MAIRIE DE PARIS

ADAPTATION STRATEGY

PARIS CLIMATE & ENERGY ACTION PLAN

PARIS' CLIMATE ACTIONS PLAN


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PARIS'S ADAPTATION STRATEGY: TOWARDS A MORE RESILIENT CITY

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INTRODUCTION

Climate change: from the global to the local level

Climate change is a global phenomenon that threatens the overall balance of our planet, with impacts that differ at times from one geographical area to another. Scientific studies, summarised by the IPPC (Intergovernmental Panel on Climate Change), of which the 5th report was published in 2013-2014, describe the consequences of climate change with growing precision, and outline possible actions for reducing the extent of this change (mitigation), and adapting to its effects (adaptation). **Mitigation and adaptation are two complementary lines of intervention that are both necessary for fighting climate change.**

In light of these assessments, action continues to be taken in several sectors and on many different levels. The international negotiations on the climate have launched a global dynamic for fighting climate change: the Earth Summit in Rio in 1992, the Kyoto Protocol in 1997 and the Copenhagen Agreement in 2009 to limit global warming to 2°C in 2100, etc. In 2015, the Paris conference (COP21) marks a crucial step in the continued strengthening of this dynamic.

In addition to States, cities, which are home to over half of the world's population and generate 70% of greenhouse gas emissions, represent a fundamental arena for action, as they are on the front line of the impacts of climate change. Over the past decade, cities around the world have become driving forces in energy and climate policies. The City of Paris led the way in this area, in unanimously adopting its first Climate Action Plan in 2007.

The Paris Climate and Energy Action Plan and the Adaptation strategy

The Climate Action Plan, adopted in 2007, was updated in 2012 with the adoption of the Main Guidelines of the Paris Climate and Energy Action Plan, supplemented by several operating and sectoral roadmaps **defining concrete measures** against climate change over the entire Parisian territory. The operational application of the Climate Action Plan in the form of an Adaptation strategy details and specifies the terms for adapting Paris to climate changes and the scarcity of resources (water, food...) in the form **of 30 objectives applied in 35 actions.**

Climate change is underway and we can already see the first effects: an increase in existing risks and the emergence of new risks for human and natural systems. **These risks will not be evenly spread between different territories and will generally affect vulnerable and disadvantaged individuals more greatly.** It is therefore necessary to implement preventative and remedial adaptation strategies to limit damage and preserve quality of life for everyone.

Paris is a robust city for dealing with the anticipated consequences of climate change, but it has elements that demand vigilance: primarily heatwaves, floods, and water resources. Several studies, experiments and achievements have been carried out in order to characterise these risks and identify means of action. Specific examples include a study on climate changes in Paris up to now and projections through to 2100 conducted with Météo-France in 2012, a diagnosis of the strengths and weaknesses of Paris in dealing with these changes and the scarcity of resources in collaboration with over one hundred Parisian stakeholders between 2012 and 2014. These studies, along with an inventory of the proposals for action received from all of the City of Paris services, and the results of the public consultation on the adaptation to climate change carried out in the spring of 2015, contribute to defining Paris's strategy for adaptation.

The main objectives of this strategy are to protect Parisians and the city and to preserve the services and resources (environmental and economic) by improving the quality of life, solidarity and attractiveness of Paris. These objectives are met by making use of innovation, experimentation and, above all, the active involvement of the Parisian territory.

The aim is to act rather than passively endure climate change, to obtain a better knowledge and understanding of the challenges in order to strengthen the resilience of the Parisian territory.

The adaptation strategy aims at coordinating the initiatives at the level of the Parisian territory, mobilising relevant stakeholders and proposing new actions with the goal of **adapting Paris to the effects of climate change and the scarcity of resources, while making the city more resilient, more attractive, and a nicer place to live.**

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In Paris, what do we need to adapt to? Climate changes in Paris

The current climate in Paris is changing and will continue to change throughout the 21st century. Heatwaves, heavy rains, droughts, more limited water resources… Many issues must be anticipated today to make Paris more resistant to climate changes.

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Hotter summers and more frequent heatwaves

Average annual temperatures have been rising in Paris since the second half of the 20th century and will continue to increase: between +2°C and +4°C for the average temperature in Paris compared to today.

Heatwaves will be more frequent and intense, and their effects will be further compounded by the urban heat island phenomenon.

The summer of 2003 or the beginning of the summer of 2015, during which Paris experienced exceptional heatwaves, could very well become a "normal" summer in 2050.

Despite the rise in average temperatures in Paris, **occasional occurrences of extreme cold should continue in Paris in winter,** but should occur less frequently.

A rise in heavy rains and storms

Currently infrequent, the occurrence of a few storms marked Paris over the past ten years, such as the storm that occurred on the night of 6 July 2001, during which the equivalent of two months of rain fell in 24 hours. The climate projections for Paris indicate an increase in the frequency of heavy rains in the coming century.

Floods will not be any more or less frequent due to climate change. Nevertheless, the impacts that the Seine overflowing as it did in 1910 would present in our connected society (metro tunnels and even flooded electricity networks) are of such a great magnitude that they present a particular need for vigilance.

Furthermore, it is **difficult to predict the impact of climate change on storms,** such as those of December 1999 (record wind speeds in Paris recorded at 169 km/h), and February 2010 (Xynthia, 122 km/h recorded in Paris) but their consequences can be significant.

Droughts and stress on the use of water resources to anticipate

Droughts lead to a significant drop in the levels of groundwater and the water system. Droughts also lead to a considerable decrease in the available volume of water for all uses (individuals, agriculture, and industry). This phenomenon was observed in particular during the periods of drought between 2004 and 2006. Several research initiatives show that the Paris Basin will face more frequent droughts in the future, particularly in summer and autumn.

Longer-term, France could experience extreme drought phenomena over long periods of time (several years or decades).

Furthermore, changes in temperature and in soil moisture levels (drought, heavy rains) could have an impact on **soil stability**, resulting in collapses or other ground movement.

Finally, much uncertainty surrounds the impact of climate change on **sunshine**.

In Paris, what do we need to adapt to? The scarcity of resources

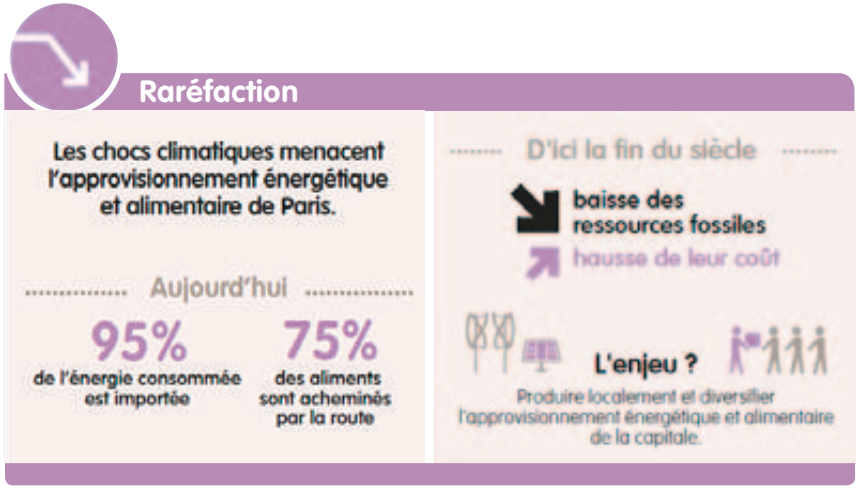
Along with climate change, human societies are faced with the challenge of the scarcity of resources at the global and local level, due to the **overexploitation** of resources and due to **pressure on the various environments.** This phenomenon, which affects several areas, can have consequences for activities and the Parisian territory. It is therefore necessary to anticipate difficulties that could arise in order to adapt to them.

Over 85% of the energy consumed in the world comes from **fossil fuels** (oil, coal, and natural gas), which are the major causes of climate change. The available resources of these fuels are being depleted; since the mid-1960s, the discovery of new oil deposits has decreased each year. Even if new technology provides access to resources that were previously unusable, the peak in conventional oil production (maximum production) was reached between 2005 and 2010. The peaks in the production of gas, coal and uranium will all take place before or around 2050. Faced with growing global demand, the difficulties in increasing production to an even greater extent creates **economic (price increases) and geopolitical pressures.**

Beyond energy resources, several other **mineral resources** (metals, construction materials…) could also be affected by situations of overexploitation. Even as recycling increases, it is still necessary to conserve these resources.

Furthermore, **the surface of fertile land for agricultural production** is threatened by desertification, rising sea levels and by soil being artificialised (urban sprawl and infrastructures). In France, the equivalent of one department disappears every 7 years.

Finally, **the erosion of biodiversity,** affected by the pressure of human activities (pollution, loss of habitats and ecosystems) threatens the services provided by nature (decontamination, pollination…) and the human activities that are dependent on these services.



What do we need to adapt to? Paris's major challenges

In 2012, the City of Paris la Ville de Paris conducted a **diagnostic study of Paris's strengths and weaknesses in facing climate change and the scarcity of resources**. This diagnosis brought to light 12 specific areas of impact for Paris (8 climate hazards, 4 areas of resource scarcity) and 13 sectors that would potentially be impacted in Paris.

Main conclusions from the climate and resources diagnosis for Paris

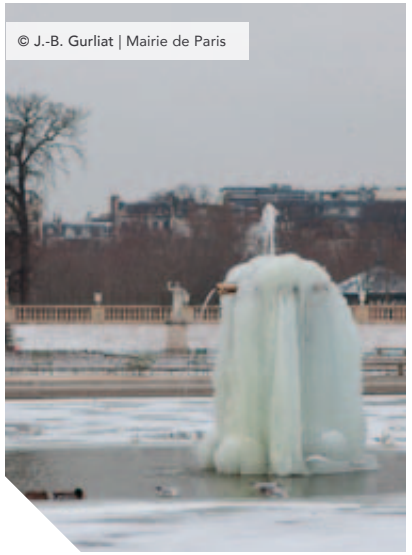
Paris is a rather robust city in the face of climate change effects. Indeed, due to its geographical location far from the coasts, Paris is not directly affected by rising sea levels, unlike other global megacities (New York, London, Copenhagen, Amsterdam…). Furthermore, Paris is not very naturally prone to strong wind phenomena, such as storms and tornados, although they can occasionally occur. Additionally, the city benefits from several infrastructures that have proven their robustness for many years: the sewer systems, networks for drinking water and non-drinking water, and transport and communication networks...

However, with climate change and the scarcity of resources, combined with urbanisation and the density within the capital, **areas requiring vigilance appear.** 5 major challenges emerge from the study of Paris's strengths and weaknesses as it faces climate change and the scarcity of resources:

- **heatwaves**: compounded by the urban heat island effect;
- **floods**: caused by the Seine overflowing its banks or by rainfall runoff after heavy rains;
- **droughts**: that can impact water resources (specifically in the second half of the 21st century);
- pressures on food and energy resources;
- the conservation of **biodiversity.**

Furthermore, certain indirect and global risks must still be studied more specifically, including the following:

- **health hazards** caused or compounded by climate changes, including problems with **air quality;**
- the **insurance system** for the city and its inhabitants in the event of repeated shocks;
- **climate migrations,** both national and international, from territories that are more vulnerable to the effects of climate change;
- etc.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Responding to Paris's major challenges: the Adaptation strategy guidelines and actions

Paris's adaptation to climate change and the scarcity of resources is a cross-cutting issue that involves different sectors, challenges and targets… Different levers of action must be utilised by all the stakeholders of the territory.

