity to create carbon sinks and invest in bio energy carbon capture and storage (BECCS) activities within the municipal boundary. Furthermore, collaborative work has led to a pilot facility to transform organic material into biochar, inaugurated in 2017.

> ***"Stockholm is well placed to lead the way in terms of work to stop climate change and to prove that it is possible to combine well-developed welfare and growth with minimal climate impact."***
>
> **- Fossil-fuel Free Stockholm**

Further information on the approach taken by Stockholm can be found on the **www.c40knowledgehub.org**

[9] Residual emissions are the emissions remaining after all technically and economically feasible opportunities to reduce emissions in all covered scopes and sectors have been implemented.

C40 CITIES

C40 Cities Climate Leadership Group

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