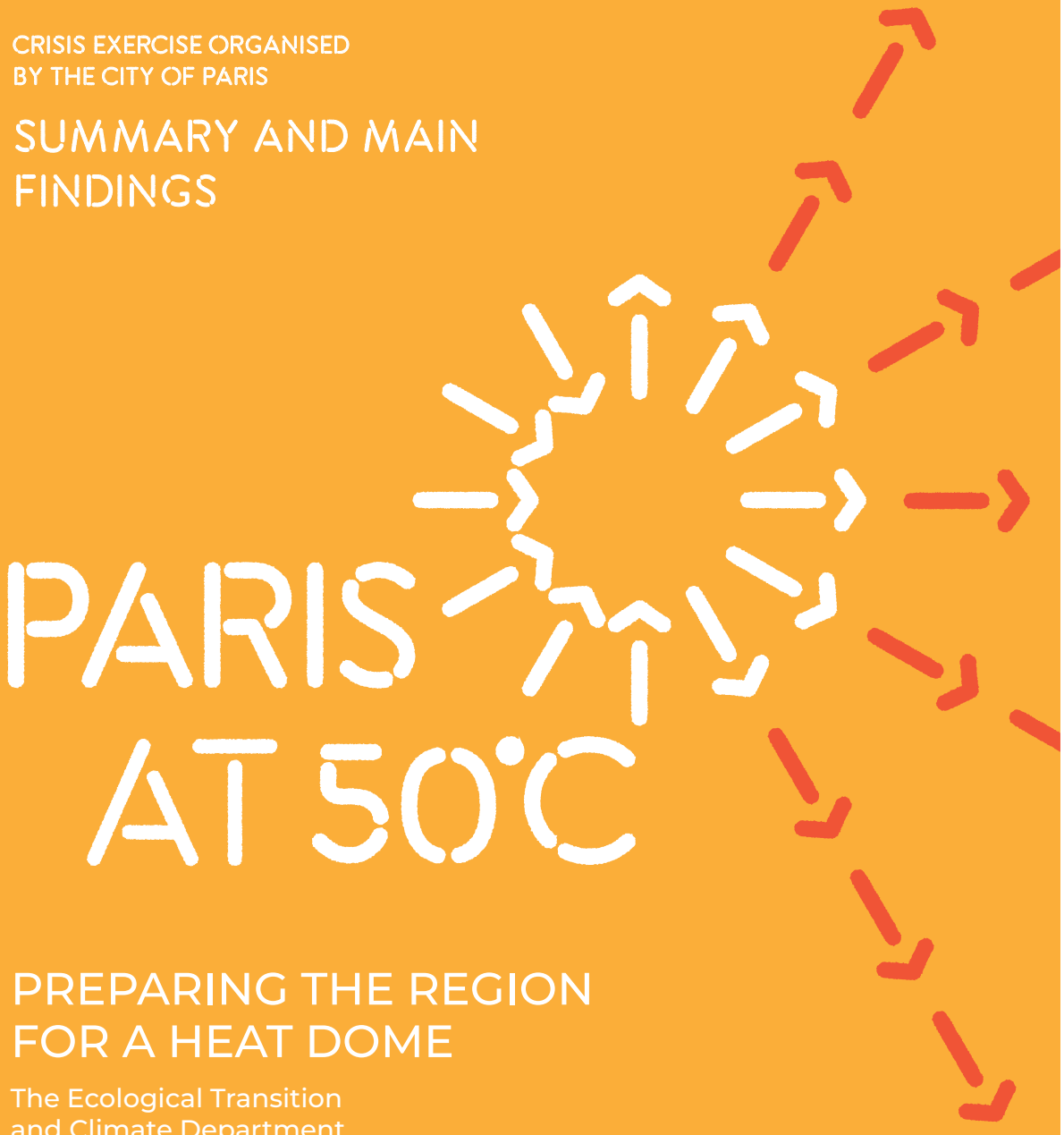
PARIS

CRISIS EXERCISE ORGANISED
BY THE CITY OF PARIS

SUMMARY AND MAIN
FINDINGS



PARIS AT 50°C

PREPARING THE REGION FOR A HEAT DOME

The Ecological Transition
and Climate Department
City of Paris

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CONTENTS

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EDITORIAL

In 2022, the Mayor of Paris entrusted me with the responsibility of drawing up a new resilience strategy for Paris, in order to learn all the lessons from the crises experienced since the adoption of the first strategy in 2017, and to meet the challenges of tomorrow. As part of this review, we organised an unprecedented crisis exercise, which once again confirmed the City of Paris as a pioneer in resilience, both on a national and international level. Fully aware of the various scenarios envisaged by the scientific community between now and 2050, it continues to develop a risk culture among its residents.

While the French population - and particularly those living in Greater Paris - have a certain risk culture, we know from a number of studies that it is still insufficient. We therefore need to make an extra effort to ensure that everyone in the Paris area is sufficiently aware of the risks they face and what they can do to protect themselves. To achieve this objective, the City of Paris organised the "Paris at 50°C" crisis exercise in two Paris arrondissements in October 2023, with the participation of many local players, including local residents.

The aim of this exercise was to prepare Paris for potential extreme heatwaves, and more generally for unprecedented crises requiring appropriate crisis management. The exercise was based on a heatwave scenario of unprecedented duration and intensity. This climate scenario was developed by scientists from the Île-de-France Regional Climate Change Expertise Group (GREC), who have demonstrated the possibility of such a heat dome occurring in Paris before the end of the century.

The best way to prepare the various parties involved in a crisis management plan is to simulate a real-life situation on the ground, with all the players involved. That's why we decided to put the planned scenarios into practice in a one-day simulation to test the crisis management plans we had developed so far. A large number of players took part in this near-real-life simulation exercise in two neighbourhoods in the 13th and 19th arrondissements of Paris, including City departments, the Paris Police Headquarters, the Paris Fire Brigade, accredited civil protection associations, network operators, public facility managers, local residents and primary and secondary

Pénélope Komitès, interviewed during the full-scale crisis exercise on 13 October 2023

school students. Particular attention was paid to local residents, who are considered key players in ensuring the resilience of Paris.

In a second phase, a tabletop exercise was organised in a crisis room to test the response of institutional players to the cascading effects of the heat dome over the Paris region. It involved all the City departments, government services, local health and social protection partners, as well as public transport, energy, telecommunications and urban cooling network operators. The health, technical, environmental, organisational and social impacts of a heat dome on the scale of the capital were simulated in order to test the organisation of the various players, how they coordinate, and the information and support systems in place for the general public, with a particular attention to the most vulnerable (elderly people, people with disabilities, pregnant women, young children, people living on the streets, etc.).

The aim of the Paris at 50°C exercise was to raise awareness of climate risks among the people of Paris and to strengthen the risk culture. To achieve this, it was essential to test the response of local residents and schoolchildren and to observe the coordination of the many partners involved and the fluidity of the simulated decisions and operations. The level of cooperation observed during the exercise was very impressive, and allows us to imagine future collaborations aimed at increasing the resilience of the Paris region.

The feedback and lessons learned from this exercise have enabled us to formulate a series of actions that form part of the new resilience strategy for Paris, such as the launch of a "Plan Grand Chaud" (Extreme Heat Plan) to better protect people living on the streets, the identification of new climate shelters throughout Paris, and the multiplication of crisis exercises involving the general public.

The teams from the City of Paris - and in particular the task force in charge of the exercise - did a remarkable job. I would like to commend them for their efforts and commitment, as well as those of all the partners who agreed to work with us to prepare and conduct this innovative crisis exercise.

1. INTRODUCTION

The Paris at 50°C crisis exercise, organised by the City of Paris as part of the review of its resilience strategy, involved simulating a heat dome of extreme length and intensity over the Paris region.

This exercise, with its innovative format, included a tabletop crisis management exercise and a full-scale exercise involving local players, in particular the people of Paris, in a way that has never been done before. The exercise involved the Town Halls in the 13th and 19th arrondissements and mobilised various local players (associations, facility managers, primary and secondary schools, building residents, etc.).

WHY A "PARIS AT 50°C" CRISIS EXERCISE?

Climate change is increasing the risk of extreme heatwaves in the medium and long term. At the request of the City of Paris, the Île-de-France Regional Climate Change Expertise Group (GREC) carried out climate simulations which show that a heat dome with peaks of 50°C, such as that which occurred in Canada in the summer of 2021, could occur in Paris before the end of the 21st century.

Since the 2003 heatwave, which raised awareness of the problems associated with climate change and extreme heat, the City of Paris has developed policies to prevent and manage the consequences of heatwaves. This policy is updated every year, taking into account the episodes experienced and the experiences of other large cities facing extreme heat. The City of Paris is therefore pursuing an ambitious and proactive policy of adapting to climate change, in order to reduce the impact of extreme heat on its territory.

Numerous actions have already been implemented, such as the creation of a network of more than 1,200 "cool islands" throughout the Paris region (green spaces, bathing areas, oasis-style courtyards, misting systems, air-conditioned rooms, etc.), revegetation, reversing soil sealing, the creation of shaded areas and shade structures and the installation of drinking water fountains in public spaces, increasing the presence of water throughout the city, the renovation of public buildings and support for the renovation of private buildings through the Eco-rénovons Paris programme.

Misting system installed as part of the annual "Paris Plage" programme

The City of Paris also has a Heatwave Plan. This plan is based on a specific departmental regulation on “heatwave health management”, the aim of which is to coordinate all the local players (Paris Police Headquarters, Île-de-France Prefecture, Regional Health Agency, etc.), to disseminate health recommendations to the general public and to implement preventive actions and measures to prevent and limit the health impacts of a heatwave, paying particular attention to vulnerable people. For example, the 11,000 people over the age of 65 or with disabilities listed in the REFLEX database will be contacted and their homes may be visited, with fans installed and air-conditioned rooms made available. Specific initiatives are also being taken to help the homeless: outreach activities to provide information and distribute water bottles, access to air-conditioned rooms, extended opening hours for public showers, etc.

Shade structure installed in the Reuilly Paul Pernin garden in 2022

Drinking fountain installed by Eau de Paris

In light of this climate context, and in addition to its climate change adaptation and resilience actions, the City of Paris wanted to prepare the territory and its residents for an extreme heat scenario by launching a “Paris at 50°C” crisis exercise, which took place in October 2023, with both a tabletop and a full-scale component. This exercise is a first in France as it is the only one to have fully involved and integrated the general public in all its diversity (schoolchildren, nursery and childcare staff, residential and nursing home staff, local associations, residents, etc.) throughout the process (preparation, D-day, and feedback sessions), in addition to the many institutional and economic partners. It was also the first time that a scenario involving such intense temperatures, and therefore a wide range of consequences, had been tested.

In terms of climate resilience and extreme heatwave management, the objectives of the exercise were:

- To analyse the consequences and impact of such an event on the lives of the people of Paris;
- To capitalise on current municipal policies and innovative solutions that have already been developed (shade structures, misting fountains, air-conditioned rooms, etc.);
- To strengthen the response mechanisms of the City of Paris and its coordination with partners;
- To raise awareness among the people of Paris of the stakes involved in heatwaves, and the need for collective action and local solidarity to deal with crises.

In addition to the crisis situation tested, the project had several objectives in terms of crisis management and resilience:

- To develop a genuine risk culture within the City of Paris, among local players (network operators, associations, businesses, etc.) and the people of Paris, as an essential preventive lever to adapt behaviour and better manage crises collectively;
- To raise awareness of the issues involved in risk anticipation and crisis management among the various players and partners in the Paris region;
- To develop a habit of cooperation between the different players in the event of a crisis.

The exercise was co-piloted by the Ecological Transition and Climate Department (DTEC) and the Crisis Management Department of the General Secretariat of the City of Paris. The project had a strong partnership dimension, mobilising more than 80 players in the Paris region and working very closely with the Paris Police Headquarters - in particular the General Secretariat for Defence and Security in Paris, responsible for crisis management in Paris - and the Paris Fire Brigade.

Purpose of the document

The purpose of this Paris at 50°C feedback document is to **report on the entire process, which lasted over a year, and to draw on the lessons learned from the different phases of the project.**

Preparing the Paris region and its residents for an extreme heat scenario required:

- Modelling the simulation of a 50°C heat dome in the Paris region;
- Mobilising residents and local players;
- Analysing the consequences of such an event on the lives of the people of Paris, its economic operators and the fluidity of the decisions;
- Deciding on improvements to the prevention and crisis management policies to be implemented following the exercise.

This document retraces the **methodology and lessons learned from the Paris at 50°C exercise** by following the chronology of the project through its **four phases:**

1.	2.	3.	4.
Preparation phase, to identify the challenges of the exercise	**Developing scenarios for full-scale and tabletop exercises**	**Operational management of the exercises**	**Feedback**

Important dates for the exercise

1 March 2022:

- Definition of the major objectives of the exercise, its main challenges and its geographical scope

2 November 2022:

- Organisation of a launch steering committee to mobilise the City departments
- Announcement of the exercise process to potential partners and presentation of working group topics

3 March and April 2023:

- Organisation and running of the thematic working groups

4 April-June 2023:

- Definition of the scope of the exercise and the exercise scenario for each component (full-scale exercise in the 19th and 13th arrondissements and tabletop exercise).