The challenges, objectives and actions of the Adaptation strategy – For a more resilient city are presented in four parts, which correspond to four requirements and scales of intervention:

1| Protect Parisians from extreme climate events

2| Ensure the supply of water, food and energy

3| Live with climate change: more sustainable city planning

4| Foster new lifestyles and boost solidarity

Each of these parts contains several types of action, from improving knowledge to the long-term development of the city, experimentation and raising awareness and mobilising stakeholders.

Considering this challenge of adapting to a territory with complex phenomena, the objectives and actions presented in this strategy will necessarily play out over an extended period of time, from now through 2050.

However, these actions must begin immediately, and several are set to be implemented by 2020.


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PROTECTING PARISIANS AGAINST EXTREME CLIMATE EVENTS
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Paris is exposed to various natural and health risks which are expected to increase due to climate change: heatwaves, floods, droughts, ground movement, storms, fires, epidemics, peaks in pollution, water quality…

All of these events of various kinds can cause significant material damage (to buildings, infrastructures, public and private facilities...), as well as damage to the physical integrity and health of individuals in the most severe situations.

Some of these risks are not new and local stakeholders are already mobilising to face them. Some actions are being implemented, or are ready to be implemented, in order to better detect and anticipate risks, and manage crises based on the specific characteristics of each risk (strengthening civil security, flood protection plans, the Heatwave Plan, specific measures in the event of an air pollution peak…).

General measures for risk prevention and crisis management in Paris

MONITORING, WARNING, PREVENTION PLANS, CRISIS MANAGEMENT, CULTURE OF RISK…

The general measures for risk prevention and crisis management in Paris consist mainly in establishing several systems:

- for **monitoring and improving knowledge** of the different types of phenomena (weather monitoring in real time, measuring stations, identifying and mapping risk areas, analysing feedback from past crises, studies and specific diagnoses…);
- for **providing information and warnings for the population,** including during «normal» circumstances, with the aim of developing a «culture of risk», by publishing, for example, information documents (such as the Municipal Information Document on Major Risks - DICRIM), or by organising events aimed at raising awareness (Plouf –Splash- 75 event on the Banks of the Seine on flood risks…);
- for supporting the population;
- for **crisis monitoring and response**, with regular crisis management drills in real-life situations;
- for ensuring the **continuity of daily life** until the situation returns to normal (development of Business Continuity Plans – BCP – for public services, etc.).

In the event of a major crisis, the City of Paris has the duty of protecting the population by mobilising all the resources of the Paris Administration. Furthermore, all the public services and relevant stakeholders (operators, media, etc.) participate in risk prevention and crisis management.

OBJECTIVE 1
IMPROVE THE INFORMATION AND INSTRUCTIONS PROVIDED TO PARISIANS AND VISITORS IN THE CASE OF AN EXTREME EVENT

This will involve disseminating information in real time in the media (radio and television), developing instructions in multiple languages, disseminating messages to raise awareness or to issue warnings in public transport and, increasingly, using social networks and mobile messaging.

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OBJECTIVE 2
ENSURE THE CONTINUITY OF PUBLIC SERVICES IN THE CASE OF AN EXTREME CLIMATE EVENT

The City has already established Business Continuity Plans (BCP) for situations of very cold weather, heatwaves, and flu epidemics, which make it possible to identify vital, priority activities to be maintained for each type of risk, and to anticipate all the necessary conditions for maintaining these activities. A BCP is also being drafted for the risk of flooding caused by the Seine overflowing its banks; others could also be drawn up for responding to other extreme events (droughts, storms, ground movement, fires…)

Heatwaves

Populations, infrastructures and natural environments are very sensitive to extreme heat.

The effects of extreme heat are **compounded in Paris** due to the **urban heat island phenomenon:** the density of buildings and artificial materials that retain heat cause an increase in the temperature in the city reaching up to 5 or 6°C more than in a natural environment. These effects are also compounded by the **particular vulnerability of certain populations** (the elderly, isolated…) **and infrastructures** (the sensitivity of rails to heat, potentially leading to disruptions in public transport systems, the vulnerability of the electric networks under the pavement where temperatures can reach 70°C, etc.).

With climate change, the summers are hotter in Paris, and heatwaves more frequent. The summer of 2003 could very well become a «normal» summer in 2050, with extreme situations further increasing compared to what has been experienced up until now.

In light of this change, the challenge is to both sustainably cool Paris down, while also **protecting the populations that are most vulnerable in the event of extreme heat.**

Every year, from 1st June to 31 August, **the Heatwave Plan** is in effect in France:

- **Level 1 consists of ensuring weather, atmosphere and health monitoring,** used to estimate whether or not a heatwave risk is present.For Paris, the weather alert threshold is defined as soon as the weather forecast predicts an average temperature of 21°C for 3 consecutive nights, and 31°C on average for 3 consecutive days.

- **Once this threshold is surpassed (level 2), prevention messages** (stay hydrated, cool off, close shutters or curtains during the day…) are disseminated through the media (television and radio messages, newspaper articles) and in public places.


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- **Furthermore, the Prefect of each département, in conjunction with the Regional Health Agency, can declare level 3, "the heatwave warning".** Paris City Hall then implements a specific organisation with available personnel and means: making cool rooms available for vulnerable individuals, contacting individuals who voluntarily registered with the CHALEX directory, making home visits and bringing individuals to the cool rooms as needed, deploying police patrols and emergency workers to find individuals who are isolated in the street…

- **Finally, level 4 maximum mobilisation** is for an exceptional recognised heatwave that is extremely intense and persistent. The State then activates the Inter-ministerial Crisis Unit, which brings together all the relevant ministries and decides to implement any measures necessary.

Action 1
Maintain and further develop the Heatwave Plan

This involves improving the coverage of the most vulnerable individuals through the national CHALEX directory, specifically through the «Shopkeepers for Solidarity» operation, which promotes solidarity within neighbourhoods by mobilising local doctors and pharmacists, involving Parisian senior clubs, as well as conducting a thorough campaign to identify frail or isolated individuals, or those in very precarious situations.


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OBJECTIVE 3
FACILITATE ACCESS TO REFRESHING AREAS IN THE SUMMER

Despite the urban heat island effect, several areas in Paris remain relatively cool during periods of extreme heat. This is the case for water surfaces (the Seine and the canals, bodies of water, fountains, reflecting pools, water jets, water misting systems, swimming pools and other permanent or temporary swimming areas…), shaded areas (parks, covered walkways, shade structures…), places that are naturally cool (green spaces, but also places of worship, cemeteries, tunnels, basements…) and finally facilities that are cool or air conditioned (museums, cinemas, shopping centres, Heatwave Plan cool rooms…).

Action will also be taken to improve the use of these spaces, by considering the possibility of providing access to those that are currently closed (gardens belonging to social housing groups, companies, religious congregations, etc.), by extending the opening hours of certain facilities (primarily parks and swimming pools during heatwaves), or by developing areas to make their use more enjoyable and facilitate social connections (for example, by installing more benches in cool or shaded areas).

To facilitate access to all of these «cool areas» a map identifying these areas will be established and widely distributed.

Action 2
Open parks and gardens 24 hours a day in the summer

In Paris, one quarter of the 490 Parisian municipal gardens are now open 24 hours a day year round. These are primarily neighbourhood squares. Yet some large Parisian parks are also included, such as the Nelson-Mandela garden (1st arr.) and the Champ de Mars (7th arr.). During heatwaves, more parks should be continuously open, including at night, in order to allow the maximum number of Parisians to benefit from the coolness of these areas and relax. An initial experiment was recently conducted during the weekends of the summer of 2015 in four big Parisian parks: André-Citroën (15th arr.), Buttes-Chaumont (19th arr.), Monceau (8th arr.) and Montsouris (14th arr.). This experience will make it possible to evaluate the effectiveness of this measure, its effects in terms of management, and to evaluate conditions for its generalisation.

OBJECTIVE 4
COOLING OFF THE CITY DURING PEAKS IN TEMPERATURE

Several solutions can be implemented to cool off public spaces or provide a feeling of refreshment for those using these areas during heatwaves. These solutions include creating new temporary or permanent installations (shade structures, plant tunnels…) and developing the use of water to cool down the city. The following solutions are also being considered:

- water misting systems in public spaces and parks;
- spraying public spaces with non-drinking water (roadways, pavements, squares). Experiments have already been conducted in Paris during the summers of 2012, 2013 and 2014. The phenomenon of the evaporation of the water sprayed on the ground provides an improvement in the thermal comfort by a maximum of 1°C for passers-by between 4 p.m. and 6 p.m.
- inflatable swimming pools;
- converting public fountains into paddling pools open to the public.

The solutions involving water require particular vigilance in ensuring sanitary conditions and monitoring the amount of water consumed, since climate change can cause stress on water resources.

This type of approach for cooling the City could be incorporated in redevelopment projects for certain squares in Paris.

Action 3
Misting of busy public spaces during heatwaves

Within the objective of helping Parisians and visitors cool off during periods of intense heat, water misters will be temporarily installed in frequently-used public places, as was previously done for Paris-Plage and the Mist Island of the Niki-de-Saint-Phalle floating garden on the banks of the Seine.

The micro-droplets of water sprayed into the air are very effective in immediately refreshing passers-by and those using the spaces, but these systems require the use of drinking water in order to avoid any health problems. This solution must therefore be reserved for areas that are frequently used, where they will the most effective, and on the hottest days.


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Action 4
Create shade structures in public spaces

Shade structures will be installed in public spaces frequently used by pedestrians or active modes of transportation (bicycles, scooters, in-line skates…). The shade structures can take the form of plant-covered pergolas, stretched white fabric (temporary installation), or permanent structures for accommodating solar panels and/or creating green spaces.

Towards «cooling routes»

Paths could connect the cooling oases (parks and gardens, waterways and bodies of water, green and blue corridors) by means of refreshing tunnels: plant-covered tunnels, plant-covered shade structures, solar shade structures, green streets, streets shaded by fabric… The choice of these routes could also incorporate systems for spraying the roadways with non-drinking water in order to cool down public spaces.

At least one cooling route is set to be created by 2020.

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Floods and other extreme climate events: heavy rains, very cold weather, storms, fires

In Paris, **floods** caused by the Seine overflowing its banks are characterised by their slow progression and long period of submersion, due to rising groundwater. The flood period generally extends from November to March. In January 1910, the year of the reference flood event, with the highest water levels known in Paris, the flood peak recorded at Paris Austerlitz (8.62m) was reached in a fortnight and the flooding took over one month and a half to subside. Today, the consequences of a 100-year flood like that of 1910 would be disastrous: 350,000 Parisians in flooded buildings, 850,000 Parisians globally impacted (loss of electricity, flooded basements), population displacement, environmental pollution, health problems, disruption of economic activity, and even loss of human life.

In addition to floods caused by rising river levels, **storms** with heavy rainfall can also cause partial flooding, liable to make pedestrian, road and railway traffic difficult.