5 June-September 2023:

- Workshops with participants, mobilisation of partners and logistical organisation of the full-scale and tabletop exercises

6 10 October 2023:

- Press conference to present the exercise

7 13 October 2023:

- Conducting the full-scale exercise and obtaining "hot" feedback

8 17 October 2023:

- Conducting the tabletop exercise and obtaining "hot" feedback

9 November-December 2023:

- "Cold" feedback, meetings with partners and City departments

10 31 January 2024:

- Public feedback event

Diagram showing the timetable for the various phases

2. A PREPARATION PHASE TO IDENTIFY THE CHALLENGES OF THE EXERCISE

This preparation phase was preceded by a definition phase. In fact, the very first step was to define the contours of what a crisis exercise could be. The politician in charge of this exercise - Pénélope Komitès, Deputy Mayor of Paris in charge of innovation, attractiveness, outlook and resilience - defined the main objectives of this project, the types of players she wanted to involve, some key elements of the scenario, as well as the geographical scope of the full-scale exercise.

Once this framework had been established, the preparation phase of the Paris at 50°C exercise was a key stage, both in mobilising all partners and local players, and in refining the scope and challenges of the exercise through a joint analysis of the impact of a heat dome on the Paris region.

This preparation involved three main stages.

1.1.
An exercise based on scientific research

1.2.
Involving partners from the outset and a joint development process in working groups

1.3.
Mobilising and raising awareness among local players

A. AN EXERCISE BASED ON SCIENTIFIC RESEARCH

The City of Paris asked researchers from the Île-de-France Regional Climate Change Expertise Group to work on an extreme heat scenario based on the latest scientific knowledge, and they accepted. Climatologists and ecologists modelled a realistic heat dome scenario for Paris, based on IPCC projections, which enabled the City of Paris to draw on rigorous scientific work to mobilise the various stakeholders in the exercise. The scientific work carried out by the Île-de-France Regional Climate Change Expertise Group led to the publication of a report.

At the request of the City of Paris, the Île-de-France Regional Climate Change Expertise Group (GREC) carried out climate simulations which show that a heat dome with peaks of 50°C, such as that which occurred in Canada in the summer of 2021, could occur in Paris before the end of the 21st century.

Such a heat dome is unlikely in the first half of the century, but its probability will increase from the 2050s onwards if we move further away from the targets set by the Paris Agreements in terms of reducing global CO2 emissions (see GREC note appended).

It should be noted that temperatures of 50°C will by no means become a summer norm in the coming decades: such episodes, if they occur, will remain exceptional.

The GREC has supplemented this climate scenario with a literature review on the impact of such a heatwave on society and biodiversity. This review highlights the major health impacts that could occur as a result of such temperatures: the health impacts of heatwaves in France is always significant, and there is reason to fear an increase in mortality during this type of episode. Other impacts include fires, damage to public transport networks, disruption to electricity networks and impacts on agricultural crops in neighbouring areas. Combined and cascading impacts are also possible, and significant impacts are also to be expected on ecosystems[1].

On the basis of this scientific evidence, and reinforced by the need to anticipate and prepare for a heat dome, the preparation of the Paris at 50°C exercise then consisted in mobilising a wide range of partners in the region.

The impacts highlighted by the Île-de-France Regional Climate Change Expertise Group (GREC):

→ **Health impacts**: excess mortality, hyperthermia, respiratory problems, etc. In particular, high night-time temperatures, which can be exacerbated by the urban heat island effect, can prevent the human body from being able to rest and recover from a state of heat stress.

→ **Critical infrastructure**: damage to critical infrastructure and networks (deformation of roads, railways, airport runways, high-voltage lines, etc.), difficulties in cooling thermal power stations, etc.

→ **Combined impacts**: with other disasters such as forest fires.

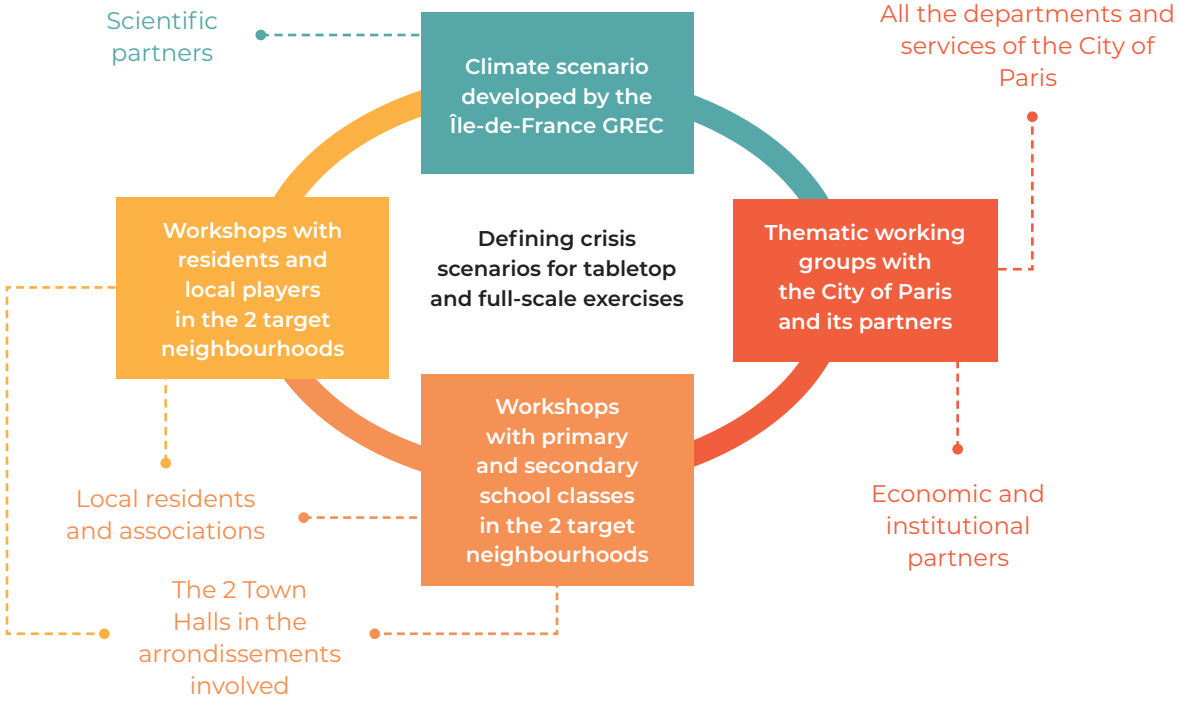
→ **Agriculture and ecosystems**: Impaired photosynthesis in plants

- Slower biomass accumulation, lower agricultural yields;
- Risk of cavitation for trees and plants (air bubbles in the raw sap transport system);
- Degradation and loss of plant foliage: reduced transpiration and interception of solar radiation, leading to an increase in the urban heat island effect as plants can no longer play their role in regulating heat and providing shade.

[1] High temperatures and drought disrupt photosynthesis and plant respiration, leading to leaf desiccation, cavitation and ultimately death. Trees no longer provide shade and lose their ability to evapotranspire, increasing the health impacts of the heat.

B. INVOLVING PARTNERS FROM THE OUTSET AND A JOINT DEVELOPMENT PROCESS

A particular feature of the Paris at 50°C exercise was the mobilisation of a large number and variety of local players in a collaborative process to develop the crisis exercise. The Paris Police Headquarters, through the General Secretariat of the Paris Defence and Security Zone (SGZDS) and the Paris Fire Brigade (BSPP), is the privileged partner of the City of Paris, without which this exercise would not have been possible. The Paris Police Headquarters was involved in the tabletop and full-scale exercises from the very beginning, right through to the feedback phase, and played an active role in the thematic working groups prior to the crisis exercise.



Managing working groups and their objectives

Thematic Working Group meeting

On the basis of the climate scenario proposed by the Île-de-France Regional Climate Change Expertise Group, the City of Paris wanted to better understand the impact of a heat dome on the Île-de-France region by stimulating collective discussions through thematic working groups (WGs). These working groups brought together all those involved in heatwaves and crisis management: all the City departments, the Town Halls in the 13th and 19th arrondissements of Paris, institutional and scientific partners (the French government, Greater Paris Metropolis, approved civil protection associations, major solidarity associations, the Île-de-France Regional Climate Change Expertise Group, etc.), economic operators (network operators, chambers of commerce, insurers, etc.), managers of facilities (nurseries and childcare facilities, residential and nursing homes, primary and secondary schools, etc.), community representatives (social and socio-cultural centres, territorial health professional communities, etc.), and so on.

This stage was essential in the crisis exercise process, firstly to grasp the complexity of the issues at stake, thanks to the different perspectives of the various players in the region, and secondly to create a shared dynamic around the risk culture in relation to climate issues.

Kick-off meeting for the working groups

The 4 thematic working groups were organised as follows:

- WG on energy, water and telecommunications networks and resource availability
- WG on public spaces (roads and green spaces), transport/mobility, buildings and underground areas
- WG on healthcare and social welfare
- WG on economy (including tourism) and insurance risk

WG themes	Participants	
	Internal - City of Paris	External
Networks: energy, water, telecommunications and resource availability	Roads and Transport Department (DVD), Sanitation and Water Department (DPE), Information and Digital Systems Department (DSIN), Communication Department (DICOM), Department of Democracy, Citizens and Territories (DDCT), Real Estate, Logistics and Transport Department (DILT)	Paris Police Headquarters (PP), Greater Paris Metropolis (MGP), Île-de-France Regional Prefecture (PRIF), Paris Fire Brigade (BSPP), ENEDIS, GrDF (Gaz Réseau Distribution France), Compagnie Parisienne de Chauffage Urbain (CPCU), Fraîcheur de Paris, Public Territorial Establishment of the Seine Grands Lacs Basin (EPTB) Seine Grands Lacs, Greater Paris Sanitation Authority (SIAAP), telephone and Internet operators, etc.
Public spaces (roads and green spaces), transport/mobility, buildings and underground areas	Roads and Transport Department, Department of Green Spaces and the Environment (DEVE), Real Estate, Logistics and Transport Department, Municipal Police and Prevention Department (DPMP), Public Buildings and Architecture Departments (DCPA), Town Planning Department (DU), Housing Department (DLH), Communication Department	Paris Police Headquarters, Greater Paris Metropolis, Île-de-France Regional Prefecture (PRIF), Paris Fire Brigade, Paris Public Transport Authority (RATP), Île-de-France Mobilité (IDFM), Architecture du Bâtiment de France (ABF)[9], Atelier Parisien d'Urbanisme (APUR), social landlords (Paris Habitat, Elogie-Siemp, etc.), Confederation of Craft Trades and Small Building Companies (CAPEB), Fédération Française du Bâtiment (FFB)
Health and social welfare	Department of Public Health (DSP), Solidarity Department (DSOL), Department of Green Spaces and the Environment, Department of Families and Young Children (DFPE), Department of School Affairs (DASCO), Municipal Police and Prevention Department, Mission SDF, Communication Department	Paris Police Headquarters, Greater Paris Metropolis, Île-de-France Regional Prefecture, Paris Fire Brigade, Paris Public Hospital Authority (AP-HP), funeral operators, Accredited Civil Protection Associations (AASC)
Economy (including tourism and insurance risk)	Attractiveness and Employment Department (DAE), Finance and Purchasing Department (DFA), Legal Affairs Department (DAJ), Olympic and Paralympic Games and Major Events Division (DGJOP), Communication Department	Paris Police Headquarters, Greater Paris Metropolis, Île-de-France Regional Prefecture, Paris Fire Brigade, Paris Tourist Office and Convention Bureau, Regional Tourism Committee, Central Reinsurance Fund (CCR), Chamber of Trades and Crafts (CMA), International Chamber of Commerce of Paris (CCIP)

After presenting the framework and objectives of Paris at 50°C, **the first WG session, in March 2023**, focused on raising collective awareness of the vulnerabilities associated with a climatic event such as a heat dome, and more generally with extreme, long and intense heatwaves. It identified the level of preparedness for such events (internal documents, dedicated HR functions, anticipatory measures implemented, etc.) and the changes to be made in the policies of the City of Paris and the actions of its partners to cope with extreme heatwaves.

The second session, held in April, extended this exploration through a series of prospective scenarios. To introduce these 45-minute workshops and encourage participants to think ahead, a fake TV news broadcast was shown at the start of the workshop, simulating a TV news broadcast in the context of a heat dome that exceeded 45°C for 8 days. It presented all the details of the situation to be played out: date, temperature, increase in the number of deaths, impact on human resources, impact on tourism, etc. Each group was given two case studies, one on telecommunications networks and the other on drinking water supply:

1. First case study: Loss of fibre-optic cables and relay antennas in a neighbourhood in the 19th arrondissement, which becomes a white zone with no means of communication. An overhead metro line (line 6) is at a standstill and trains full of passengers are stuck on the overhead section;

2. Second case study: Water restrictions throughout Paris due to low groundwater levels. Fire in the 13th arrondissement (in a tower block in the Olympiades neighbourhood) and insufficient water pressure to meet the needs of the Paris Fire Brigade.

This session had three specific objectives:

- To identify potential "domino effects", i.e. the chain or cascade effects of one incident leading to another, and so on. For example, heat can cause rails to expand and prevent trains from running, affecting the mobility of people and goods, and even hindering the supply of food and medicines to the Paris region, with an impact on the healthcare sector.
- To test certain domino effects through case studies, in order to identify the consequences of a series of events for the general public and economic operators;
- To identify responses to better prepare us collectively to deal with such situations.

Example of work produced by the second workshop session on the issue of water with WG No. 1 - Energy, telecommunications and water networks and resource availability:

Anticipate the crisis

Identify & prepare

- Order and delivery of water stocks
- Equip the crisis unit
- Build up a water stocks
- Determine priorities
- Increase network monitoring
- Organise network response capabilities
- Identify potentially affected or at-risk professions
- Activate the Heatwave Plan
- Modify and improve joints in engineered structures to prevent expansion

Needs

- Secure water supplies
- Identify water stocks
- Identify key sites where people can escape the heat
- Identify areas at risk in the event of water/electricity cuts

Adapting to the crisis

Ensure continuity

- Modified working hours and opening hours of premises
- Improve and secure water supplies for local teams and employees
- Introduce working from home
- Network intervention to resolve incidents only
- Identify who is present, available and at risk
- Control use of the Seine
- Limit cleaning to "minor sanitation" areas (markets, gutters, pedestrian areas, and washing of waste collection and street cleaning vehicles).
- No watering of green spaces between 8 a.m. and 8 p.m.
- Switch off unnecessary equipment
- Activate the Business Continuity Plan (BCP) fallback site
- Communicate best practice to employees
- Inter-Prefectoral Order on water-saving measures
- Shut down outdoor worksites
- Monitor staff conditions (travel, health impacts, possible right not to work due to the heat, etc.)
- Support for employees' families to reassure staff at work

Protect the general public

- Supply and distribution of bottled water
- More staff for the City of Paris Contact Centre (3975)
- Activate the RETAP plan (for the restoration and emergency supply of electricity, electronic communications, water, gas and oil networks)
- Activate the zonal crisis centre
- Activate the heatwave plan
- Communicate current restrictions, useful gestures and maps to access water points and cool islands through various media.
- Monitor the operation of air-conditioning systems, especially in cooled areas open to the public
- Open a public information centre
- Prioritise the supply of water to misting fountains

Actions to be implemented

Coordination between players and between crisis centres

Needs for continuity

- Pool resources and requests for assistance from volunteers in the City of Paris
- Determine the availability of the cooling network in the light of restrictions on the use of the Seine
- Decide on uses of the Seine
- Activate the Departmental Mobility Plan
- Identify power cuts in the area
- Staff availability
- Equipment required for the work
- Travel capacity (additional vehicles, etc.)

Needs of the general public

- Mobile cooling systems
- More space for emergency accommodation
- Identify which sites are open or closed (museums, leisure centres, etc.)
- Common message framework

Needs

Identify contact points in each structure

Working group meeting

The collective sharing of vulnerabilities has shown that these are largely linked to the dependence of many activities on essential infrastructure (electricity, telecommunications, transport and drinking water networks). Since these infrastructures were designed for a temperate climate, they are affected to varying degrees by extreme heat. The **main conclusion** to be drawn from this second session is that the **crisis stems not so much from technical failures as from human and organisational issues**. As a result, two major cross-cutting issues emerged as particularly decisive and relevant to all the themes:

- The first concerns preserving human resources in a context that can be detrimental to their health.

- The second relates to the exchange of information between local stakeholders, which is particularly important given the many knock-on effects between these players (commonly known as “domino effects”).

The third meeting was therefore organised around these issues, bringing together all the working groups in three round-table discussions:

→ Anticipating the impact of a heat dome on the body and decision-making, based on a presentation by the head of the Paris Fire Brigade’s studies and forecasting office;

→ Adapting working conditions to the crisis and identifying the issues and challenges involved, based on a presentation by the Head of the Employee Relations and Prevention Policies Division of the Human Resources Department of the City of Paris;

→ Communicating in times of crisis, with a presentation by the Head of the Mission and Communication Department of the Prefect’s Office and the Head of the Crisis Management Department of the General Secretariat of the City of Paris.

Issues and challenges identified in each thematic working group

The various working groups have enabled us to learn how to assess the impact of an extreme heatwave in Paris on infrastructures and the ability of public authorities to maintain public services and protect vulnerable people.

Thematic working groups meeting

The region's infrastructure

The **public transport networks** in the Paris region are not well suited to very high temperatures. Previous heatwaves in the Paris region have highlighted the great vulnerability of above-ground rail infrastructure, due to significant temperature fluctuations during periods of intense heat. The deterioration of public transport services can have direct consequences, such as an increase in road traffic, as some regular public transport users switch to their private cars. This increase in road traffic is likely to exacerbate the urban heat island effect and pollution. In addition, if public transport were to be severely disrupted, this could have a negative impact on the commuting patterns of certain "essential" workers. For example, 75% of the firefighters in the Paris Fire Brigade (BSPP) live outside the Paris metropolitan area: if they cannot get to Paris because of transport difficulties, the BSPP can quickly become understaffed, at a time when fire risks are multiplying.

For **telecommunications networks**, the majority of antennas are installed on rooftops and are therefore highly exposed to sunlight and heat; for buried (underground) cable networks, especially fibre-optic cables, the impact depends on the characteristics of the soil and road surfaces, as well as their behaviour in the face of drought. The ability of this equipment to withstand high temperatures is still uncertain, as, to date, no tests have been conducted in temperatures above 40°C.

What's more, the resilience of telecommunications networks is highly dependent on the electricity network. As a result, in the event of a power cut, the affected telecommunications infrastructure may be unable to function. These networks also depend on the ability of maintenance staff to travel via the public transport networks. The loss of communications networks would have a significant impact on many activities, such as payment systems in shops and restaurants, parking meters and water treatment plants. A massive and prolonged disruption to telecommunications networks would therefore cause massive disruption to all activities and make coordination between the various players extremely difficult[4]. The telecom operators who participated in the working groups expressed their interest in continuing discussions with Enedis and the City of Paris Roads and Transport Department to better identify network vulnerabilities across the Paris region.

Although there is no direct link between heatwaves and **drought**, it cannot be ruled out that a combination of the two could lead to water shortages. **Drinking water supplies** could be affected by electrical or telecommunication network failures affecting water treatment plants, although it is unlikely that all plants would be affected at the same time. In addition, a shortage of water resources, in particular a drop in the level of the Seine, would affect the district cooling network managed by Fraîcheur de Paris, which depends on the Seine for its operation. Refrigeration plants use water from the Seine to dissipate heat (the water is then discharged into the Seine). If the temperature of the river rises too high (above 30°C) or its level falls too low (by more than 3 metres), the city's cooling network will be affected. The WGs have identified various ways to conserve water in the event of drought, in particular by prioritising certain uses over others. The issue of restricting the use of water, established by the Paris Police Headquarters, depends on a compromise between health issues and drought issues (the health issue being the priority), but also between the preservation of green spaces and the preservation of water resources. Proposals have been put forward to reduce the long-term waste of water resources (e.g. an alert system to detect abnormal consumption or water leaks).

Gas networks are buried underground and are only indirectly affected by high temperatures. Similarly, the **electricity network** appears to be relatively resilient to hot weather. The fact that much of the network is buried underground protects it from extreme temperature fluctuations. The diversity of production sources (nuclear, gas, etc.) limits the risk of power cuts. However, the electricity supply could, in theory, be affected. Insufficient river flows or excessively high water temperatures would prevent the nuclear electricity production circuit from cooling sufficiently, leading to the shutdown of certain reactors that supply Paris. A prolonged interruption of the electricity supply would have a major impact on the entire population and activities of Paris. For example, the lack of electricity would bring the transport network, telecommunication networks and drinking water production to a standstill.

The risk of an extreme and prolonged heatwave damaging **buildings** is relatively low in Paris. The region has little exposure to the phenomenon of clay shrinkage and swelling, which is one of the main causes of damage to buildings during exceptional climatic events. The main problem in Paris is the ability to use or live in buildings during hot weather. Although efforts to adapt the buildings of Paris to the new climate are well

[4] The working groups discussed the possibility of using alternative means of communication, such as walkie-talkies, to partially compensate for the lack of conventional means of communication.

underway, they are complicated by the heritage status of a large proportion of the buildings and the regulations in place to protect them. In order to prioritise its actions, the City of Paris wants to gain a better understanding of people living in accommodation that is particularly vulnerable to heatwaves, i.e. those living under the roofs of old buildings that have not been renovated.

The continuity of public services

Healthcare facilities (hospitals, maternity wards, residential and nursing homes, etc.) are vulnerable to the infrastructure failures described in the previous section, but a number of precautions have been taken: the mandatory provision of electrical generators, back-up electricity networks, prioritisation within the framework of critical network recovery plans, and so on. However, the healthcare system can become overwhelmed in the event of a heat dome, particularly due to the increased demand for care[5]. But, in addition to the material issues, the biggest challenge is likely to be maintaining the capacity of carers, who will also feel the effects of the heatwave on an individual basis. One of the ideas put forward by the WGs is to strengthen the provision of care by general practitioners via the CPTS (Territorial Health Professional Communities).

The heat dome effect also has **safety** implications, such as an increase in stress and aggressiveness due to high temperatures, and a likely increase in unauthorised swimming in the Seine River and the Ourcq Canal, resulting in accidents and drownings. There is also an increased risk of fire outbreaks, particularly involving electrical batteries and transformers, causing fires that are difficult for firefighters to bring under control. In addition to the risks themselves, the heat dome effect raises questions about the need to adapt **safety standards, particularly in places used as climate shelters** (underground stations, tunnels, car parks, etc.), which were not originally designed to accommodate large numbers of people for long periods of time, as well as the specific equipment to be provided (sleeping arrangements, sanitary facilities, food supplies, etc.). We therefore need to think about implementing protocols and new regulations for these potential climate shelters.

Children are particularly vulnerable to intense, prolonged heat. This raises the important issue of the **continuity of school activities, extra-curricular activities, before and after school care and other childcare facilities** in the event of a heat dome. Adaptation measures have already been put in place, such as grouping nurseries and childcare facilities together during the peak summer months in premises that are less sensitive to high temperatures and where cooling equipment can be concentrated. Another measure is to reduce the amount of tarmac or similar surfaces within school grounds, in order to limit the heat island phenomenon and to create “Oasis” school grounds. In 2023, around 130 school grounds in Paris were transformed “Oasis” school grounds.

[5] Heat has a major impact on human health, increasing the risk of dehydration and cardiovascular problems.

The various economic sectors

Paris is the world's most popular tourist destination, accounting for 15% of jobs and 13% of GDP. However, the impact of a heat dome on tourism is difficult to assess, and so far, periods of extreme heat have not had a significant impact on tourist numbers. This could be explained by the fact that bookings are made in advance and are difficult to cancel. The working group discussions highlighted three issues specific to tourism:

- Adapting tourist activities by modifying opening hours (including closing during the hottest hours) or promoting tourist sites close to the place of accommodation, to avoid the need for transport;

- Human resources management, with the impact of changes in working hours for employees; possible difficulties in transporting employees in the event of transport problems; protective equipment for employees exposed to the heat, particularly those working outdoors;

- Questions of fairness that could arise if Paris were to be subject to restrictions on water or electricity, two resources heavily consumed by the tourism sector.

Concerning **insurance risks**, the heatwave phenomenon has not yet been taken into account in insurance policies. However, insurers could be more mobilised than usual if a heat dome led to a mass exodus of people from Paris, as happened during the COVID-19 crisis. Similarly, the increase in the probability of certain risks, such as fire, would have an impact on the insurance industry. There is also a risk to their profitability and sales if they fail to anticipate the risks incurred during heatwaves, and an image risk if their insurance offers do not cover the risk of heatwaves. Insurers have set up awareness raising and prevention systems, sending text messages to alert customers to weather warnings[6] or reminding them of the right reflexes or behaviours to adopt.

In the **retail sector**, retailers were less able to participate in the working groups, and the few representatives they did have mentioned the lack of awareness among retailers of the issues related to extreme heatwaves and the need to support and raise their awareness. One communication tool that could be used is the CESPPLUSSUR (Safety of retailers, businesses, professionals, the self-employed and users) scheme run by the Paris Police Headquarters, which provides advice on safety and situational prevention. Situations vary greatly depending on the business sector. Florists will be directly affected by the heat as their products are sensitive to it; restaurant owners will find it harder to adapt their opening hours. On the other hand, local retailers can play a protective role by keeping an eye on vulnerable people, providing water points for the general public, or cool areas if their premises are air-conditioned. In fact, air-conditioned shops are already being used during the hot weather in Paris.

[6] These text messages are based on the France Predict weather service. However, this does not apply to heatwaves, which are already well covered by the media.

Protecting vulnerable people

Homeless people are among the most vulnerable during periods of extreme heat, as they often struggle to find shelter and access water sources. The City of Paris and social welfare associations have set up schemes to complement those developed by the Regional Prefect and the Paris Prefect of Police, who have jurisdiction in this area. Measures such as extra patrols and outreach activities, and providing shelter or accommodation in support centres or air-conditioned rooms have been implemented. But this requires human resources, which can be difficult during the summer season when people usually go on holiday. Another challenge is managing homeless people who seek refuge in car parks or cool places for people to escape from the heat, such as supermarkets.

The **concept of climate shelters** refers to places where people can be accommodated at temperatures that are acceptable to the human body. This concept is beginning to be explored in the Paris region, in two ways in particular:

- facilitating access to green spaces, even in the evening (extending opening hours during very hot periods);
- making air-conditioned rooms and premises available to vulnerable people listed in the REFLEX database, and even to the general public.