Snow and ice can also affect the daily life of Parisians by stopping traffic (roadway, railway, river and air traffic). These hazards can lead to individuals and objects (roofing, tree branches) falling on public roads and, if they continue over a long period of time, can affect economic activity.

Storms can also have a very serious impact, as was the case with the storm of 1999 (record wind speed measured at Paris Montsouris of 169 km/h on 26 December). In Paris, continuous strong winds or strong gusts of wind could present a danger for the public and damage equipment: falling trees or large branches, parts of monuments or objects in public places (traffic lights, construction site barriers…).

Generally, **fires** in Parisian buildings are not directly related to climate conditions, but to electrical problems or unextinguished cigarettes, etc. However, fires that start outside (public areas, parks, woods...) are fanned by wind conditions and aggravated by dry conditions and/or heatwaves. Although few forest fires currently break out in Paris, climate changes could amplify this phenomenon.

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OBJECTIVE 5
CONTINUE TO ANTICIPATE AND PROTECT PARISIANS FROM FLOODS, STORMS, VERY COLD WEATHER, FIRES

For several years, the City of Paris has been preparing to manage the crisis of **floods caused by the Seine overflowing its banks.** Thus, the **Paris Flooding Risk Prevention Plan (PPRI)** requires managers of institutions with public service missions to establish a **Protection Plan against Flooding (PPCI)** if the institutions are located in a flood zone in Paris. This plan must be updated annually and must describe the measures taken for responding to an exceptional flood, and also prepare for the period of recovery time after the flood.

The City has also established a Business Continuity Plan (BCP) for the flooding of the Seine, and participates in the Flood Prevention Action Programme (PAPI) for the Seine and Marne Rivers in the Paris region. The prevention actions for floods are financed in part by the State. Paris is also **protected by hydraulic infrastructures**, lake reservoirs upstream from Paris that make it possible to influence the water level and flow rate of the Seine, not only in order to provide replenishment support in summer and autumn, but also to prevent floods in winter.

The City of Paris is also preparing for **very cold periods**: winter weather monitoring, warnings given to the population, the annual update of the Snow Plan for avoiding risks of ice and snow, the annual update of the Winter Emergency Plan for providing assistance to vulnerable individuals during very cold periods…

These measures can be supplemented by additional provisions that are either general or specific to the risks that will be amplified or more frequent due to climate change:

- **Drawing up a storm plan for the trees in Paris.** Based on feedback from previous storms, the choice of the type of tree species to be planted can be adapted, as can the upkeep arrangements for the trees based on their phytosanitary state. Planning will also include the projected closing of parks and cemeteries in the event of wind episodes, and the information provided to the public including safety instructions.

- **Prepare for fire risks for green spaces.** This involves making evaluations to determine if there are means of quick action that could work to stop a fire at its onset in the green spaces in Paris, and develop a fire plan. Furthermore, this action also requires establishing a map of existing fire hydrants and potentially identifying additional needs in the woods in conjunction with the Paris Fire Brigade (BSPP).

- **Generalise the crisis management plans for all Parisian institutions.** Most Parisian educational institutions at the primary level already have a Specific Safety Measures Plan (PPMS), which allow them to prepare for major crises. This action involves coordinating and generalising these plans as needed for all of the Parisian educational institutions (primary schools, secondary schools, high schools, and universities), and initiating the process with early childhood and recreational institutions.


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Similarly, for other establishments open to the public and for companies, plans for the organisation of emergency responses in the event of a major accident (SESAM) are planned (crisis units, emergency response cards, and internal and external communication to ensure the safety of people and activity in the event of a major crisis). This involves prompting the establishments open to the public and big Parisian companies to draw up such a plan, related to the potential climate risks (floods, heatwaves, droughts…).

Health risks connected to climate change

The new climate conditions in Paris may have repercussions on Parisians' health: heatstroke, allergies, the development of new diseases and epidemics, deteriorating air quality, even abnormally high death rates in the event of extreme climate episodes… Moreover, certain healthcare structures are themselves vulnerable to extreme climate events. The challenge is to anticipate all of these risks and limit as much as possible the health effects of climate change, knowing that they are amplified in Paris due to the urban heat island phenomenon.

An **epidemic** related to seasonal conditions (influenza, gastroenteritis…) or to the appearance of carriers (mosquitos, ticks…), whose development is boosted by the new climate conditions, can be aggravated in Paris due to many exchanges and transfers taking place in the City.

In terms of **air pollution,** Paris has consistently significant levels of pollutant emissions. It suffers chronic nitrogen dioxide and fine particulate PM10 and PM2.5 pollution and each pollutant has a specific impact on human health: irritation of the mucous membrane, the skin, eyes, and the respiratory tract, a decrease in respiratory capability or asthma attacks. Since the combination of intense heat and clear weather conditions stimulate peaks in ozone pollution, the impacts on Parisians' health will be more evident with climate change in terms of chronic or long-term infections of the bronchial tubes, asthma and aggravated allergies.

The City of Paris participates in **health monitoring** for its territory, and has a Business Continuity Plan (BCP) which allows it to continue essential business in the event of an epidemic or pandemic, and is drawing up a **Paris Environmental Health Plan** (PPSE) for 2015 that will include the effects of climate change and extreme climate events.

Concerning atmospheric pollution, **air quality monitoring** is constantly conducted by the AIRPARIF association, which predicts pollution episodes and provides warnings to the authorities and citizens. The City of Paris is also committed to an ambitious **plan for combating air pollution** related to road traffic, including measures for decreasing the circulation of the most polluting vehicles within Paris and accompanying measures encouraging the renewal of the motorised vehicle fleet. In the event of a prolonged period of pollution, the City of Paris will provide free access to public transport and bicycle and vehicle-sharing systems (Vélib', Autolib'). More generally, policies in place are aimed at encouraging the use of public transport and developing «softer» modes of transportation (walking, biking).

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OBJECTIVE 6
ANTICIPATE THE DEVELOPMENT OF NEW ILLNESSES IN PARIS

The health stakeholders of the City of Paris and all the medical structures participate in epidemic warning networks that are organised at the national level. This action involves incorporating diseases into the monitoring and warning system that are potentially aggravated in Paris due to climate change, including diseases that can be transmitted from animals to humans, such as avian influenza, or diseases transmitted by carriers, such as Lyme's disease (carried by ticks), malaria or chikungunya (carried by mosquitoes).

A specific study will be conducted to determine the health system's vulnerability to various hazards and the development of new diseases. This study will accomplish the following:

- **Define and monitor health indicators related to the urban climate.** These health indicators should, at a minimum, track diseases, air quality, water quality, allergies, the heat in Paris and the impacts of these aspects on the health of Parisians. Once these indicators have been defined, they will be incorporated in the observation tool for the health of Parisians, established within the framework of the Parisian environmental health plan. This "resource centre" is intended to capitalise on the relevant health-related data for Paris, specifically concerning health inequalities and the diversity of urban environmental characteristics impacting health.

- **After identifying and mapping the emergency first aid structures that exist in Paris,** which will provide a comprehensive and updated view of the systems in place, their distribution within the territory, and their accessibility in terms of opening hours, it will then be necessary to develop other emergency first aid centres as needed and extend the hours of certain health centres in Paris, in order to respond to diverse health crises which could be caused by climate changes (heatwaves, waves of pollution, epidemics…).

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PARIS' CLIMATE ACTIONS PLAN

ENSURING WATER, FOOD AND ENERGY SUPPLY

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The resources consumed in Paris will be affected by climate change, regardless of whether or not they are produced in Paris. Water resources of the Seine River Basin will be less abundant in the future compared to current amounts, whereas the need will potentially be greater, due to the growth in population, or to greater needs for cooling. The food consumed in Paris is mainly imported from other French or foreign territories which will also be impacted by climate change. This could lead to changes or even the disruption of means of food production and provisioning. Finally, Paris also depends on other territories for its energy supply. However, extreme climate conditions, such as severe heat and droughts, can affect the production and/or networks for energy distribution.

Furthermore, even without taking climate change into account, some of these resources are overexploited and their reserves are in danger of running out. This could lead to local and global supply tensions, particularly for fossil fuels (oil, gas, coal) or food (soil, inputs).

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The City of Paris has already started to anticipate the impacts of climate change in these areas. For example, "Eau de Paris", the company responsible for providing drinking water for Paris, incorporates the need for an additional security margin into its provisional production planning in order to respond to peaks in demand during heatwaves. Actions for controlling and conserving water resources have also been implemented (more economical management of green spaces, monitoring and optimising the consumption of public equipment, water-saving kits, leakage reduction programmes…). The first successful initiatives are being used to develop urban agriculture in Paris and a sustainable food plan has been established that promotes the production of organic, local and seasonal food for Paris institutional restaurants. Finally, since the adoption of the Climate Action Plan there are now numerous existing and local actions for reducing energy consumption and producing renewable energies (upgrading the energy efficiency of public buildings and housing, solar power plants, geothermal development...) that will continue to increase. Similarly, energy distribution networks are currently being secured in order to make them more resistant to extreme climate events.

Conserving water resources and ensuring that they are accessible to all

Possible **stress on water resources,** generated by climate change, could occur occasionally during low water periods and periods of high demand due to the increase in population and new water uses for cooling. On a more structural level, stress on water resources could also occur in the event of **prolonged periods of drought** currently unprecedented in the Paris Basin.

The City of Paris and the Eau de Paris public company have already begun to anticipate the impacts of climate change.


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OBJECTIF 7
MANAGE WATER CONSUMPTION

In the context of the possible depletion of water resources and the likely increase in part of the demand (population growth, development of new uses), controlling water consumption is imperative.

This is a **challenge at the watershed level**, where the water drawn off for Parisian use remains much less than that taken for agricultural or industrial purposes. Therefore the entire water governance must anticipate this new reality.

However, it is still necessary to take action at the level of the City of Paris, by continuing and strengthening water-saving measures:

- **more economical management of green spaces** (optimising watering, using non-drinking water, choosing less water-consuming plant species);
- raising users' awareness and distributing water-saving kits;
- monitoring and optimising public facility water consumption;
- **leakage reduction programmes** for leaks in the networks;
- **developing the use of non-drinking water** (harvesting and using rain water or using the Parisian network of non-drinking water).


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Action 5
Adopt and implement the blueprint for and use of the non-drinking water network

The development of the uses of non-drinking water is essential for adapting the city to climate change, by generalising its use whenever the drinking quality of water is not required, while still keeping in mind that it is just as rare as drinking water and is a resource that must be conserved.