However, the occurrence of an extreme heatwave, such as a heat dome, raises the question of whether other places, such as shopping centres, underground stations, car parks, etc., should be used as climate shelters. It is also important to bear in mind that these shelters may need to be used for long periods of time (especially at night), which will require special equipment (bedding, sanitary facilities, food, etc.).

Some people are particularly vulnerable to heat, especially the **elderly and those with chronic illnesses, as well as children and pregnant women.**

These people need to be monitored as closely as possible to ensure that they have the resources they need to protect their health. A number of measures have been introduced to protect vulnerable people, such as appointing caretakers in social and private buildings to monitor them. At this stage, this mission is only fulfilled on a voluntary basis.

Following the heatwave of 2003 and the French Law of 30 June 2004, the City of Paris set up a census of vulnerable people (known as the REFLEX database). Those listed in the database are monitored by City of Paris staff to ensure they are in good health and, if necessary, redirected to cooler areas or offered home visits.

Another risk factor is **exposure to heat at home**. In fact, the situation varies greatly from one home to another. However, the ability to prevent heatstroke among residents of the most exposed buildings remains limited, mainly because there are currently no indicators or measurement systems to identify these buildings.

The key issues identified: human resources and communication between the various players

Two cross-cutting issues emerged as particularly decisive: the protection of workers and human resources, and communication between the various players in the region.

The challenge of maintaining human resources in the event of a heat dome

The ability to tolerate and acclimatise to heat varies from one person to another. The most common effects of hot weather are: dehydration (perspiration and respiration) and loss of mineral salts; an increase in body temperature due to heat accumulation (radiation, convection & conduction), which increases the risk of cardiovascular problems; the accumulation of fatigue, which causes irritability and stress.

Given the health risks associated with heatwaves, it is important to take action on working conditions. This includes regulatory measures (adapting the French Labour Code and collective agreements) and strengthening the accident prevention culture within companies (reorganising working hours, prioritising tasks, providing access to rest areas, etc.).

The main finding of the working groups was the lack of a comprehensive regulatory framework for heat exposure: many provisions are left to the employer. The French Labour Code requires employers to assess the risks to workers' health and safety posed by the temperature of their working environment. For outdoor activities, it is important to note that the temperature threshold above which adverse health effects can occur is 28°C, compared to 30°C for office environments. This does not necessarily mean that activities must be ceased, as this depends on the vulnerability factors specific to each individual.

Employers are on the front line when it comes to protecting their employees and implementing measures to ensure the **continuity of their activities.** Some of the main measures identified by the working groups include:

- the use of Personal Protective Equipment (PPE) to protect workers from the heat;
- adapting working hours (especially for outdoor work) and working from home, whenever possible and if the employee so wishes. This is an important area for adaptation in a context where transport (especially public transport) can become difficult to use - although it may be preferable to allow employees to come to their place of work, especially if they can benefit from cooling systems;
- protecting workers: a number of ideas have been put forward to protect workers from fatigue over the long term, such as measures to improve thermal comfort in workers' homes (e.g. providing them with fans, cooling devices or even covers to protect windows from the sun).

Another option is to provide workers with accommodation close to their place of work, so that they do not have to travel (and to provide them with cooler places to rest). However, this option raises material issues (finding such places, logistical issues, etc.) and the challenge of maintaining a good work-life balance.

Several participants in the working group pointed out that these human resources measures should be planned and discussed with trade union representatives well in advance of heatwaves. In this respect, the company's risk prevention plan appears to be an appropriate framework for discussion.

The challenge of communication in times of crisis

The exchange of information between local stakeholders is extremely important, given the many cascading effects between the activities of these players (commonly known as "domino effects") that have been identified for each sector.

In order to anticipate a crisis, the City of Paris needs to have **alternative information media** available in the event of a breakdown in the telecommunications network (e.g. billboards in the 550 green spaces throughout Paris) to complement digital communication channels. A clear procedure for prioritising the use of display media should be established, based on the importance of the messages to be communicated. **"Outreach initiatives"**[8] by the Town Halls in the arrondissements can also be carried out in collaboration with the Paris Social Action Centre, in order to inform and support people do not have access to the arrangements and services put in place by the public authorities.

Telecommunications companies and operators also expressed the need to be identified in the information chain so that they can be alerted to actions taken by public authorities, as well as their recommendations. Today, there is a live alert system for companies (messages sent by the government), which is used, for example, during events when certain transport routes are closed. This system could be used during heatwaves, while non-digital means of communication could be used in the event of a relatively widespread breakdown of the telecommunications network.

Faced with a telecommunications problem, the main point of communication for the general public, civil society and economic operators would be the arrondissement Town Halls. People tend to turn to places they are familiar with and that they know are open. According to the various departments of the City of Paris and the participants in the working group, the arrondissement Town Halls could be used as climate shelters, with air-conditioned rooms and information points for residents. Arrangements should be made to install shade structures and misting systems in front of the arrondissement Town Halls, which are often very mineral and exposed to the sun. A Public Information Centre will be set up by the Paris Police Headquarters, along with a zonal crisis unit. This call system provides information on the measures and recommendations to be followed in the event of a prolonged heatwave. The Public Information Centre also provides a means of enriching institutional information as it becomes available. It is both a top-down and bottom-up system between institutions: staff can pass on information to their manager, who will pass it on to the crisis unit.

The Paris Police Headquarters points out that multiplying communication channels increases the chances of reaching recipients. In particular, we are developing a partnership with the FNRASEC (French National Federation of Certified Civil Protection Radio Amateurs) to enable us to maintain communication between services in the event of a telecommunications network failure. An exercise was carried out to set up this system and to verify the effectiveness of the communication link.Finally, in the event of an emergency, 112 (the European emergency number) will continue to work thanks to the relay antennas of all the operators of the multi-operator inter-antenna relay system.

[8] These are systems that promote access to information for all. Representatives of public services visit places frequented by people in need who may not have access to these services. These initiatives can take the form of collective information points, drop-in sessions in associations or social centres, event days, forums, etc.

Assessment of the thematic working groups

The WGs were a success, with all those involved showing a keen interest not only in the heatwave but also in the Paris resilience strategy in general. The creation of links between the different players, the exchange of ideas and the training provided by the exercise met the needs of all those involved.

Resilience is an issue that requires long-term work with all the players involved, in order to build a common understanding of the risks and to jointly develop solutions. The mobilisation of all those involved in the organisation of the exercise helped to build a common interest around this issue.

Information meeting for residents at EHPAD Annie Girardot

Participatory workshop with local residents

C. RAISING AWARENESS AND MOBILISING LOCAL PLAYERS

The main innovation of the Paris at 50°C crisis exercise lies in the mobilisation of players from the two target neighbourhoods: the arrondissement Town Halls, decentralised departments of the City of Paris, public institutions, local residents, students, associations, etc.

The Town Halls in the arrondissements played a key role in developing the scenarios, as it was their empirical knowledge of the area that made it possible to identify climate shelters and the local players to involve. The two neighbourhoods were chosen because they were rich in local associations to work with, but also, and above all, because they offered a wide range of municipal facilities that could be mobilised in a full-scale exercise.

Local residents were involved through a number of channels, including primary and secondary schools, municipal facilities and associations (nurseries and childcare facilities, residential and nursing homes, social centres, senior citizens' clubs, etc.) located in the two neighbourhoods, as well as social landlords. The commitment of the key players, and in particular the Town Halls in the arrondissements, was a decisive facilitating factor. The primary and secondary schools showed great interest in the exercise, and despite some parents' reservations about crisis exercises, the students helped to make it a success.

For public service establishments (nurseries and childcare facilities, residential and nursing homes and senior citizens' clubs), organisational and risk issues related to fragile populations have limited room for manoeuvre. As a result, childcare facilities and residents of residential and nursing homes were not mobilised in the end. On the other hand, associations and social landlords, who acted as important intermediaries with the general public, were present. However, since the local residents were not part of a "captive" group, it was more difficult to ensure their presence on the day of the exercise.

Awareness-raising workshops for local residents and students

The people of Paris involved in the exercise were all invited to an awareness-raising and preparation workshop.

The aim of these workshops was to raise awareness of the impact of extreme and prolonged heat on their day-to-day activities and to identify adaptation solutions that have been or could be implemented. The workshops were adapted to each audience - especially students and schoolchildren - and were designed to be enjoyable, educational and to encourage discussion. They included a presentation of the project, a quiz on the impact of heat on health and psycho-social risks, a card game showing the impact of a heatwave on daily life and the solutions that can be implemented, and a final discussion.

A total of 7 workshops were organised with students, residents of the social buildings involved, senior citizens from the “La vie en mauve” club at EHPAD Annie Girardot and professionals from EHPAD Annie Girardot.

Organising workshops to prepare for the exercise was a real asset: these workshops allowed us to get to know the participants beforehand and give the exercise meaning.

Although the physical phenomenon behind global warming seems to be generally well known, whether by adults or children and teenagers, it is useful to explain its causes. While the reality of global warming is undisputed, our understanding of its impact on the Paris region remains very limited. Many of the participants came away from the workshops saying that they hadn not imagined all the consequences a heat dome could have, especially on the essential infrastructure of the City of Paris. Participants spontaneously suggested solutions to heat dome and infrastructure failures, in addition to those proposed as part of the exercise. They suggested setting up shelters in cool, nearby places, such as cellars or building car parks, but also in churches and department stores or supermarkets; preparing meals that do not require cooking equipment; stocking up

Awareness-raising workshop in a primary school in the Danube neighbourhood (19th arrondissement)

on drinking water in large containers; and protecting sun-exposed windows with UV filters or survival blankets. One point that came up several times during the workshops, and which was unanimously endorsed each time, was the importance of taking inspiration from countries that have already experienced disruptions to their electricity or drinking water networks.

In order to make the Paris at 50°C crisis exercise part of an overall educational project and to increase the students' level of understanding, an awareness-raising course on the challenges of climate change was set up throughout the school year, in collaboration with the Climate Academy, for the classes taking part in the exercise.

The workshop with residential and nursing home staff focused on the professional practices of caregivers and supervisors, as well as issues specific to the care of dependent elderly people. In addition to issues such as the vulnerability of telecommunications networks, the dependence of human resources on public transport, or the difficulty of adapting working hours, which were the focus of particular attention in the working groups, the management of medicines in the event of power cuts or the management of bodies in the event of mass mortality of local residents were also raised.

The issue of thick cotton clothing worn by caregivers, which is particularly uncomfortable in hot weather, was also raised. Workshop participants suggested that they be given the option of wearing lighter clothing in summer.

Staff in direct contact with vulnerable people have also raised the issue of implementing specific measures to limit the risks associated with increased irritability, such as providing psychological support, setting up support solutions (loan of refreshment equipment, alternative accommodation, etc.) for people with poor rest conditions at home, or increasing staff supervision ratios - although this is difficult to implement in a context where the crisis may have a negative impact on staff availability.

Participatory workshop with staff from EHPAD Annie Girardot (13th arrondissement)

Awareness-raising workshop with local residents

Awareness-raising workshop with secondary school students from Collège Georges Braque

Information meeting for residents at EHPAD Annie Girardot

Participatory workshop with local residents

3. OPERATIONAL MANAGEMENT OF THE PARIS AT 50°C EXERCISE

Operational management meant that the scenarios for the tabletop and full-scale exercises had to be very precisely defined, in line with the objectives of this global crisis exercise.
Exercise management is based on operational management tools that provide a framework for everyone's role, including in terms of communication.

A. DEVELOPING SCENARIOS FOR FULL-SCALE AND TABLETOP EXERCISES FOR PARIS AT 50°C

1 Choosing scenario storylines in line with the objectives of the exercise

The full-scale and tabletop exercises enabled us to achieve distinct objectives, thanks to the diversity of the situations that were simulated.

Full-scale exercise

Building on the lessons learned from the thematic working groups, the scenario for the full-scale exercise focused on the temporary sheltering of the people of Paris in “climate shelters” for the duration of the 50°C heat peak, in particular potentially vulnerable people such as the elderly living in residential and nursing homes, social housing residents and children. These climate shelters are places that have been requisitioned and equipped by the City of Paris.

This scenario addresses several of the issues raised in the working group meetings and workshops: the thermal insulation of buildings, power cuts, loss of 4G antennas, lift motor breakdowns, deliveries of essential goods, etc. By placing local residents in a “fictional bubble” and observing their reactions and behaviour in the context of a heat dome, the chosen scenario aimed to:

- **Test existing systems** available in the City of Paris, such as cooling systems (shade structures and misting systems) or air-conditioned rooms in public buildings (such as residential and nursing homes);
- **Experiment with new solutions** that could be envisaged, in particular new types of naturally cool shelters, and to test the issues of continuity of activities (especially education) in degraded or at least unprecedented conditions;
- **Test the ways in which different populations live together** in a crisis situation, as well as the chains of solidarity that are formed (spontaneously or thanks to the existing systems in place in the City of Paris);
- **Simulate various technical incidents**, in order to test the responses of both the City of Paris (incident on the street) and its partners (intervention by Enedis following a power cut, for example);
- **Raise awareness and observe local residents’ reactions** to additional events planned by the project team and "simulated" by certain participants, in particular fainting and vomiting.

The full-scale exercise was thus able to stage events arising from the working groups' diagnosis, with a strong mobilisation of the local population (local residents, schoolchildren and secondary school students, residential and nursing home staff, associations, etc.), the support of institutional partners (Paris Police Headquarters, Paris Fire Brigade, etc.) and the participation of regional players (ENEDIS, the Protection Civile Paris Seine first aid association, the French Red Cross, the RATP public transport authority, the Samu Social emergency response service, the 19th arrondissement's Territorial Health Professional Community, etc.).

In addition to the residents themselves, there is a major challenge in terms of coordination between players, communicating information, allocating roles, coordinating their response capabilities, managing stress and priorities, etc.

Intervention by the Roads and Transport Department to simulate a tree falling on the road on 13 October 2023

Tabletop exercise

The tabletop part of the exercise focused more on the response capacity of the City of Paris and its various partners, on the adaptation of systems and crisis measures taken, and on coordination between various players. The scenario for the tabletop exercise was designed to meet five objectives:

- The **resilience of organisations** to a prolonged period of very hot weather;
- The **coordination** of the various players involved to provide solutions;
- The network of **cool spaces** in Paris that can be used by the public;
- **Support for people living on the streets**, in conjunction with government services;
- The **impact on major networks**, particularly public transport;
- The **impact** of an **event of this type**.

In this way, the scenario storylines of the tabletop exercise tended to focus on issues related to the scope of responsibilities of the various departments and institutional players of the City of Paris and their ability to respond to a crisis situation.

These completely new situations were a source of learning for the City of Paris, its partners and the people of Paris, not only in terms of coordination, but also in terms of a better understanding of each other's skills and capabilities.

The City of Paris crisis room during the tabletop crisis exercise on 17 October 2023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2 Description of the scenario for the full-scale exercise

The work carried out by the various WGs has made it possible to define an overall scenario for the whole of the Paris region, which constitutes the general context of the crisis. Particular events adapted to the full-scale exercises in the 13th and 19th arrondissements and to tabletop exercises were then detailed.

In terms of methodology, the development of the scenarios was based on:

1. The conclusions of the experts from the Île-de-France Regional Climate Change Expertise Group and the experts in the thematic working groups;
2. Bilateral exchanges between the City of Paris and each partner and operational stakeholder involved in the full-scale exercise;
3. The desire to test a variety of equipment and situations;
4. Studying the logistical and operational feasibility of events.

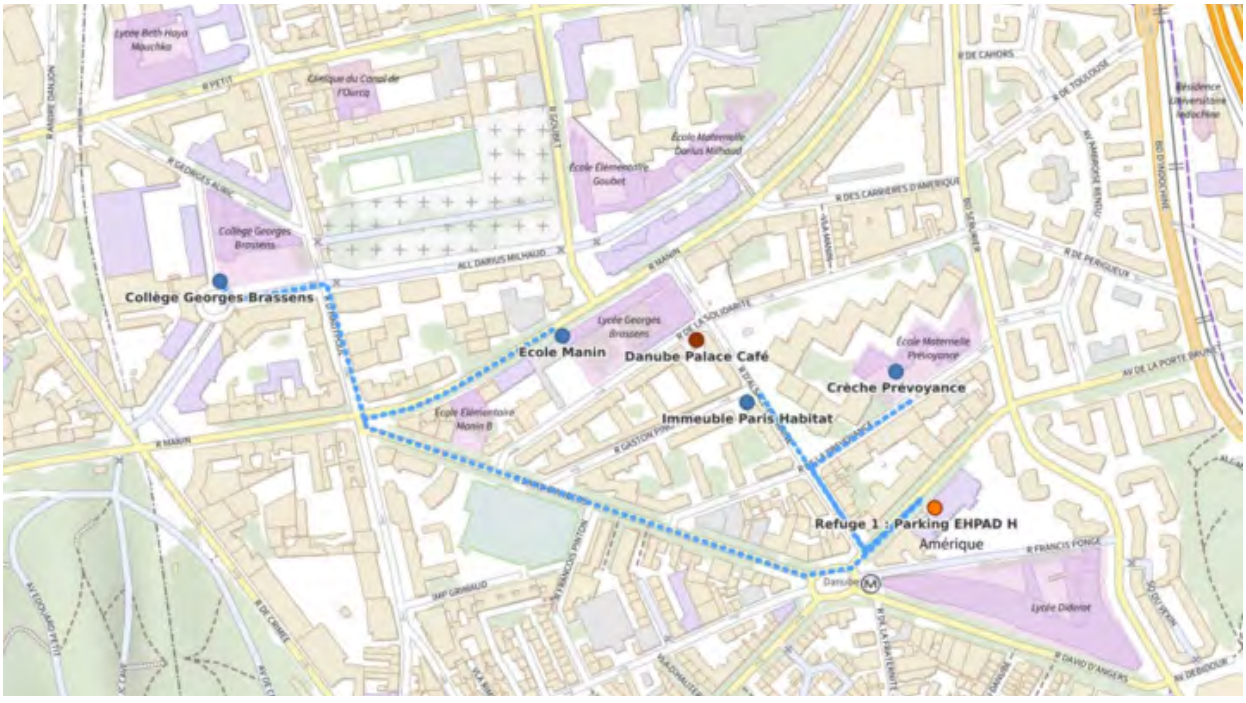
→ The overall scenario - General context of the crisis exercise

It's 25 June 2032 and, for the past 2 weeks, the Paris region has been experiencing an unprecedented heatwave, with temperatures ranging from 38.5°C to 42.3°C. Over the last two days, the heat has got worse: the thermometer has reached 46°C, and at night the temperature doesn't drop below 28°C. According to the weather forecast, temperatures will continue to rise throughout the week, reaching as high as 50°C.

For several years now, the City of Paris has been transforming itself to become increasingly resilient in the face of heat. This has included renovating buildings, planting trees and repainting roofs. Despite all these long-term efforts, and the measures put in place since the start of the heat wave, in some buildings with high exposure to the sun, after two weeks of very hot weather, the situation is becoming untenable. Well-insulated buildings keep the temperature cool in the first few days. After a while, the heat begins to penetrate the building, and power cuts that prevent ventilation systems from working only accelerate the process.

In response to this exceptional situation, and as part of the extreme heat plans triggered by the city, the opening of naturally cooled refuges is planned.

→ The scenario in the 19th arrondissement



Map of the locations in the 19th arrondissement

Context:

The day before, students from the École Manin primary school and the Collège Georges Braque secondary school had suffered fainting spells. The two schools approached the City of Paris for a climate shelter for their students and staff. Given that the nursing home is already in great demand, the town has offered to make the nursing home car park available to these establishments. To cope with the heat, the City of Paris has also provided access to an air-conditioned room for several residents of Paris Habitat.

Events tested:

During the bus journey, organised using one of the RATP's electric shuttles, several students felt unwell, including one who suffered a severe asthma attack requiring emergency treatment. The teacher called 18 (the Paris Fire Brigade) and was asked to stop the bus and get the other children off, so that they could take shelter and escape from the heat in the Jardin Hérold, accompanied by a pair of social workers.

The call to 18 resulted in the arrival of a paediatric SMUR (Mobile Emergency and Resuscitation Service - SAMU Emergency Medical Service), which attended to the students feeling unwell directly on the bus.

After a presentation of the Jardin Hérold and the measures implemented by the City of Paris to combat heatwaves (shade structures, misting systems, water fountain), the students walked to the EHPAD Hérold car park to continue their lessons.

The aim was to test the movement and sheltering of students in a nursing home car park used as a climate shelter, and to see how they reacted in such a place and when confronted with fellow students who felt unwell. This also allowed us to study how school staff managed their stress and priorities, how the emergency services responded, and how these players interacted and communicated with one another.

Local residents as well as parents and their babies came to the nursing home to cool off in an air-conditioned room. Residents and parents in the climate shelter were kept informed of developments (particularly via Twitter) and given advice by their loved ones.

A fake Twitter feed was set up by Crisotech to relay information, including a rumour about air toxicity and the possibility of fire. One resident simulated a temporary loss of consciousness, requiring the assistance of a nurse and the intervention of the Protection Civile first aid association, who were on hand to assist the children in the car park.

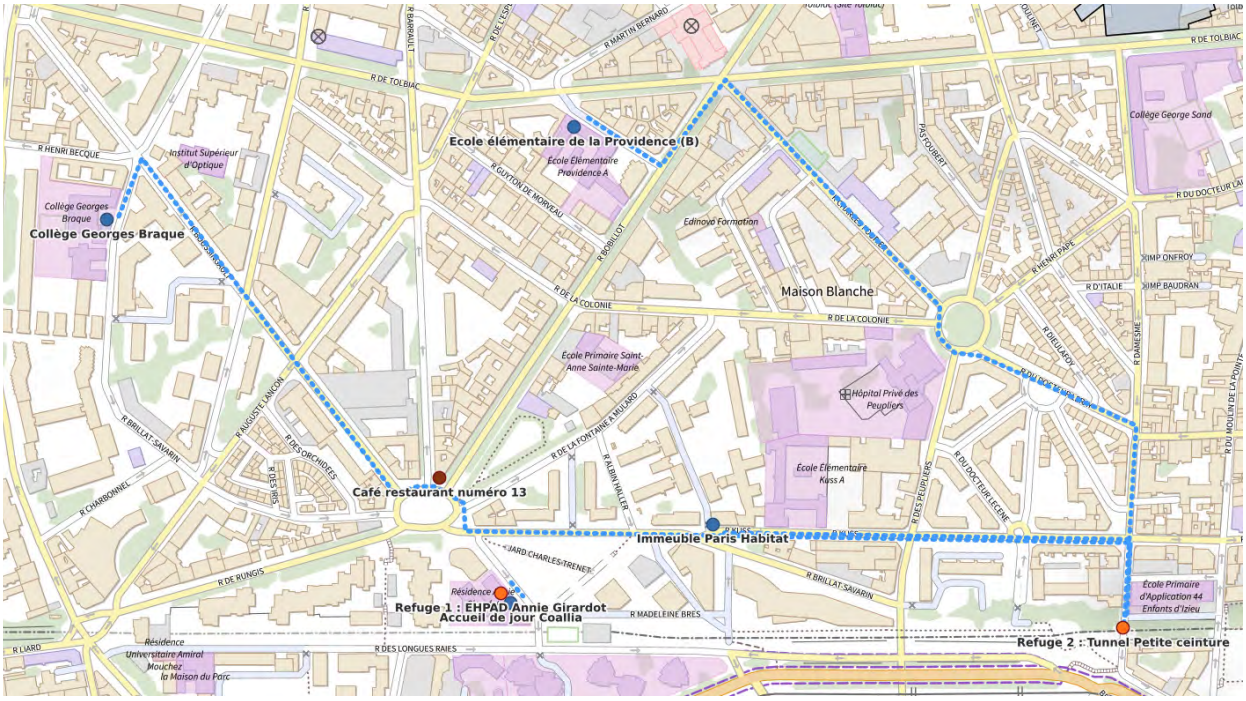
The aim was to test how people perceive certain instructions and information on social media, how they react to stress and their ability to help each other.

At the same time, a nearby road was blocked off to protect the pavements, which are softening in the heat. The repeated passage of vehicles in hot weather creates ruts that make roads dangerous and very costly to repair. At the same time, the Roads and Transport Department was called out to cut down a tree that was in danger of falling onto the road following a fire the day before.

intervention by the Roads and Transport Department to simulate a tree falling on the road on 13 October 2023

Resident simulating a fainting spell

→ The scenario in the 13th arrondissement



Map of the crisis exercise in the 13th arrondissement

Context:

Rising temperatures had a localised impact on the electricity supply in several neighbourhoods of the capital. A number of junction boxes failed due to the high temperatures experienced over the week.

These failures had multiplied over the past 48 hours, increasing the time it took to restore the network. The hot conditions slowed down the work of subcontracted technicians at the breakdown sites, which requires opening up the road (the junction boxes are underground). Power restoration times became increasingly long due to the increasing number of outages and the difficulties encountered by maintenance staff in moving around and supporting their equipment. The day before, the Place de Rungis food market in the 13th arrondissement suffered a power cut lasting several hours. The ventilation and refrigeration systems stopped working and the temperature inside the building rose inexorably. This event created the risk of a break in the cold chain.

Following a number of students fainting, the École Providence primary school and the Collège Georges Braque secondary school approached the education authority and the City of Paris the previous day (24 June) to test the idea of sheltering students in naturally cool areas.

At the same time, Paris Habitat asked the City of Paris to shelter some of its tenants whose homes had become unbearably hot. The City of Paris proposed to evacuate these tenants, together with their children and teenagers, to the "Petite Ceinture" railway tunnel. In response to this urgent request, the City of Paris had opened and equipped a climate shelter in the Petite Ceinture tunnel 24 hours earlier to accommodate these people. During the exercise, the tunnel was used by two classes from the École Providence primary school, as well as by residents identified by Paris Habitat. Those who wished to do so could stay overnight. Since the classrooms had become too hot, lessons were held in the climate shelter.

At the same time, a number of elderly people receiving support from the Coallia association showed signs of distress in the heat. Faced with this situation, Coallia approached the director of EHPAD Annie Girardot, which usually welcomes

The Petite Ceinture tunnel (13th arrondissement) equipped to accommodate children from the École Providence primary school

those supported by the association for daytime activities, with a view to providing temporary accommodation for these elderly people. The director of EHPAD Annie Girardot asked the City of Paris for authorisation to adapt some of the common areas of the nursing home to accommodate these elderly people.