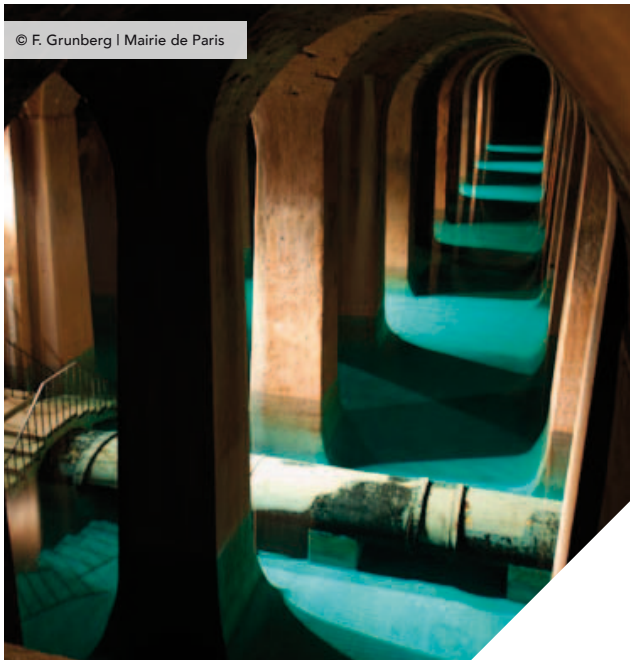
This blueprint involves upgrading and developing the network, extending it to include new operations, and broadening its uses. For the 2015-2020 period, it sets the strategic framework for collaborative actions between the City of Paris and the Eau de Paris public company in charge of managing this network.

OBJECTIF 8
ENSURE CONTINUOUS WATER SUPPLY IN THE EVENT OF EXTREME CLIMATE CONDITIONS

Diversifying sources of water supply is a security in the event that a source becomes unavailable due to drought, flooding or pollution. Water supply in Paris already depends on several diverse sources of drinking water: water pumped from the Seine and Marne rivers, 102 different groundwater sources in 5 major water catchment areas, 6 wells for emergency drinking water supply in the Albian aquifer (deep groundwater levels), interconnections between drinking water networks for emergency water supply or support with other local authorities. At any time, Eau de Paris can have enough production capacity available for meeting peaks in water demand in the event of a heatwave.

A 2,000 km network of structures, 470 km of which are aqueducts, brings water from these sources to the consumption locations, after passing through treatment plants and 5 reservoirs.

The robustness of this entire supply system must be studied with the perspective of the developments caused by climate change. **A study on the changes in Paris's needs and uses at the watershed level on one hand, confronted with, on the other hand, the changes in resources and means of conservation** will be conducted and will contribute to the development of a **Water Supply Continuity Plan** in case of extreme climate conditions (droughts, floods, heatwaves…).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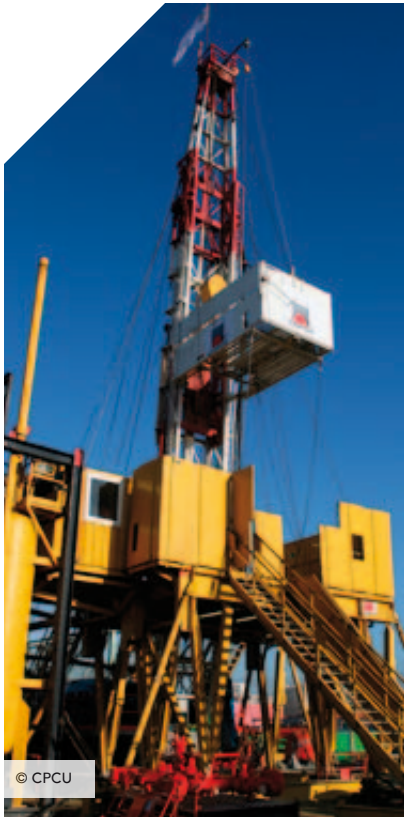
Action 6
Drill new wells that access the deep groundwater levels beneath Paris (Albian aquifer level)

In Paris, six drills draw good clean water from the Albian groundwater. The Albian aquifer layer is a deep groundwater level that stretches under the entire Paris Basin and is over 500 metres deep. The use of this aquifer layer is strictly controlled and is included in the Water Management and Development Blueprint. Three of the six wells have been equipped with public fountains: Place Paul-Verlaine (13th arr.), Square Lamartine (16th arr.) and the Square de la Madone (18th arr.). The Clichy-Batignolles well, on the other hand, is integrated into a geothermal doublet that provides heat for the new eco-district. In the framework of securing the drinking water supply in Paris, new drills into this aquifer layer are being considered, particularly in the new Bercy-Charenton district (12th arr.).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OBJECTIVE 9
ENHANCE FREE ACCESS TO DRINKING WATER IN PUBLIC SPACES

Today, with over **1,200 free drinking water sources present in public spaces in Paris**, the City of Paris is already taking the necessary steps to provide free access to water for all.


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Action 7
Develop new drinking water fountains

The objective is to plan for **the installation of new drinking water fountains** in Paris, and identify the actions that could facilitate free access to water in public spaces throughout the year. With this in mind, the City is undertaking the first step of identifying zones in Paris where access to drinking water in public spaces should be improved. This work of mapping these zones, will serve as the basis for proposals for improving access to water by increasing the number of drinking fountains and potentially proposing the redistribution of certain water sources.


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Strengthen local food supply systems and develop urban agriculture

Like all urban territories, food supply in Paris comes primarily from other territories, and 75% is delivered by road. The Île-de-France/Paris region depends greatly on other French regions for provisioning, in the event of a shortage in fossil fuels, the region would only have a few days of food autonomy. Ensuring Paris's food supply therefore requires anticipating and adapting to several types of developments:

- **Changes in global agricultural and food production conditions.** While the rise in average temperatures and CO2 concentration levels can in certain cases improve agricultural yields, the scarcity of freshwater resources, the loss of arable land due to rising sea levels, desertification and urbanisation will affect agricultural production at a global level, which could create tensions over supply or increased prices.

- **The scarcity of fossil and mineral resources.** Food supply requires mineral resources (nitrogen, potassium) and fossil resources (oil, natural gas) for producing inputs for conventional, production-oriented agriculture and for transporting productions.

- **Extreme climate events** such as droughts or risks affecting transport systems (floods, storms…).

To confront these different threats, the challenge is to both **support local food production that respects the environment,** and to **strengthen and diversify the food supply** of the capital.


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OBJECTIVE 10
33 HECTARES OF URBAN AGRICULTURE IN PARIS BY 2020

Gardens shared in green spaces, educational mini-farms near schools, sliding vegetable gardens on the facade of new buildings, urban farms shared by several office buildings, orchards in schools, participatory vegetable gardens, roofs and walls producing fruit and vegetables… Several solutions are possible for contributing to creating green spaces in the city, **developing local food production and involving residents** in this transformation of the city.

The objective is to reach 33 hectares of urban agriculture in Paris by 2020: on the roofs or walls, in the courtyards of buildings, even in public spaces, several projects will be implemented in Paris. To provide an example, 0.5 hectares, or 5,000m² of urban agriculture, will be installed on the roof of the Chapelle International Freight Hall near Porte de la Chapelle (18th arr.) in 2019. The City of Paris will also launch two calls for project proposals, one for creating green spaces on Parisian buildings and the other on **urban agriculture**. These new developments will complement the existing 5.8 hectares of shared gardens and 0.5 hectares of vineyards in Paris, as well as the 5 hectares of the Paris Farm.

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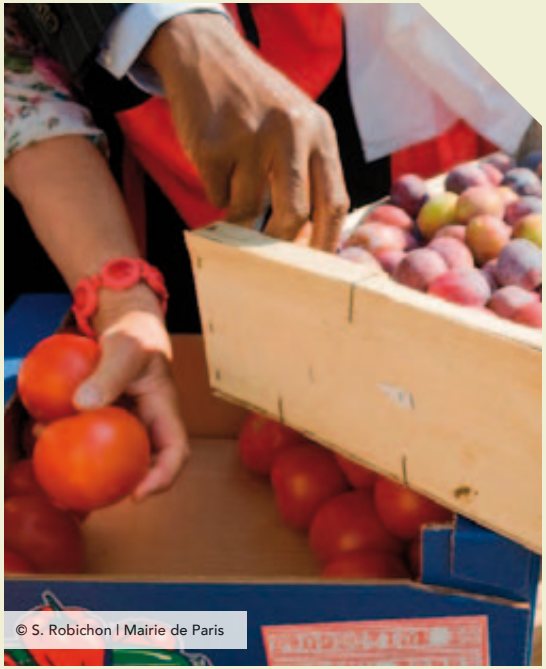
Action 8
Develop urban agriculture gardens on water reservoirs

Today water reservoirs are part of the last large property holdings of the French capital. Little used today, these large surface areas could eventually become home to urban agriculture garden projects. Studies are already being conducted in order to determine the possible opportunities and operating conditions.



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OBJECTIVE 11
ENSURE PARIS'S FOOD SUPPLY

This long-term objective to secure Paris's food supply has several aims:

- **fight against food waste**;
- **develop local agricultural production** (a part of the food products produced in Île-de-France, which implies the diversification of the crops planted and the development in particular of market gardening);
- the **diversification of means of supply** (road, river, rail) to compensate for disruptions in supply and the development of sustainable deliveries with lesser impact on the environment;
- Anticipating the need to **maintain the cold chain** during heatwaves, especially for restaurants, the food trade and small shops (emergency cooling systems, connections with the urban cold network…).


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Action 9
Reach 25% of food products consumed in Paris being produced in Île-de-France in 2050

Today, very little of the food consumed in Paris comes from Île-de-France – except for grains; only 8% of the food consumed comes from a supply zone less than 50 km outside of Paris. With the aim of contributing to protecting long-term food supplies in Paris, it is necessary to plan for one quarter of food products consumed in Paris to be produced by 2050. This presents a very ambitious objective, which implies overcoming several challenges: **diversifying or changing the cultural practices of Ile de France farmers**, investing in new production materials, **creating and organising new supply chains…** Developing urban agriculture in Paris and implementing the Sustainable Food Plan will help in meeting this objective.

This objective requires establishing **new relationships between urban and rural territories**. Partnerships will be sought with Ile de France communities that wish to participate in this new dynamic, with industry representatives, chambers of agriculture, and the various institutions involved in the agricultural system (local governments, land management, etc.).


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Action 10
Continue working with farmers and municipalities on water catchment areas and water supply

Drinking water supply in Paris depends on various sources, half of which are underground, located 100 to 150km from the capital, in the Departments of Seine-et-Marne, Yonne, Aube, Eure-et-Loir and Eure. Over the 200,000 hectares of these drinking water intakes, Eau de Paris continues to follow a strategy for conserving water resources, in particular by assisting farmers in developing their practices. **Extending the area of organic agricultural surfaces** is one of the components of this strategy, through land acquisition and **assisting farmers in making the transition to organic farming**. Currently, nearly 2,000 hectares are organic or are being converted to organic agriculture on three pilot catchment supply areas (aires d'alimentation de captage – AAC). Among these, due to the dynamic driven by Eau de Paris, that of the sources from the Vanne Valley recorded the strongest growth: surfaces were multiplied by 6 in 6 years to reach 1,632 hectares in 2014.

Action 11
Reach the objectives of the Sustainable Food Plan

Since 2009, the City of Paris has been implementing a policy of sustainable food development (organic, approved, local, and seasonal) in its institutional catering (childcare centres, schools, retirement homes, administration restaurants…). The actions taken have thus increased the organic food served from 6.6% in 2008 to **27.3% of sustainable food (24.2% organic food) in 2014**, making the Paris municipality the first public purchaser of organic food in France. With the new 2015-2020 Sustainable Food Plan, the City of Paris has set the **objective of serving 50% of sustainable food in its institutional restaurants for 2020.** Three indicators will also be associated with this objective, measuring respectively the introduction of organic products, that of local, seasonal products, and finally those approved with labels such as "Label Rouge", Marine Stewardship Council and sustainable fishing.