The Petite Ceinture tunnel (13th arrondissement) equipped to accommodate children from the École Providence primary school

The Petite Ceinture tunnel (13th arrondissement) equipped to accommodate children from the École Providence primary school

Events tested:

The exercise began with a lesson for the year 5 and year 6 classes in the tunnel. Suddenly, half an hour into the lesson, one of the children started vomiting, followed by another, and then a total of 10 children vomited in the space of 20 minutes. A preventive emergency response system (PAPS) consisting of two first aiders from an approved civil security association (French Red Cross) was on site to help them manage the situation. They were assisted by a doctor from the CPTS (Territorial Health Professional Community) and together they alerted the Paris Fire Brigade. The risk was that of carbon monoxide poisoning (gas leakage), which can be fatal. All of the students were evacuated from the tunnel and remained in the shade under the trees. The fire brigade arrived on site with an emergency and victim assistance unit (SAP) comprising 5 ambulances and a light vehicle with the SINUS on-call chief. They used a carbon monoxide detector to rule out the possibility of CO poisoning. The cause of the vomiting was actually food poisoning, caused by a break in the cold chain.

Given that it is preferable to travel early in the morning and that this allows other events to be studied in greater depth, it was decided not to include the movement and sheltering of students, and to test whether the tunnels could be used as a climate shelter where students could be taught. A great deal of attention was also paid to the cooperation between the various players involved, from the site manager to the various care teams and the teaching team, in the face of such a serious risk of carbon monoxide poisoning.

Two tourists whose hotel had closed and who could no longer find accommodation, and a homeless person, as well as three residents with their pets from nearby social housing buildings, arrived at the entrance to the climate shelter and asked to be sheltered.

However, with two school classes and around ten Paris Habitat residents already there, the shelter had reached its maximum capacity. The two-man team from SAMU Social and the Social Support Unit, accompanied by the municipal police, took charge of them and offered to take them to another climate shelter.

In general, a number of shelters will quickly reach their maximum capacity during an extreme heatwave. It is therefore important to be able to identify how the various players can manage this saturation. In such circumstances, the challenge is to avoid rising tensions and to be able to preserve everyone's health.

At the same time, EHPAD Annie Girardot, which is linked to the tunnel by a radio station set up by the FNRASEC (French National Federation of Certified Civil Protection Radio Amateurs), welcomed students from the Collège Georges Braque secondary school, as the site is cooler than their classrooms. They help the nursing home staff to set up the night area for those supported by the Coallia association. They considered the best layout and solutions to limit the heat, such as placing survival blankets on the windows. This event raised questions about the solutions that can be put in place to cope with heatwaves, with a strong emphasis on intergenerational mutual aid.

There was a power cut for a few seconds due to a fault in the electrical network. Fortunately, the generator took over. ENDIS mediators and aerial technicians arrived 10 minutes later to explain the situation and to point out that the network could only be restored after dark, as working conditions were too difficult during the day. The generator could only operate certain essential equipment. The ENEDIS aerial technicians ensured that the director and staff of the nursing home fully understood the implications of using the electrical generator.

A power cut can have a major impact on vulnerable people living in residential and nursing homes. Staff need to be aware of this risk so that they can avoid it and be prepared should it occur. It also enables us to check that the equipment is working properly, as well as the responsiveness of ENEDIS.

Students simulating food poisoning

Samu Social de Paris on site for the full-scale exercise on 13 October

③ Description of the scenario for the tabletop exercise

Testing the impact of an extreme heatwave on major networks (particularly public transport) and the coordination of the various players

The exercise was prepared and scripted by the City of Paris, in conjunction with “accomplices” from the various partner structures. The City of Paris led the exercise and activated its central crisis unit. The Paris Police Headquarters and several other participating structures also activated their crisis units.

The scenario for the tabletop exercise involved a series of fictitious events that participants had to deal with, simulating the decisions to be made, the action plans and resources to be deployed. The health, technical, environmental, organisational and social impacts of a heat dome on the scale of the capital were simulated in order to test the organisation of the various partners in the face of this extreme situation, how they coordinate, and the information communication systems in place for the general public, as well as support systems for the general public, with a particular focus on the most vulnerable and the homeless. Unlike the full-scale exercise, no action was actually implemented in the field.

A warm-up exercise was launched eight days before the tabletop exercise, with participants receiving daily weather reports, press releases and instructions from the Paris Police Headquarters, as well as internal updates from the City of Paris. The aim of this was to enable the participants to immerse themselves in the simulated situation before the crisis exercise.

The City of Paris crisis room during the tabletop exercise on 17 October 2023

Scenario content

Public transport experienced many technical difficulties disrupting the movement of equipment (various breakdowns, cable fires, air-conditioning faults, etc.) and consequently the service to users (delays, suspended lines, passengers transferred to other lines or modes of transport, difficult transport conditions, fainting, etc.).

Air-conditioning breakdowns and episodes of overheating in the facilities of the 3 telecommunications operators (Bouygues Telecom, Orange and SFR) led to the disruption or even suspension of fixed and mobile telephone services. The Paris Monitoring Centre (CSP) of the Paris Police Headquarters and the COGIC, the inter-ministerial crisis management operational centre, were notified of losses of communication with fixed and mobile sites, as well as emergency numbers.

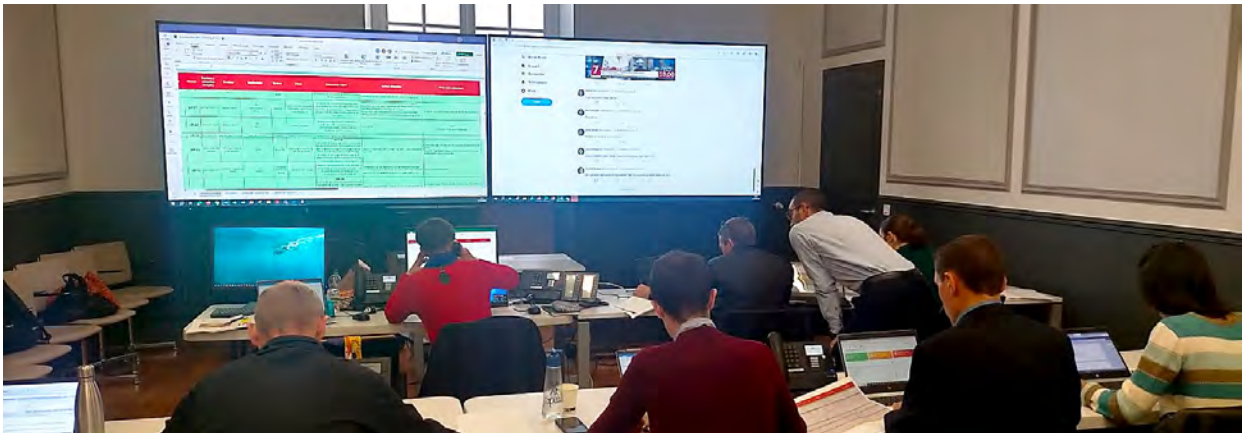
Two power cuts occurred in the area around Rue de Rochechouart, Rue Tardieu and Rue André Antoine (9th and 18th arrondissements) and in the area around Rue de Bagnolet and Rue Pelleport (20th arrondissement), affecting 1,200 households and 450 households respectively, including the EHPAD Alquier-Debrousse retirement home and the telecommunications operators in the areas concerned. EHPAD Alquier-Debrousse activated its generator.
Telecommunications operators liaised and coordinated with ENEDIS on issues relating to the operation of the electricity network. ENEDIS installed generators in the two affected areas.

Fire hydrants were opened (street-pooling) in several Paris arrondissements (13th, 15th, 18th, 19th and 20th), requiring the intervention of the Eau de Paris teams in conjunction with the municipal police to ensure the safety of operations to restore service.

With the temperature of the Seine rising above 26°C, Eau de Paris and Fraîcheur de Paris applied for temporary exemptions from the Regional Health Agency and the Île-de-France Regional Prefecture to continue drawing water from the Seine to continue producing drinking water and run cooling systems.
The Regional Health Agency granted an exemption for the use of drinking water intended for human consumption when it reaches 25°C.

Mobile drinking water dispenser installed at the entrance to the Petite Ceinture tunnel in the 13th arrondissement

Testing the resilience of organisations to a prolonged period of very hot weather



The City of Paris crisis room during the tabletop exercise on 17 October 2023

Incidents in the transport system affected the availability of municipal workers and staff from the Île-de-France Prefecture and the Paris Public Hospital Authority (AP-HP), who had difficulty starting their shifts or travelling to intervene. The Regional Health Agency implemented measures to enable staff to reach their social and medical-social facilities and services despite the disruption to public transport.

For its part, Samu Social de Paris decided to provide accommodation for its staff affected by transport problems.

Due to the hot weather, network operators (Orange, RATP, SNCF, Eau de Paris, EDF, etc.) and the City of Paris were with a large number of their drivers, technical staff, service staff, reception staff and/or security staff exercising their right not to work in extreme heat. As a result, network operators were forced to reorganise their operations, in particular by using on-call teams and rearranging their working hours and responsibilities, so that technical interventions and repairs, which were more numerous than usual due to this extreme heatwave, could be carried out, prioritising the most urgent ones, and so that operations and services to the general public could be maintained. In addition to staff exercising their right not to work in extreme heat, some RATP drivers simply did not report for work. This meant that a number of RATP services had to be modified as there were few replacement drivers available.

A large number of people fainted on public roads, on public transport (metro, buses and trains) or at funerals in cemeteries across Paris, prompting major interventions by the emergency services and the fire brigade. The response times of the Paris Fire Brigade increased significantly due to the overwhelming demand throughout the country, and a request was made to the Paris Police Headquarters for reinforcements by mobilising the Accredited Civil Protection Associations (AASC).

The Department of Green Spaces and the Environment (DEVE), which is responsible for funeral matters, reported that a large number of staff exercised their right not to work in extreme heat. Workers (gravediggers, reception and security staff) at three Paris cemeteries - Père-Lachaise (20th arrondissement), Montparnasse (14th arrondissement) and Thiais (Val de Marne) - exercised their right not to work due to deteriorating outdoor working conditions and a sharp increase in the number of burials. Burials were postponed and morning openings were staggered.

The Department of Green Spaces and the Environment also reported serious tensions related

to the operating capacity of funeral facilities (crematoriums, funeral chambers, etc.), which was approaching maximum, and the difficulties faced by funeral companies in terms of human resources (employees on sick leave, repeated fainting, deteriorating working conditions, etc.). The Paris Monitoring Centre of the Paris Police Headquarters was alerted to the potential impact of this situation on the funeral chain, which needed to be anticipated.

Following a number of incidents of fainting during household waste collection rounds or cleaning operations, and due to difficult working conditions, waste collectors also exercised their right not to work in extreme heat. This affected the workshops of the 6th, 12th, 14th, 17th and 20th arrondissements.

Reception and security staff at several municipal museums (Petit Palais, Carnavalet, Musée d'Art Moderne, Musée de la Libération de Paris and Cognacq-Jay) exercised their right not to work because of the hot weather and the difficulty of managing the influx of visitors and ensuring that admission limits were respected. Several staff members were verbally or physically assaulted. Receptionists and healthcare professionals at the Edison (13th arrondissement), Ridder (14th arrondissement) and Marcadet (18th arrondissement) healthcare centres also exercised their right not to work due to the hot weather, which made it difficult to receive the public and to cope with the increasing number of patients. The closure planned over the next few days prompted the City of Paris to alert the Paris Monitoring Centre of the Paris Police Headquarters and the Regional Health Agency to the possibility of mobilising the CPTS (Territorial Health Professional Communities).

The Regional Health Agency mobilised the City of Paris CPTS (Territorial Health Professional Communities) to relieve the pressure on healthcare facilities (emergency departments) and to intervene in saturated healthcare centres in their area.

As well as healthcare centres, the operation of certain municipal facilities such as public swimming pools, public showers and Paris museums, was severely disrupted by the influx of users and visitors. Disruptions and disturbances in front of these facilities required the intervention of the municipal and national police forces to regulate the flow of users, ensure the safety of the work of municipal staff and ensure that people continued to be welcomed in the cooler areas and climate shelters throughout the City of Paris.

As part of the Paris Heatwave Plan, a large number of City of Paris staff were called upon to make home visits, deliver fans and take people to air-conditioned rooms, but they were unable to do so due to transport problems and the extreme heat. The search for other volunteers struggled to meet the needs created by the day's absences, and there were concerns about the organisation of the coming days.

The disruption to waste collection caused by waste collectors exercising their right not to work in extreme heat, particularly in front of certain healthcare facilities, prompted the Regional Health Agency to ask the City of Paris to prioritise waste collection.

The manager of the Courcelles municipal gymnasium in the 17th arrondissement, where more than a hundred migrants (especially families with young children) were housed as part of a temporary shelter programme, reported that the heat inside the building was unbearable, despite creating draughts and installing mobile air-conditioning units. France Terre d'Asile (an association that promotes and defends the right to asylum) called for reinforcements from the Protection Civile Paris Seine first aid association, which was already on site and was having difficulty managing the situation. Protection Civile Paris Seine was unable to deploy additional teams due to excessive demand, which it was unable to cope with.