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Develop the production of local and renewable energy and improve the resilience of energy networks to climate hazards

Today, 95% of the energy consumed in Paris is not produced in Paris. In anticipation of **the reduction in available fossil resources** and the increase in their cost, the challenge is to **develop local renewable energies and recovered energies**, while at the same time **decreasing energy consumption**, , by diversifying the energy supplies of the French capital and ensuring that access to energy remains possible for all.

The production of electricity in France and the Parisian electricity network are vulnerable to climate change. For example, the combination of intense heat and drought hinder the cooling of thermal and nuclear power plants. **Intense heat in Paris weakens the electricity distribution network**, potentially causing power outages for Parisians during heatwaves.

The reduction of energy consumption coupled with securing distribution networks and the development of local renewable energy production are the priority axes of intervention for maintaining the local economy (including tourism), the living conditions of households and the quality of transport services, etc. These actions must be designed to ensure the long-term supply of energy for Paris. This challenge can only be met through a **long-term metropolitan approach terme** that integrates the global energy context.

In 2007, the City of Paris adopted its Climate Action Plan, which sets the objective of reducing energy consumption by 25% on the territory and having 25% of renewable and recovered energies in the energy mix by 2020. These objectives are set at 30% for buildings, the vehicle fleet and City activities. In order to meet these objectives, the City has developed an action programme that demonstrates its commitment to anticipating the scarcity of fossil energy resources. The programme includes the following actions: installing solar panels (Halle Pajol, social housing…), drilling geothermal wells (North-East Paris in the 19th arrondissement, Clichy Batignolles in the 17th arr.), recovering sewer heat in order to heat buildings (Wattignies schools in the 12th arr.), 100% renewable electricity supply for municipal buildings and equipment starting on 1st January 2016…

Furthermore, as the owner of the energy networks on its territory (electricity, gas, heat, urban district cooling), the City of Paris reviews its vulnerability each year to the climate extremes that have taken place (floods, heatwaves, very cold weather) and schedules investments with distributors (ErDF, GrDF, CPCU, Climespace) to upgrade these networks.

OBJECTIVE 12
MONITOR THE CONDITIONS FOR ENERGY ACCESS FOR ALL

Heating buildings, hot water heating, mobility, means of communication and telecommunication, and operating various electrical devices: energy is both essential in running our urban society and a basic need. However, economic and/or geopolitical tensions on energy resources and the investment required for strengthening local networks leads to rises in prices. Economic projections show that energy prices will continue to increase. In this context of continuously rising energy prices, the **risk of energy poverty** must be addressed when energy poverty causes health problems (due to inadequate heating), and social and economic problems (access to employment, etc.).

Action 12
Establish a plan involving multiple stakeholders to fight against energy poverty

Several measures have already been implemented to prevent energy poverty situations (in particular by updating the energy efficiency of housing, providing advice on limiting consumption), or respond to it (financial aid for paying bills). The City of Paris wishes to step up these measures by creating a dedicated strategy and action programme with all the relevant stakeholders involved in this issue (energy operators, social workers, public institutions, the Paris Climate Agency…).

OBJECTIVE 13
TRIPLE THE SHARE OF RENEWABLE ENERGY IN PARIS OVER 10 YEARS AND INCREASE THE PRODUCTION OF RECOVERED ENERGIES

In 2014, the City of Paris committed to tripling renewable energy production in Paris within ten years. The inventory of existing renewable and recovered energy installations and the study of the potential development of different energy sources is currently being updated.


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Geothermal energy, solar energy, hydrothermal energy (using the coolness of the Seine river water for urban district cooling), recovering the heat from the incineration of waste are the main current energy sources produced locally. Future avenues to be explored include recovering energy from diffuse sources (wastewater networks, grey water from buildings, datacentres) and recycling organic waste. The first experiments are currently underway, such as the Aspirant Dunand swimming pool (sewer heat recovery).

Action 13
Consolidate the territorial energy strategy

To reach the objectives set by the Paris Climate and Energy Plan, a clear **energy strategy** must be developed, identifying the specific opportunities for development of the various sources of renewable energy, and articulating local production projects, operations for reducing energy consumption, and investments in the networks.

This strategy must make it possible to create **blueprints for developing the different energy networks**. These blueprints, true decision-making tools for **determining energy choices** (development projects, buildings, etc.), will take into account developments in the global energy context, the Climate Action Plan objectives, the need to control energy bills, and the initiation of a new governance (citizen participation and initiatives, the Greater Paris metropolitan area, etc.).

At the same time, it is necessary to reduce long-term energy consumption in Paris and develop energy produced on the territory using renewable energies and recovered energies, while ensuring the resilience of the distribution of energy in the context of extreme climate conditions.

Finally, it is also necessary to go a step further and develop **energy solidarity between territories,** as well as joining energy networks together at the Greater Paris metropolitan level.

This **appropriation of energy issues at the local level** is essential for optimising projects and defending the public interest in an area experiencing fast and significant changes.

OBJECTIVE 14
IMPROVE ENERGY AND TELECOMMUNICATION NETWORK RESILIENCE TO WEATHER EVENTS

Weather events can affect the operation of energy networks. The electricity network is particularly vulnerable to three types of events:

- In **very cold spells,** demand for electricity increases sharply. **Peak electricity demand increases twice as fast** as average consumption. If certain situations (maintenance, incidents) occur during periods of high demand, problems may occur, causing power outages over a more or less wide area.
- Certain facilities necessary for the electricity network to function are particularly **sensitive to hot weather.** During heat waves, temperatures under the pavement can reach 70°C, causing this equipment to malfunction and provoking longer and more numerous power cuts in Paris during years with heat waves. Telecommunications networks (mobile, internet, etc.) are also sensitive to heat waves, sometimes compromising communications and internet access. Identified as one of the electricity network's weak points, these facilities are included in a renewal programme as part of the objectives of the concession contract between Paris and ErDF.
- **Flooding due to heavy rains or a rise in the river level** can also disrupt network operations. If a 100-year flood such as that of 1910 happened in Paris today, 300,000 buildings would lose their electricity supply, even if their street were not flooded.

The electricity network is segmented in such a way that preventative power cuts would be implemented to speed up re-establishing electricity when the water level subsides. These power cuts could last several days, even several weeks, depending on how long it takes the water level to decrease. The objective of the City of Paris objective is to make the "sensitive electricity zone" as small as possible by investing in the electricity network and optimising its operations.


PARIS'
CLIMATE
ACTIONS
PLAN
LIVING
WITH CLIMATE
CHANGE: MORE
SUSTAINABLE
CITY PLANNING
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The way we plan and develop the city (infrastructure, equipment, building, public spaces, etc.) is a powerful lever to adapt our way of life to climate change, contribute to risk prevention and improve our living conditions. For example, allowing a greater place for water and nature in the city contributes to sustainably lower temperatures during heat waves while offering Parisians more space for recreational activities. Buildings can choose passive cooling solutions (solar protection, ventilation, connecting to the cooling network that uses the Seine, etc.) Materials can be chosen based on their ability to store heat, or not. In the same way, new rainwater management methods can be implemented in a public square, a park or an apartment building to reduce the risk of flooding after heavy rains.

The City of Paris is already taking measures to face these challenges. The renovation of the Place de la République is a good example of public space design that fosters more effective adaptation to severe heat: lighter-coloured materials, keeping the large trees that give shade and a reflecting pool accessible to the public when the weather is hot.

Additionally, numerous measures are being carried out to green the city (+62 hectares of green space between 2001 and 2014, planting nearly 4,000 trees in the first year of the term, greening the banks of the Seine, etc.). Alternative rainwater management is also being developed, with rain gardens or green swales, such as in Martin Luther King park in the 17th arrondissement.

These initiatives also contribute to limiting the decline in biodiversity, a major issue exacerbated by climate change (climate change is estimated to threaten 20% of plant and animal species with extinction by 2050). Biodiversity could be considered as both a weak point and a solution to adapt to climate change

Allowing a greater place for water and nature in the city

Water and vegetation help cool the city and limit the urban heat island effect. Water evaporation and plant evapotranspiration "consume" heat and help reduce surrounding temperatures. Developing water and nature in the city is a priority for the city to adapt to climate change.

Green spaces and the different ways in which water is present in the city also bring many advantages:

- **preserving biodiversity** (green and blue corridors);
- **alternative rainwater management,** looking to limit flooding caused by heavy rains and discharges of polluted water into the environment;
- **improving quality of life** through a positive re-appropriation of public space and encouraging new uses;
- **proven health benefits:** beyond cooling and reducing noise pollution, greenery has positive psychological and physical effects on individuals.


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OBJECTIVE 15

BY 2020, NO PARISIAN SHOULD BE MORE THAN A 7-MINUTE WALK FROM A PLACE TO RELAX WITH WATER OR GREENERY

The city wants to make Paris greener by creating more green spaces and adding greenery to public spaces and buildings. This objective will be attained by 2020 so that no Parisian will have to walk more than 7 minutes to find a place to relax with water or greenery by 2020.

Many projects have already been implemented to allow more space for water and nature in the city, such as opening 62 extra hectares of parks and gardens between 2001 and 2014, making the banks of the Seine greener or creating new ponds. Several framework documents define the directions and actions needed to increase the city's water and nature development: the Biodiversity Action Plan (2011), the Blueprint on Water (2012), and the Paris Rainwater Action Plan (under development).

Action 14
Reinforce the presence of water in urban developments

Water's presence can be reinforced by creating fountains and other visible water points in the city: swales, rain gardens, ponds, fountains, etc.

Contributing to both cooling public spaces and creating an alternative management of rainwater, swales (that gather rainwater) and rain gardens (full-earth gardens that gather rainwater and partially flood during heavy rains) will be created by 2020. Development projects are great opportunities to implement these solutions, such as the nature basin in the Rungis ZAC garden (13th arr.) or in Martin Luther King park as part of the development of Clichy-Batignolles (17th arr.).


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OBJECTIVE 16
DEVELOP USE OF WATER IN PUBLIC SPACES

It is important to develop durable cooling systems using water, i.e. systems that remain in place year round, but that Parisians and visitors will primarily use during heat waves:

- build **new ornamental and drinking fountains;**
- build new reflecting pools;
- implement new misting systems;
- install **water parks** in public spaces or in parks.

Action 15
New reflecting pools in Paris's main squares

To develop sustainable cooling systems using water, i.e. systems that remain in place year round, but that Parisians and visitors will primarily use during heat waves, **building new reflecting pools** will be studied as part of the renovation programme for Paris's main squares.


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Action 16
Restore water supply and facilitate access and use of decorative fountains

Water surfaces (artificial lakes, decorative fountains, etc.) are heavily sought after by Parisians and visitors on the hottest days of the year. However, most of time these places are off-limits to the public: unsupervised, hard to access, with water not safe for drinking, none of which stops passers-by from cooling off in them during heat waves. In the short term, the City of Paris, in collaboration with the Regional Health Agency, will study the health consequences of expanding access to these water installations. Depending on the results, secure, technical facilities could be tested in some of Paris's busy areas.


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OBJECTIVE 17
CREATE MORE PLACES FOR SWIMMING

With 7 million entries each year, swimming pools have become one of the public's most sought-after public facilities. Paris currently has 39 municipal swimming pools. The **Paris Swimming Action Plan** adopted by the Council of Paris in 2015 includes €57 million in investment to build new city pools and basins in Paris between 2015 and 2020.


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Action 17
Create four new indoor pools and two new open-air pools in Paris

With 104 measures, the Paris Swimming Action Plan has three objectives: begin improving and modernising Paris's swimming pools while creating four new pools (Davout in the 20th arr., Elisabeth Sports Centre in the 14th arr., Rue Belliard in the 18th arr. and Rue Eblé in the 10th arr., in addition to the nearly-finished Balard swimming pool that will be open to residents during certain hours), introduce wider opening hours to meet demand for Paris's pools, and improve the quality of public service.

In total, **Parisians will have 10% extra swimming space available,** reaching nearly 100m² per 10,000 residents, proof of territorial rebalancing and an unprecedented building effort.

The plan also provides for **two new projects for swimming spots**: on the Seine at André CItroën park (15th arr.) and is looking into creating **an ecological swimming area between Suzanne Lenglen park and the heliport** using treated natural water.

Action 18
Open natural swimming sites

In addition to the new pools, the city would like to open natural sites such as canals and lakes to swimming by 2020. To be studied:

- creating a summer swimming area in La Villette basin (19th arr.);
- allowing summer swimming on Lac Daumesnil (12th arr.).

Water quality, other uses and installations will be different for each site. This requires extensive work with all users, communities and stakeholders beforehand and from health authorities to ensure that the public can swim without risk.

OBJECTIVE 18
CONDUCT A VAST GREENING PROGRAMME TO COOL THE CITY

The City's objectives for adding green spaces by 2020 are ambitious:

- **100 hectares of green roofs and walls,** with a third for urban agriculture;
- +30 ha of green spaces open to the public;
- **+20 000 trees** planted in Paris;
- increase green spaces in newly developed neighbourhoods;
- promote green spaces in new developments in Paris, etc.

The different projects to help achieve these objectives will be implemented depending on operational opportunities, prioritising neighbourhoods most in need of cooling, and taking into account the allergy risks presented by the chosen species (especially important in Paris given that atmospheric pollution worsens allergy symptoms, and can be aggravated by climate change).

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Action 19
Implement innovative solutions for greening the city

These objectives will be achieved through experimenting or generalising solutions that have been little used until present:

- adding green spaces to school courtyards;
- developing "**green streets**": two projects are already planned in the 12th and 15th arrondissements, in addition to adding "cooling paths" over the longer term between parks and Paris's other cool spaces;
- removing impermeable elements from certain ground surfaces.

Based on the results of the green and humid spaces thermal regulation study carried out by the City of Paris in 2014-2015, special attention will be paid in designing green spaces to optimising their cooling effect:

- **favour full-earth green spaces** and avoid making existing spaces impermeable;
- **systematically include different plant strata**, with at least open grass-covered surfaces and shaded areas (alternating low and high plant strata, plant-covered pergolas, etc.);
- plant large deciduous trees that give shade during the day.

Action 20
Choose and plant new species adapted to the future climate

Pollution, heat, drought, illness, fire, storms, declining water resources... The effects of climate change create risks to Paris plant life. First of all, it will be necessary to study changes to the range of plant life in the city under new climate conditions, and later to experiment with different ranges of plants. Ideally, the plants chosen will need little water but also have useful properties for cooling and managing rainwater.

The review of Paris's **biodiversity action plan** in 2016 will be an occasion to further include these goals in the city's strategy and actions in choosing species and its strategy for preserving and encouraging biodiversity.

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Action 21
Design parks that are "adapted to climate change"

As part of the objective to open 30 new hectares of green spaces to the public in Paris by 2020, it is important to use this occasion to have **parks that limit water use, effectively manage rainwater and are able to cool off visitors.** These parks can meet all of these challenges if they include thinking on diversifying plant strata (lawns, shrubs, and wooded areas with large deciduous trees) and the types and species of plants included, if they include measures to manage rainwater (full earth, swales, holding pools, partial flood zones, etc.), if they give access to water to cool off Parisians and users (drinking fountains, water features, misting systems, wading pools, reflecting pools, temporary swimming pools, etc.) and if they have areas exposed to sunlight and shade (trees, plant-covered pergolas, etc.). Work will be carried out as part of Paris's environmental health action plan on a project for a garden or educational path with allergy-causing species - to help the public recognise them, learn their period of pollination and protect themselves - and plant life adapted to Paris's future climate, that can stimulate visitors' imagination and serve as a means for educational or extracurricular activities.

Several parks will be designed by 2020 in Paris according to previous recommendations that will also be applied to renovating existing green spaces and certain developed areas in the forests, for example.

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Transform buildings and public spaces

Due to Paris's high population density, buildings and public spaces tend to store heat accumulated during the day and create a microclimate known as an "urban heat island". This phenomenon explains the higher temperatures in the city compared to the suburbs or the countryside, especially at night. **Urban planning is an important factor in public health during heat waves.**

Other events possibly amplified by climate change will put pressure on constructions themselves: flooding from heavy rain or the Seine, droughts and the accompanying swelling of clay soils, storms, fires, etc.

The challenge here is to begin transforming Paris's buildings and public spaces to both improve Paris's quality of life during heat waves and make the city's installations more resilient to extreme climate events.

Paris is already acting in favour of more positive urban planning in regards to climate change: high environmental quality in new buildings, thermal renovation of existing buildings (especially as part of the Paris Climate and Energy Action Plan) that also improves summer comfort, creating green spaces, improving the city's permeability, developing the city's cooling network that uses the Seine for cooling, etc.

These actions will be undertaken alongside construction activities and will be expanded over a wider scale to begin a real and sustainable transformation in Paris's buildings and public spaces.

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OBJECTIVE 19
REQUIRE A SUMMER COMFORT GUARANTEE IN NEW CONSTRUCTIONS

Taking the **summer comfort** of Paris's buildings into account is a crucial issue, particularly for housing and offices, in limiting air conditioning use during the increasing number of heat waves expected in the future. **Predicting users' future summer comfort needs** is vital, by taking into account projected changes in Paris's climate and **promoting passive cooling solutions.**

Making these recommendations mandatory for developments in Paris in the Local Urbanism Plan (PLU) is expected.

Action 22
Install passive cooling solutions in Paris's buildings

Several technological solutions exist to protect buildings and their occupants from the heat, whether through installing exterior solar protections on all types of buildings in Paris, or putting in place positive cooling solutions where solar protection is insufficient:

- Install effective exterior solar protections on buildings.

- Overhangs, awnings, shutters or shades, exterior solar protections are an essential solution to improve summer comfort in Paris's existing and planned buildings.

- Test new solutions that are passive, low energy or use renewable energy or recover energy in buildings.

In new constructions or renovations of air conditioning systems, looking at alternative and innovative solutions to classic cooling systems is important. Tests are already being carried out in Paris and will be closely monitored and analysed for technical, environmental and economic impacts. Air conditioning at the Hôtel de Ville by recovering heat lost in the non-drinking water network (4th arr.) and the ground-coupled heat exchanger installed in the Halle Pajol (18th arr.) are two such examples. The following cooling solutions can be explored:

- **Reducing internal heat sources** (refrigerator condensers, lighting, computers, etc.).

- **Natural cross ventilation** or ventilation by thermal draught (chimney effect).

- **Increasing air speed in building ventilation** (justified by dynamic thermal simulations as is already the case in overseas territories) or free-cooling by nocturnal over-ventilation.

- **Choosing materials** based on their thermal inertia (phase-change materials) or their colour, or more specifically their albedo (ability to reflect the sun's rays): white roofs and walls or "cool roofs" and "cool walls". White is the best colour to meet these criteria, but these thermal properties can also be found in "cool roof" paint technology in other colours.

- **Adapted design of external walls**: double-lined walls with a cooled internal air layer, walls with layers of water to improve thermal inertia, roofing with circulation of cool air between the layers.

- **"Geocooling"** using underground coldness, usually combined with geothermal heating to produce renewable heat during winter.

- **Alternative air conditioning:** adiabatic cooling or cooling through humidification, absorption machines, magnetic cooling, solar cooling, solar chimneys (depending on these technologies' energy consumption and potential health impacts).

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Action 23
Develop the urban cooling network

Since 1991, Paris has developed **an urban cooling network** that serves 500 customers (equalling 5 million m^2) over 70km of network. Among the largest cooling networks in Europe, **this infrastructure is an important advantage** in offering an effective cooling solution that is more environmentally friendly than traditional air conditioning: **using renewable energy** (part of the cooling distributed by the network comes from the Seine's natural and renewable coolness), **fewer greenhouse gas emissions** (few coolant leaks and lower energy consumption), managing health risks, fewer hot air emissions, reducing the aesthetic impact of air conditioning units on roofs or façades, etc.

It is important **to continue developing this network** for which many opportunities exist, while extending service to different types of customers, such as those with fewer cooling needs, to help limit their use of separate air conditioning and air treatment units.

The concession agreed with Climespace to develop and operate this network will come to an end in 2021. This contractual deadline must be seen as an opportunity to **include climate change in the cooling network's strategic perspectives** (increasing needs, resilience against various hazards).


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Action 24
Draft standards for constructing buildings adapted to climate change

Drafting standards for constructing new buildings in Paris, in relation with technical experts and relevant certifying organisations, is to be undertaken. These standards could then be used for climate certification applied to new buildings. It would have several articles on essential measures to adapt new buildings to climate change:

- take into account predicted data of a future climate at +3°C for any new development;
- in thermal simulations of summer comfort, include a future climate scenario at +3°C to know which building measures to implement to limit interior temperatures higher than 28°C to no more than 50 hours per year ("Haute Qualité Environnementale" efficient level)
- require exterior solar protections
- add natural or passive ventilation as an objective for new buildings and renovations (cross ventilations, allow more fresh air circulation at night, etc.);
- colour and reflectivity criteria for walls and roofs;
- include green spaces;
- prepare for flood risks;
- take into account health issues linked to construction (interior air quality, ventilation to maintain clean air, etc.).

Action 25
Ensure protection against flooding risks

At-risk buildings situated in a flood zone can be protected by different solutions:

- placing electrical installations higher up;
- anti-flood doors if the building is watertight and made to resist water pressure (strategic sites);
- removable watertight barriers;
- waterproof materials on the lower parts of buildings located in flood zones, etc.

For example, anti-flooding measures are already prepared and operational in the Paris Rive Gauche commercial zone with sheet piling stored in buildings near the Seine.

OBJECTIVE 20
DEVELOP ALTERNATIVE RAINWATER MANAGEMENT

Optimal rainwater management is an important challenge for dense and highly impermeable cities like Paris. As climate change can cause more frequent heavy rains, this issue will become even more important. Continuing to develop alternative rainwater management techniques to avoid over-saturating sewers and flooding is needed.