The Paris Public Hospital Authority (AP-HP) warned of a significant increase in the number of people being treated after fainting and in the number of people showing up spontaneously at A&E departments.

The Regional Health Agency mobilised private healthcare facilities in the Paris region to help cope with overcrowding in the public hospitals. A transfer of patients was organised from the Pitié-Salpêtrière Hospital (13th arrondissement) to the Charles Foix Hospital in Ivry-sur-Seine, Val-de-Marne. Numerous residential and nursing homes alerted the Regional Health Agency to difficulties linked to air-conditioning breakdowns and numerous fainting spells among residents.
The director of EHPAD Annie GIRARDOT reported a technical problem with the air-conditioning system, and that air conditioning of the rooms was becoming less and less effective due to a generator failure. One resident suffered a minor fainting spell. It is worth noting that EHPAD Annie Girardot was being used as a climate shelter for local residents and students from the Collège Georges Braque secondary school, who were more comfortable there than in their classrooms. The maintenance contractor was contacted for an emergency call-out, and staff were asked to be extra vigilant about hydrating users and using fans. EHPAD La Source d'Auteuil in the 16th arrondissement reported a collective outbreak of food poisoning due to a breakdown in the refrigeration system and the failure of the generator.

The Regional Health Agency called for a reorganisation of social and medical-social facilities and services to enable residents to stay in the residential and nursing homes and avoid transfers to healthcare facilities, some of which are already overcrowded. Eau de Paris and the City of Paris were contacted by the Regional Health Agency following reports of numerous cases of legionellosis, which, according to the results of an epidemiological survey, were attributable to misting fountains installed in the Parc de la Villette (19th arrondissement) and the Parc André Citroën (15th arrondissement).

Information meeting for residents at EHPAD Annie Girardot

Numerous cases of fainting were also reported among City of Paris staff, particularly in the cemeteries and waste management departments, prompting the two City departments concerned to remind their staff of the correct precautions to take in hot weather and to activate their internal protection procedures.

The Department of Green Spaces and the Environment reported a serious accident involving a tree cutter on duty in the 15th arrondissement. The situation appeared serious: the tree cutter was unconscious and, due to the heat, was not wearing his helmet (mandatory personal protective equipment). The operational departments of the City of Paris were asked to remind their employees to wear the required PPE.

Due to ozone pollution and restrictive measures to reduce pollutant emissions, EDF's combustion turbines were shut down. EDF applied to the Regional Prefect for a temporary derogation to restart them, possibly to support the production of electricity needed for the increased use of air conditioning.

The hot weather had an impact on wildlife, with excessive fish mortality in the Parc Montsouris lake (14th arrondissement). The Department of Green Spaces and the Environment ordered them to be removed, launched expert assessments and analyses to find the exact cause of this excessive mortality, and prepared a communication aimed at the people of Paris.

Testing the network of cool spaces in Paris that can be used by the people of Paris

A large brush fire on in front of the Town Hall in the 13th arrondissement spread to the roof of the building, forcing the users and staff to evacuate. The Mayor of the 13th arrondissement asked the City of Paris to quickly find a solution to accommodate the people who had come to the Town Hall to escape from the heat in one of the air-conditioned rooms.

The Town Halls in the 5, 6, 9, 10 11, 18 and 20th arrondissements reported that their air-conditioned rooms were full, and requested access to additional cool spaces for the general public.

In response to this request, the City departments proposed a number of administrative buildings (103 and 121 Avenue de France, and the Paris City Hall) and other municipal facilities (entertainment centres, conservatory in the 14th arrondissement, and the Eastman centre in the 13th arrondissement). Some of the proposals required specific human (security) and material resources.

The City of Paris contacted for the Accor Group to provide additional air-conditioned rooms. The proposal to requisition cinemas was passed on to the Paris Police Headquarters.

Testing support for homeless people, in conjunction with government services

The Assistance Unit for the Homeless (UASA) of the Municipal Police and Prevention Department (DPMP), which has stepped up its outreach activities, reported an increase in the number of homeless people suffering from the heat in public spaces in the 9th, 10th, 11th, 14th and 15th arrondissements. Cases of hyperthermia and deteriorating health, aggravated by the heat, have also been reported. The City of Paris was looking for suitable places to accommodate homeless people.

A fire broke out in the Bois de Vincennes. Several homeless camps were affected. Three camps were completely destroyed and more than twenty people were injured, some of them seriously. A search for beds for “severely burned” people began, as did the search for solutions to shelter these homeless people, in collaboration with government services.

Testing the impact of an event of this type

The organisers of the cross-country race in the Bois de Boulogne on Saturday 26 June (500 participants and a team of 42) asked the city whether they should go ahead with the event or postpone it due to the very hot weather. They were faced with a large number of runners dropping out of the race, as well as members of their organising team. They asked the City of Paris about postponements and cancellations of outdoor sporting events, which in turn referred the matter to the Paris Police Headquarters for a decision.


eau de Paris
ici
JE CHOISIS
L'EAU DE PARIS
Je remplis ma gourde

B. MANAGING THE EXERCISE AND THE TOOLS AVAILABLE

The full-scale exercise was managed by the Ecological Transition and Climate Department (DTEC) and the Crisis Management Department of the City of Paris, with the support of Crisotech, a specialist crisis management agency that won the public contract for the exercise.

Crisotech provided project management support and coordinated the exercise. The exercise lasted around 3 and a half hours in each of the two arrondissements and required a large number of exercise coordinators to welcome and coordinate the various participants, lead the sequences, observe the exercise and guide the outside observers and the press.

1 Coordinating the sequences

Each sequence was led by one or more exercise coordinators, who were responsible for guiding the participants, interacting with them and initiating events as required.

Event timelines

A timeline was created for each participant, indicating the main events that would affect them, their locations and timings, all while maintaining the element of surprise. In this way, everyone was aware of their role and the structuring elements of the scenario; the aim of the exercise is to put participants in situations where they can test their reactions and learn from them.

An exercise with international appeal

The innovative and unique nature of the Paris at 50°C exercise has attracted the interest of many other national and international cities. Numerous cities have expressed their interest in learning more about how the City of Paris organised itself to prepare for this exercise, and the main lessons learned.

The cities of London and Madrid, as well as the international network of "C40" cities were invited to attend the full-scale exercise, as observers.

The City of Paris has also been asked on numerous occasions to share its experience with several major city networks (the Resilient Cities Network, C40, Fabrique des Transitions, France Urbaine, etc.).

Simulated crisis room in the Maison 13 Solidaire, 13 October 2023

TIMELINE FOR THE ÉCOLE MANIN PRIMARY SCHOOL

The day before, students from the École Manin primary school suffered fainting spells. The school approached the City of Paris for a climate shelter for their students and staff. The City of Paris suggested that the EHPAD Hérold car park, a cool place where people can escape from the heat, could be used to accommodate the students.

As a reminder, a Crisotech coordinator will always be on site during the exercise to help you during the various events, brief you and adapt the scenario to the situation.

8:40 a.m. — BUS — 1

Students from the École Manin primary school board the bus bound for EHPAD Hérold.

2 — Unwell students — 8:45 a.m.

During the journey, some students experience a worsening of their symptoms.

8:55 a.m. — Caregivers — 3

The bus stops at the corner of Bd Sérurier and Rue Ponge. Students get off the bus and those who feel unwell are taken care of by the carers.

4 — Jardin Hérold — 9:00 a.m.

The students disembark the bus and head for the Jardin Hérold, where they can take shelter and cool off. Two social workers are present on site.

9:45 a.m. — EHPAD Hérold car park — 5

The group then set off on foot to the EHPAD Hérold car park, accompanied by a nurse from the CPTS, the Protection Civile and the Municipal Police.

6 — Lessons — 10:15 a.m.

The students arrive at the car park and, with the help of the Protection Civile, organise the area so that they can continue with their lessons.

11:00 a.m. — Talking circle — 7

The end of the exercise is announced and the exercise coordinator proposes a moment of discussion in the form of a talking circle.

Example of a timeline

TIMELINE FOR COLLÈGE G. BRAQUE

On 23 June 2032, during an extreme heat dome, students from the Collège Georges Braque secondary school are welcomed into EHPAD Annie Girardot on Rue Annie Girardot, which is cooler than their classroom.

As a reminder, a Crisotech coordinator will always be on site during the exercise to help you during the various events, brief you and adapt the scenario to the situation.

02:30 p.m. — Arrival (1)

The secondary school students arrive on site at 2:30 p.m. to prepare for the exercise.

Media training — 03:00 p.m. (2)

Workshop with all the students in the class.

03:30 p.m. — Solidarity activities (3)

Working in sub-groups, the students help to set up a space to welcome residents from the day centre for the night.

Power cut — 04:00 p.m. (4)

Power cut in the neighbourhood. EHPAD Annie Girardot switches to generator power.

4:10 p.m. — Enedis (5)

ENEDIS arrives on site.

Discussions — 04:30 p.m. (6)

The ENEDIS technician explains the situation.

05:00 p.m. — Talking circle (7)

The end of the exercise is announced by a new radio news flash. The exercise coordinator proposes a moment of discussion in the form of a talking circle.

Observation:

During the full-scale exercise, an observer, who was part of the animation team, was present at each location to record, as accurately as possible, all actions and decisions made by the participants during the exercise. In particular, the observer had to describe the sequence of events and the ways in which the various participants communicated and exchanged information.

In the morning, two observers were present in the 19th arrondissement, then, in the 13th arrondissement, a third person was in charge of monitoring events at the EHPAD Annie Girardot. They were given observation grids to ensure that they captured all the main findings of the exercise. By asking questions such as “Did this partner manage priorities correctly?” or “Did the person in charge of this sports facility understand the needs expressed by so-and-so?”, they ensured that the observers did not miss anything important.

Awareness-raising workshop with secondary school students from Collège Georges Braque

② Operational management tools

The schedule, a tool for compiling scenarios

In the context of crisis exercises, the "schedule" is an operational transcription tool constituting a dashboard which brings together guidelines, scenarios, protocols and information used to guide and monitor the exercise. The schedule defines the crisis scenarios that will be used during the exercise. It includes items to be monitored during the exercise, communication plans, specific actions in the event of an emergency, and so on. A schedule is designed to make it easy to adapt the exercise to the actions of the participants, for example by adjusting the scenarios to maintain a high level of realism.

Start date	Location	Event	Site	Event number	Input	Transmitter	Recipient	Stakeholders
20231013 0816	Both	JUNK	SOCIAL ROOM		Background on the heatwave and the heat dome in Paris - TV news broadcast 1			
20231013 0817	Both	A1Bus	SOCIAL ROOM		Evacuation of certain establishments to safe havens (several in Paris, Providence, Braque, Manin: take live photos).			
20231013 0828	Paris 19	Set up	École Manin	Event 0	Lanyards for the children joining the bus. Some of the children complain that they feel unwell just before: asthma and pain for a child with sickle cell anaemia.			
20231013 0830	Paris 19	Fainting children	Bus	Event 1	Event 1: On the bus → 4 students faint and are taken care of by the CPTS. The bus stops at Jardin Hérold so the children can be taken care of. Manage communication at Jardin Hérold.			RATP / CPTS / Samu Social / DVD / DPMP / DEVE / Manin
20231013 0835	Paris 19	Fainting children	Bus	Event 1	(Go up to the students (different coloured lanyards) and ask them to say they feel unwell. Feeling sick or unwell, hot, vomiting, asthma attacks and pain. Some students just feel very weak. It's all on their information sheet) This must be done before boarding the bus	Coordination	Determined or random students	RATP / Manin

Extract from the schedule used in the full-scale exercise in the 19th arrondissement

The cue sheet, an operational management tool

The cue sheet is a complementary tool to the schedule, which records all the logistical information needed to conduct the exercise in the field. It enables all actions to be centralised and coordinated, specifying the places, times and players involved. It facilitates the visibility and operational monitoring of the requirements and deadlines for each planned action, thus reinforcing cooperation within the project team.

	JARDIN HÉROLD					
Hours	**Designation**	**Duration**	**Actions**	**Coordinator/Contact**	**Comments**	**Departments/ Partners involved**
	Highlights					
			Bus parks on Rue d'Alsace-Lorraine at the corner of Rue de la Solidarité		Notify the Roads and Transport Department	
8:30 a.m. - 8:45 a.m.	RAPT bus to take students from school to car park		Route via Bd Sérurier	Crisotech	RATP OK / Electric bus. Bus departure time: 8:30 a.m.	RATP
			Fainting children			
			Call and arrival of the doctor (unscheduled care by the CPTS)	Crisotech	2 doctors and 2 nurses are mobilised	CPTS
			Bus stop corner Bd Serrurier / Rue Francis Ponge			CPTS / DPMP
			The healthcare team collects the equipment from the nearest pharmacy and boards the bus		Pharmacy to be identified and notified the day before; Carried out by the CPTS the day before the exercise	CPTS
8:45 a.m. - 9:30 a.m.	Jardin Hérold		The bus stops at Bd Sérurier/Rue Francis Ponge and the children get off: a team of mediators from the DPMP is on hand to reassure them and accompany them, along with their teachers, to Jardin Hérold (shade structure, fountain, misting system) to find shade and escape from the heat		On-site visit on 05/09 with STV / SALPA / Eau de Paris / DTEC / SGC. Jardin Hérold group. Added value for the Department of Green Spaces and the Environment	DCPA / DVD / Eau de Paris / DEVE

Extract from the cue sheet used in the full-scale exercise in the 19th arrondissement

3 Communication and media coverage of the exercise

In the run-up to the exercise, a number of **communication tools** were produced, such as a visual and a logo to be used on all communication media sent to the various players involved (timeline, booklet for the participants, posters, etc.), in order to enable the media used during the crisis exercise to be quickly and easily identified.