Action 26
Implement the "Paris Rainwater Action Plan"

Continuing on from the "Rainwater Action Plan", several actions will be undertaken:

- Creating rainfall zoning to go with the existing waste-water zoning. This introduces plot-by-plot rainwater management with defined minimum levels of rainwater to be eliminated via infiltration, evaporation, and evapotranspiration instead of through the sewer network. In consequence, it calls for a guide to alternative rainwater management techniques. It looks to accompany designers and developers in designing and implementing alternative rainwater management techniques by publishing a guide to promote adding plant life at the foot of trees, building rain gardens, swales, or receptacles to gather rainwater from the street;

- Using **draining structures** (permeable paving with a reservoir base, draining ditches, infiltration wells), **permeable materials** (cobblestones with grass or sand joints, porous concrete, stabilised draining coatings, permeable resin) and **planting greenery** (swales, plant life that lets water through) in **designing public spaces.**

Several examples of these techniques are already being implemented in Paris:

- **Creating reversible spaces that flood** during heavy rains and can be used when dry (parks, swales, sports fields, etc.). Adding temporary flood areas to existing facilities is important: make ponds or reversible spaces that can serve as retention pools for rainwater when direct infiltration is not possible. Open-air retention pools (ponds, rain gardens, controlled flood zones) ahead of areas at risk of flooding during storms is a preferred solution.


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Action 27
Improve permeability when renovating the banks of the Seine

Although constrained by the need for reversible installations, renovating the Seine's south bank has enhanced plant life, making the area more agreeable for visitors and creating more welcoming spaces for biodiversity. The north bank's renovation must improve permeability as much as possible and promote positive connections between blue and green zones.

Existing bankside installations will be part of localised permeability experiments to progressively return the banks to a more natural state.

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OBJECTIVE 21
INCLUDE RECOMMENDATIONS FOR BUILDINGS AND PUBLIC SPACES IN URBAN REGULATIONS

Effectively extending adaptation measures for buildings and public spaces will be achieved by **progressively adding recommendations, incentives, or requirements to city regulations** (city planning documents, construction specifications, etc.).

Certain existing regulations can hinder adaptation initiatives. The City of Paris has begun work to **identify and remove these barriers** where possible. For example, a "**greening permit**" was created in 2015 to facilitate residents' initiatives to add greenery to public spaces themselves.

Action 28
Include adapting to climate change in the PLU (local urbanism plan)

The City of Paris began working on a **change to the Local Urbanism Plan** in 2014. It is a real opportunity to include measures toward adapting to climate change (creating green spaces, taking summer comfort and flood risks into account, etc.):

- the PLU should include development and planning guidelines to promote ecological coherence and guarantee compliance with the Regional Ecological Coherence Plan. It includes, among others, preserving biodiversity reservoirs in Paris's forests, the Seine, green spaces, and ecological corridors;
- terraces over a certain size must include plants;
- open green spaces will be created as part of new developments;
- full-earth green spaces will be preferred;
- Paris's PLU will include an Article 15 dedicated to the environmental and energy performance required for each development. This will implement the objectives of the Paris Climate and Energy Action Plan in urban planning regulations. Energy efficiency and renewable and recoverable energy production policies should be strongly encouraged, even required, and the issue of summer comfort taken into account.

Other climate change adaptation measures must be analysed to find opportunities to include all or part of them in urban planning regulations over the long term:

- remove barriers to installing shades and shutters in Paris;
- require exterior solar protections in public and residential building construction programmes;
- plan a form of greening for all new developments in Paris, etc.

These issues are to be taken into account in drafting the coming Territorial Coherence Plan (SCoT) for the Paris metropolitan area.

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Finally, for Paris's social housing, there is already an obligation to add greenery to buildings in all new constructions (greening of buildings is a requirement unless impossible for technical or heritage reasons or if it conflicts with the building's purpose).

Action 29
Saint-Vincent-de-Paul, an eco-district as an example of adaptation

The result of reconverting a former hospital, the future Saint-Vincent-de-Paul neighbourhood will embody the City of Paris's energy and environmental ambitions. Reducing the environmental footprint, promoting the site's natural resources and adapting to climate change are at the heart of this **3.4-hectare green neighbourhood project** in Paris's 14th arrondissement.

From an adaptation point of view, the objectives will be included in each step of the project, from its design to operational implementation, to limit the "urban heat island" effect and respond to the scarcity of water resources:

- Paying special attention to thermal renovation of remaining buildings and to planned buildings and public spaces' **bioclimate design**: optimising sunlight input in the winter and reducing it during the summer, cross ventilation in housing, optimising air management in the city, choosing bright materials that don't stock heat, greening roofs, façades and exterior spaces to encourage evapotranspiration, etc.

- **Using water resources efficiently**: reusing rainwater, including water in public spaces, using the non-drinkable water network to cool public spaces during heat waves, etc.

- Making use of the **two large protected green spaces** in the heart of the zone, especially as places to cool off.

Imagine and build a sustainable city

It is necessary to pursue not only the measures cited previously, but to go further in considering, by 2050, **major changes in the city's imagination, design, and uses.** The general idea is to move toward a **greener, lighter, more permeable, more shaded, more welcoming city** where all residents and activities, as well as water and biodiversity, can find their space.

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OBJECTIVE 22
PROMOTE THE CIRCULAR RAILROAD AS A PLACE TO BREATHE AND AS A BIODIVERSITY RESERVE

The circular railroad is 32 km of rail infrastructure that goes almost around the whole of Paris, more or less close to Paris's ring road.

Abandoned over the great majority of its surface, **nature has spontaneously taken over the site.** It comprises a large full-earth surface (nearly 50 hectares) that not only allows rainwater to infiltrate into the ground but also permits the growth of plant life that is very resistant and self-sufficient with roots that naturally grow deep. Depending on the section, there are more or less greenery and spaces colonised by wildlife. Studies undertaken in 2014 of the ecological services provided by the circular railroad have measured its essential impact on Paris in terms of its biodiversity, its role as a buffer for noise pollution and as a cooling zone during heat waves.

Taking back ownership of the circular railway will open new breathing and leisure spaces to the public while preserving and promoting biodiversity through uses such as cultural and educational walks. The circular railway's role as an ecological corridor must be preserved.


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OBJECTIVE 23
RESTORE THE WATER QUALITY OF THE SEINE

During heat waves, the Seine could be an important place for Parisians to swim and cool off.

With its candidacy to host the Olympic Games in 2024, the City of Paris would like the Seine to continue as a place to swim as it was in the past. This requires work ahead of time against pollution throughout the Seine basin, particularly from agriculture and defective sanitation networks, as well as consultation with all of the river's users (river traffic, etc.), neighbouring municipalities and public institutions.


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Action 30
Launch a study on the future of the Paris ring road

The ring road is important in keeping Paris running, and maybe also as part of Paris's identity. Although many studies and projects have thought about how to better assimilate it into the urban area (speed limits to reduce noise and pollution, installing new sound barriers, etc.), **climate change and declining of resources could call its future into question over the long term.** Studying these issues and finding possibilities to use the ring road as part of creating a sustainable urban region will begin.

The study will explore different possible visions, in a rigorous forecasting exercise that looks to propose meaningful and potentially feasible solutions. Occasional public events could be held on the ring road to give a new view of this infrastructure (pedestrianisation, organising a bicycle race, etc.).


PARIS'
CLIMATE
ACTIONS
PLAN
FOSTERING
NEW LIFESTYLES
AND BOOSTING
SOLIDARITY
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Some of our fellow citizens are particularly vulnerable in the face of extreme climate events. The solidarity of all Parisians with the most vulnerable members of the population is indispensable. A warmer climate will modify our daily life and that of the capital.

Finally, the fight against climate change cannot be meaningful without complementarity and solidarity with other territories, both our neighbours and those further afield. For example, the City of Paris is working on the idea of a Green Fund for Cities and Local Authorities as a tool for financing projects to adapt territories to climate change around the world.

Foster new lifestyles

Lifestyle includes the ways in which households travel around, house themselves, relax, work and consume. **Climate change and declining resources can affecter and restrict our lifestyles:** through lower thermal comfort during heatwaves, disruptions of public transport when temperatures are very high or during snow, increased demand for hydration and cooling at a time when water is becoming less available, etc. In addition to this, **new, more or less virtuous forms of behaviour can appear**, such as a more diversified offering of recreational activities making greater use of public space on the one hand, or increased use of air conditioning on the other:

- to take more effective account of stakeholders' changing uses and expectations in projects and to organise the working of the city;
- **to raise awareness among Parisians of new, sustainable lifestyles** that are compatible with the issues raised by climate change and declining resources;
- **to foster the active participation** of all stakeholders in these new behaviours to be adopted and in the transformation of the city.

The City of Paris is already acting to foster these new ways of life through awareness-raising and mobilisation measures, in particular on the environment, sustainable development and the climate (the **Paris Climate Action Charter** with local economic stakeholders, the **Sustainable Paris Stakeholders** process involving civil society, etc.).

More generally, in all areas, the municipality is seeking to develop new tools, such as the **participatory budget** or **greening permits** which can all be used by inhabitants to transform their city.

OBJECTIVE 24
ADAPT PUBLIC FACILITY OPENING TIMES

By adapting the opening times of public facilities, administrative formalities and recreational activities can be made easier, while also adapting times to take account of weather conditions (closing buildings at the hottest times of day during heatwaves, for example, or providing access to cooler spaces by opening parks at night, notably for the most vulnerable people…). As far as parks and gardens are concerned, the aim, among others, is to **diversify the activities on offer** to keep up with changing practices (innovative play areas, cultural programming, using historic band stands and covered areas, etc.) and adapting opening times and accessibility accordingly.

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Action 31
Adapt public facility opening and agent working times to weather events

Heatwaves, high water levels on the Seine, storms… a number of climate events can have an impact on Parisians' public services and lifestyles. Studies will be conducted of the opening times of certain facilities and agent working times during weather events. Representatives of the relevant departments and also users will be involved in the process.

In particular, faced with diverse practices and growing demand for **Paris swimming pools,** the objective has been set of optimising the pools and their opening times through to 2020 to offer the general public 20% more opening time (making 314 extra hours of swimming a week for Parisians). To do so, various measures will be implemented, such as:

- creating time slots dedicated to families at weekends and during school holidays;
- consolidating and improving early-morning opening (from 7am) every day of the week;
- extending the current midday break (11.30-1.30) at least until 2.00pm on some weekdays;
- boosting the number of late-opening days (through to 10.00pm) by at least 30 evenings a week for the pools as a whole;
- a new real-time information system to get all the data about the pools (number of users, closures and their causes, etc.).

OBJECTIVE 25
ADAPT WORKING CONDITIONS DURING HEATWAVES FOR THE MOST DEMANDING TYPES OF WORK

During heatwaves, employees working in outdoor jobs may be particularly affected by heat: building site workers, gardeners, street-cleaners, etc. To protect the health of these employees, adaptations of their working conditions may be necessary: avoiding the hottest times of the day and giving preference to work in the morning and/or evening, extending their lunch break, or avoiding any unnecessary travel… For the City and its departments, these measures will need to be defined with the Occupational Risk Prevention Offices of the relevant directorates and worker representatives.

This issue also concerns many companies and organisations in Paris. Joint studies and coordination may be introduced as necessary.

OBJECTIVE 26
DEVELOP TELEWORKING

During climate events (heatwaves or cold spells, storms, flooding, etc.), it can prove difficult to get to work (disruptions of public transport, extremely difficult comfort conditions, etc.). Developing teleworking can provide a response to such risks, particularly during major events. In addition to adapting the rules within each organisation, tools can be introduced to facilitate such practices: creation of business incubators and fablabs, co-working spaces, teleconference and teleworking systems…

OBJECTIVE 27
RAISE AWARENESS OF NEW BEHAVIOUR AMONG PARISIANS

The purpose of this action is to accompany those who live and work in Paris to adopt new types of behaviour, in particular regarding the development of their urban environment and life in it: new reflexes in the construction and use of buildings (for example, closing curtains and exterior blinds during the day during heatwaves), conducting shared local diagnostics to involve Parisians in any changes made to their districts, to take account of climate change in the future uses of their districts and raise awareness generally of the impacts of climate change in Paris and ways of adapting to it…

It also implies developing "traditional" awareness-raising tools (brochures, information and awareness-raising campaigns, participatory processes), and exploring new approaches, such as nudges, competitions, using social media, etc. A particular effort is also to be made to target children and young people, following through on the actions already implemented through the Environment and Sustainable Development Education Network coordinated by the City of Paris.

Action 32
Conduct experiments in rainwater harvesting and re-use in construction operations

With a view to moving towards new behaviour in the construction and use of buildings in Paris, the aim is to conduct an experiment in rainwater harvesting on the scale of a building in order to re-use it for parks and garden maintenance and cleaning public spaces. This experiment will provide an opportunity not only to test a new, alternative rainwater management method, and also to contribute to diversifying the sources of water used as water resources become rarer.


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Action 33
Foster food production in forgotten spaces (balconies, wasteland…)

With the support of the Maison du Jardinage located in the Parc de Bercy (12th arr.), the aim is to raise awareness among Parisians through practical workshops, publication of documents and information meetings on growing vegetables on balconies or in the forgotten spaces of the city.

With the support of the mayors of the arrondissements, a list will also be drawn up of unused plots of land, in particular those belonging to social housing owners and major institutions.


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Reinforce solidarity and cooperation

Climate change will have effects both globally and locally and in all sectors of activity. In addition to this, it is generally the most vulnerable people who will be hit hardest by its drawbacks. These three characteristics necessarily call for a coordinated response in the form of solidarity. Cooperation between everyone will be indispensable if we are to adapt to climate change.

The City intends not only to foster solidarity between all the inhabitants, but also to play an active part in international cooperation between the world's different cities.

OBJECTIVE 28
ENCOURAGE SOLIDARITY BEHAVIOUR TOWARDS THE MOST VULNERABLE PARISIANS

The aim is to develop **a system of solidarity between the inhabitants of a given building or district** that will be active in particular in the event of an extreme climate event (flood, storm, heatwave…), in order to make sure that everyone is kept informed and in safety.

In Paris, one of the major examples of solidarity in extreme climate events is the system that is activated in the event of heatwaves, in particular the CHALEX file which serves to provide help to people who feel vulnerable when temperatures soar. The "Shopkeepers for Solidarity" system that completes the CHALEX system is another example of a solidarity system that could be extended by also involving health professionals (pharmacies, doctors…) in pinpointing those inhabitants of the district that could potentially be vulnerable.

OBJECTIVE 29
DEVELOP COOPERATION BETWEEN LOCAL GOVERNMENTS ON ADAPTATION

Climate change will often have greater consequences in territories other than Paris, a city that is robust to its effects. Developed countries and cities also have a greater responsibility, on the one hand because they emit more greenhouse gases, and on the other because they have more resources to combat climate change.

Paris intends to assume its responsibility by playing an active part in international cooperation between cities through the various networks of cities of which Paris is a member or through bilateral relations. Paris will put all its know-how and resources into combating climate change with its partners.

Action 34
Create a green fund for cities and local authorities to enhance international solidarity

In the image of the green fund for climate between States on which discussions are currently underway in the international bodies, the City of Paris made a proposal in spring 2015 to create a "green fund for cities and local authorities" so that cities and local authorities can contribute to financial solidarity on the climate. **The creation of such an international solidarity and cooperation tool is also a clear sign of the commitment of cities and of Paris to finding a solution and a global agreement on the climate.**

Several steps remain necessary to make the idea a reality, beginning by a study of the form the fund could take: direct contribution to the green funds of the States, creation of a 1% for the climate system similar to those that exist for water and sanitation or for waste, other forms of cooperation…

OBJECTIVE 30
ANTICIPATE CLIMATE-DRIVEN MIGRATION

Climate change is set to have impacts on natural and health risks, on energy and food security and on the distribution of water resources, for Paris but also for the world as a whole. There are more vulnerable regions than Paris around the world, however, faced with these changes, and in particular the Mediterranean Basin, Central Africa, South-East Asia and Island States. In addition, new climate conditions in France could give rise to new migration patterns, with people being less attracted by the Mediterranean Basin as it becomes too hot and too subject to fires and water restrictions, or even violent rain and flash floods, in addition to rising sea levels; and drawn more towards the more northern regions in France with a more clement climate. **Paris could thus face "international" climate-driven migration (climate refugees after a crisis or series of crises in certain parts of the world) but also "domestic" climate-driven migration.**

France and its capital have had a tradition of hospitality for centuries, welcoming men and women fleeing from difficult economic conditions, political repression and warfare. The face of our national territory and of the Paris conurbation has also been transformed by population movements within the country in the course of the 20th century, in particular by rural exodus. While migratory flows into Paris have been relatively little influenced by climate so far, this may become more so in the future. As political and economic capital, Paris has a key role to play in defining and organising climate-driven migration on an international scale, as do the other European and worldwide capitals. **The issue here is twofold: providing a welcoming living environment for these future new arrivals and playing a role in cooperation within Paris and with other territories affected by climate change around the world.**

Action 35
Forward-study of climate-driven migration on the metropolitan level

If climate change is not slowed down in the 21st century, it is estimated that several hundred million people may be forced to migrate in the world as a whole. These extreme scenarios have been little studied for the moment and forward studies must be conducted to foster an understanding within the metropolitan area of the migratory flows Paris might expect.

To maintain an attractive living environment, we must also anticipate potential impacts on the City of a huge influx of refugees if a large-scale climate disaster should occur, for example. The possible consequences include:

- additional pressure on already-declining resources (water, energy, etc.);
- increased needs in accommodation, housing, transport infrastructures and services for the population (health in particular);
- additional needs for the social and professional integration of non-French-speaking populations of foreign origin.

The City of Paris will undertake a study with its partners (State, metropolitan area, etc.) to look into the various possible scenarios and define a relevant strategy to anticipate climate-driven migration phenomena.

GOVERNANCE, MONITORING & INTERACTION WITH THE CITY'S OTHER PROGRAMMES

All the objectives and actions for 2020 and beyond listed in this Adaptation Strategy will be monitored by the Climate-Adaptation Unit in the Climate-Energy and Circular Economy Directorate of the City of Paris (Urban Ecology Agency, Parks, Gardens and Environment Directorate), responsible for overall steering of the Strategy. This monitoring will be consistent with the Energy and Climate Resilience Mission of the City of Paris General Secretariat, and more particularly its Resilience Coordinator. Steering and implementation of the various actions, meanwhile, will be entrusted to coordinators within the City of Paris, and also to the City's partner entities, such as Eau de Paris, InVS, ERDF, developers and social housing organisations.

While **Technical Monitoring Committee Meetings** for application of the Adaptation Strategy will be organised several times a year, political monitoring will also be provided in the form of an **Annual Steering Committee** for the Adaptation Strategy, chaired by the Councillor in charge of the environment, sustainable development and water, canal policy and the Paris Climate and Energy Action Plan.

As the Adaptation Strategy addresses themes that are cross-cutting by nature, it also links in with other action plans and blueprints of the City of Paris, which are mentioned regularly in its pages. Among others, there are the interactions between the Adaptation Strategy and the Biodiversity Plan (2011), the Blueprint on Water (2012), the Paris Rainwater Plan (to be published), the Swim in Paris Plan (2015), the Paris Environmental Health Plan (to be published), the Environmental Noise Prevention Plan (2015), the Sustainable Food Plan (2015), the new Biodiversity Plan (2016), the Local Urbanism Plan, the Air Quality Improvement Plan (2015), the Cycling Plan (2015), the Pedestrian Paris process (autumn 2015), the crisis management and prevention plans: Heatwave Plan, Drought Plan, Snow Plan, Winter Emergency Plan, Flooding Risk Prevention Plan, Municipal Protection Plan, Specific Security Plans, School Accident Intervention Plans, Business Continuity Plan, Paris First Aid Facility Development Plan; and of course the Climate and Energy Action Plan for Paris (2012), of which the Adaptation Strategy is an integral part. The managers overseeing these various plans will take part in the technical committee meetings to monitor the Adaptation Strategy.

The Adaptation Strategy anticipates new issues for Paris, and also suggests the creation and management of new municipal plans as yet to be defined: Storm Plan, Fire Plan and Water Supply Continuity Plan for extreme climate events. Other plans might be suggested in later revisions of the Adaptation Strategy to boost the City's resilience, such as a City Supply Plan in the event of extreme climate conditions…

Adapting Paris, an iterative process

Measures to adapt to changes in the climate are, by definition, forward-looking measures, the effectiveness of which must be measured and assessed in times of crisis, or even improved if necessary. It is therefore proposed that the **Adaptation Strategy should be updated regularly**. The key strategies and those actions that have not yet been launched could be **reintegrated into the Paris Climate, Air and Energy Action Plan** due for revision in 2016-2017.

In addition, the City of Paris wishes to make a positive contribution to the efforts of other institutions or partners on this subject, in particular on the metropolitan level **with other municipalities and territories, such as the Greater Paris Metropolitan Area.**

Adapting Paris to be more resilient

As the adaptation of Paris contributes to shaping a more attractive city and one that is more robust in the face of extreme climate conditions, it makes its full contribution to the overall resilience of the city. Paris was selected by the "100 Resilient Cities" initiative supported by the Rockefeller Foundation in 2014. The purpose was to devise a global resilience programme for Paris, in which adaptation to climate change plays an important role. The city's resilience strategy will also serve to define other actions as a complement to those in the Adaptation Strategy, notably on awareness-raising among citizens, disseminating information on impacts and solutions, and the consequences for the financial system, and notably for insurance.

Towards a comprehensive resilience strategy

The issues raised by climate change and declining resources are considerable and far-reaching. They also require us to look to the long-term future, with a dynamic, forward-looking approach to guide our action. This being the case, the responses we provide must also fit in with other global risks, tensions and changes that can affect the territory of Paris, its people and its activities.

This is why the municipality intends to undertake the elaboration of a comprehensive resilience strategy of which the Adaptation Strategy is one of the foundations.

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INFOGRAPHICS

Groupe Rouge Vif

WRITING

Direction des Espaces Verts et de l'Environnement, Agence d'Écologie Urbaine

DESIGN & EXECUTION

Agence 9

November 2015

MAIRIE DE PARIS

DIRECTION DES ESPACES VERTS
ET DE L'ENVIRONNEMENT

Paris climate action