The two **arrondissement Town Halls** distributed information about the full-scale crisis exercise on their premises and via their communication media (newsletters, websites, etc.).

The City of Paris communication plan has 3 main focuses:

- **On the editorial side**: a newsletter from the City of Paris was sent out the week before the exercise, relaying the existing article on the Paris.fr website and an invitation to follow the content on the day on social media. A second newsletter was issued after the exercise, providing feedback on the experience. At the end of the tabletop exercise, a news article was published on the Paris.fr website presenting the highlights of the simulation. The magazine 'A Paris' published an article summarising the event.

- **On the media side**: videos were shot on smartphones on the day of the exercise, and interviews were conducted with the players involved during and after the exercise, which was broadcast on Instagram the same day. A photo report was also produced by the Communication Department.

- **On social media**: Instagram stories, threads on X (formally known as Twitter) and videos on TikTok were produced and broadcast on the day.

Press relations

A **press conference** organised at the Paris City Hall, attended by Emmanuel Grégoire, First Deputy Mayor of Paris, Pénélope Komitès, Deputy Mayor in charge of innovation, attractiveness, resilience and outlook, General Arnaud de Cacqueray, representing the Paris Fire Brigade and Frédéric Lallier, representing the Paris Police Headquarters, helped to mobilise journalists.

30 journalists from regional, national and international print and broadcast media attended. The 13 members of the media who were accredited to cover the full-scale crisis exercise attended the press briefing that followed the press conference.

A printed press kit was distributed to all journalists present; it was also available in digital form on the City of Paris press website.

Given the constraints of the exercise, and in particular the need to keep the participants in a fictional bubble, only a limited number of journalists were accredited to attend the crisis exercise. In order to allow as many journalists as possible to attend, they were divided between the two arrondissements. A press tour was organised to ensure that the exercise ran smoothly, with a briefing to set the mood in each arrondissement.

A press briefing was also held in the crisis room on the day of the tabletop exercise.

Press coverage:

- Press conference: 30 journalists present
- Full-scale exercise: 13 journalists present at the 2 sites
- Tabletop exercise: 5 journalists present

→ Extensive media exposure

With over 34 local, national and international press reports on the event, the exercise was well received by both professionals and the general public. Broadcasting mainly on the web (62% of the fallout was published on the Internet), audiovisual broadcasts of the reports and the publication of several paper articles enabled us to reach a wide audience.

Thanks to the media coverage of the exercise, many French and international cities have heard about it and are keen to learn from it.

→ Positive press feedback with high added value

The excellent press coverage of the exercise confirms that Paris is at the forefront of resilience, both nationally and internationally.

The quality of the content produced and its didactic aspect underline the role that the press can play in promoting a risk culture among the general public. As well as being a stakeholder, the press can play a key role in raising awareness of the issues involved in a crisis. The press is therefore essential when it comes to spreading a risk culture and raising awareness of the problems associated with heatwaves.

Emmanuel Grégoire, 1st Deputy Mayor of Paris and Pénélope Komitès, Deputy Mayor of Paris, at the press conference

Pénélope Komitès, interviewed during the full-scale crisis exercise on 13 October 2023

4. THE FEEDBACK PHASE

In the context of an innovative exercise such as Paris at 50°C, feedback is a crucial phase in building a shared vision of the lessons learned from the exercise and its entire development process.

To achieve this, a comprehensive feedback methodology was drawn up and implemented in conjunction with the partners involved in the exercise, including hot and cold feedback, and involving all stakeholders in both the full-scale and tabletop exercises. This method of jointly building feedback allowed us to consolidate an overall, shared analysis of lessons learned and to make recommendations in response to the Paris at 50°C exercise.

A. BUILDING A SHARED FEEDBACK METHODOLOGY

1 Discussion circles to gather “hot” feedback & questionnaires to gather “cold” feedback

Discussion circles support participants at the end of the exercise and are particularly useful for gathering participants’ reactions immediately after the exercise (“hot” feedback). The aim is to allow everyone to express their feelings after the exercise, to share their emotions and surprises, and to allow a gradual and collective exit from the fictional bubble. They were organised after each exercise sequence with the participants and led by a professional from Crisotech.

As for the questionnaire, it’s a good tool to get a better understanding of how the participants felt about the exercise. The questionnaires were tailored to each type of participant: residents, management and partners. The various partners and adult participants were asked to answer a short questionnaire, while the students were asked to answer questions in a small booklet specially designed for them.

2 Internal and external feedback meetings

A month and a half after the exercise, two feedback meetings were organised, chaired by Pénélope Komitès, based on the analysis of the questionnaires: one meeting with partners of the exercise and another, internal, with City departments. The aim of these two meetings was to present a summary of the lessons learned from Paris at 50°C by the project team, and to collect observations from each partner. On the basis of this shared learning, the discussion then focused on identifying the main avenues to be pursued and developed. Two avenues of action were explored in sub-groups, one on climate shelters and the other on the organisation of future crisis exercises.

3 Organising a feedback event open to all partners and the press

Pénélope Komitès, Deputy Mayor of Paris, in charge of steering the Paris at 50°C exercise, wanted to organise a public feedback session to report on the whole process, during a morning dedicated to the exercise.

A press breakfast was organised to allow journalists to exchange views with the City of Paris, the Paris Police Headquarters and the Paris Fire Brigade. The discussion focused on the preparation of the exercise, how it unfolded and the main lessons learned. Many questions were asked by the journalists.

In a second phase, all the lessons learned were shared during a public presentation open to all the City of Paris' partners in the field of urban resilience. Approximately 200 people attended.

Following speeches by Pénélope Komitès and Dan Lert, Deputy Mayors of Paris, Marie Villette, Secretary General, and Frédéric Lallier, Deputy Chief of Staff of the General Secretariat of the Paris Defence and Security Zone (Paris Police Headquarters), two round-table discussions were held to discuss the positive aspects and areas for improvement identified during the crisis exercise.

The first focused on the technical aspects of the crisis exercise (energy networks, telecommunications networks, etc.) and brought together some of the public and private operators involved: Orange, Enedis and Bouygues Télécom, as well as the RATP.

The second round-table discussion involved local social players (Samu Social de Paris - social emergency response service, Paris Habitat - social landlord, the French Red Cross, Protection Civile Paris Seine - first aid association, and the headmistress of the École Providence primary school in the 13th arrondissement) to discuss the challenges involved in caring for different groups of people, particularly the most vulnerable, in the event of an extreme heatwave.

From left to right: Colonel Patrick Gindre, Deputy Chief of Staff and Head of the Employment Division in charge of forecasting, operations and prevention at the Paris Fire Brigade, Pénélope KOMITÈS, Deputy Mayor of Paris and Frédéric Lallier, Deputy Chief of Staff of the General Secretariat of the Paris Defence and Security Zone, Paris Police Headquarters, at the press breakfast organised on 31 January 2024.

Public meeting to gather feedback on the exercise, 31 January 2024 at the Climate Academy

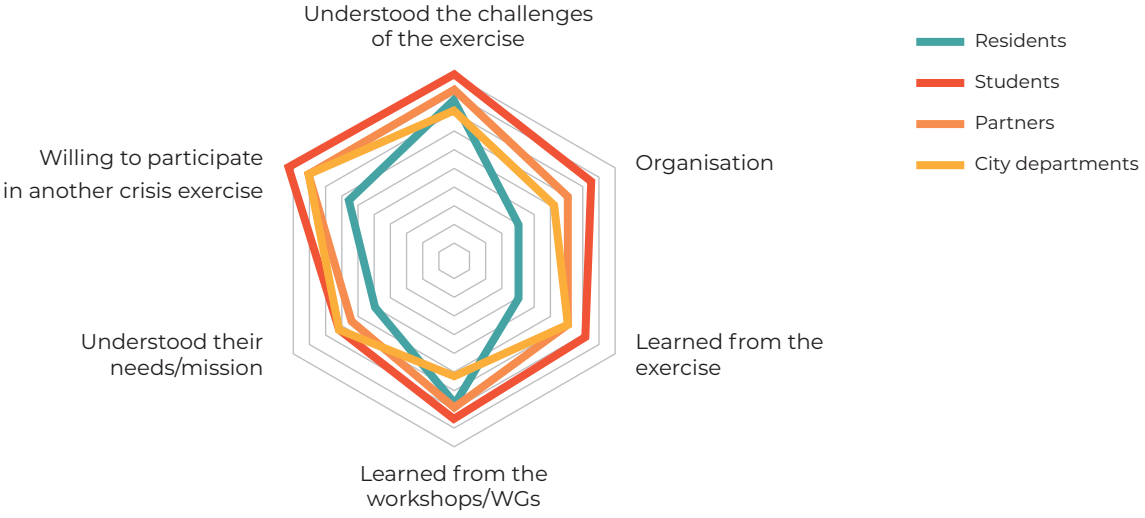
B. ANALYSIS OF LESSONS LEARNED AND RECOMMENDATIONS

1 Perceptions and feedback from exercise stakeholders

Analysing the various feedback media (discussion circles, questionnaires, booklets, meetings, etc.) highlights a number of salient points about how the exercise was perceived by the participants involved on the day.
The majority of participants found the experience rewarding and said they would be willing to take part in this type of exercise again.

Everyone had a clear understanding of the challenges and objectives of the exercise,thanks to satisfactory communication beforehand. The preparation phase, involving both working groups of professionals and workshops with the general public, helped to increase knowledge and learning about extreme heat. Finally, the organisation of the exercises was generally well received.

Radar chart of feedback from participants in the full-scale exercise



The vast majority of **students** were very satisfied with the experience, and are keen to take part in this type of exercise again. Secondary school students who took part in the exercise suggested two areas for improvement: the first was to propose a sensory device to better understand and feel the physiological effect of such a temperature; and the second was to propose role-playing exercises that would require them to think and adapt more during the exercise. Primary school children who took part in the exercise suggested improvements that were more related to leisure activities that could be offered in the climate shelters, such as fun videos.

Local residents expressed the need for better preparation before the exercise on the day, and expressed a desire to play a more important, better defined role. This illustrates the special attention that needs to be paid to each participant to enable them to fully engage in this type of exercise. One possible area of improvement would be to mix "civilian" participants, playing their own roles, with professional participants, in order to involve local residents in more elaborate roles during the exercise. Finally, the large presence of observers and the press may have given some participants the impression that they were taking part in an exercise with a strong communication aspect.

Most of **the professional partners** involved in the exercises had already taken part in crisis exercises, either in tabletop exercises for organisations such as operators, or in practical exercises for players such as the Paris Fire Brigade (BSPP) or civil protection associations. However, the Paris at 50°C exercise had two dimensions that they had not experienced before. Firstly, the exercise was conducted with "civilians", which introduced a degree of uncertainty and required partners to be more aware and able to adapt. Secondly, the exercise involved a very large number of players and brought into play the interdependencies identified during the working groups. It provided training in coordination, with the ultimate aim of facilitating collaboration between everyone involved, for a more coordinated response in the event of a crisis.

The various departments of the City of Paris were almost unanimous in their opinion that the exercise had gone well. In addition, the way in which they collaborated with the various participants was described by most as "very good". On the other hand, some stressed the need to be involved at every stage, from preparation to operational participation, in order not to lose sight of the bigger picture and to have a detailed understanding of the reasons behind the choices made when implementing the scenarios. Overall, the City of Paris staff involved in the exercise fully understood the approach and its benefits, and are willing to repeat the experience with greater involvement on their part.

2 The main lessons learned from the exercises and recommendations for public policy

The Paris at 50°C exercise highlighted issues relating to the heat dome and crisis management, particularly among partners of the City of Paris (network operators, associations, facility managers, economic operators, etc.).

It was also an opportunity to highlight the measures taken by the City of Paris to cool its public spaces and keep the public cool throughout the Paris region, such as misting fountains, shade structures and shaded areas, the provision of air-conditioned rooms in public buildings, and the technical measures needed to make public spaces safe during heatwaves, such as the intervention of the Roads and Transport Department to secure a lamppost.

Finally, the crisis exercise and its feedback highlighted several priority areas of work for the City of Paris and its partners.

Reinforcing and supplementing the measures taken by the City of Paris to meet the challenges of heatwaves

→ Providing shelter for vulnerable people in climate shelters

In the event of extreme heatwaves, the human body is vulnerable, and it becomes necessary to shelter people in climate shelters.

Numerous studies, particularly those carried out by Santé Publique France, show that while people with chronic illnesses, pregnant women, the elderly, the homeless and very young children are particularly vulnerable to heat, the whole population is more at risk in the event of an intense and prolonged heatwave.

The first area of work therefore concerns shelters, with two main questions to be addressed: what objectives and needs should these shelters meet, and how can we develop a denser territorial network?

Discussions with the various partners revealed that the City of Paris could rely more on local players who already have knowledge and experience of climate shelters, such as Samu Social de Paris and the French Red Cross. It's a challenge to share feedback related to the cold weather shelters of the Cold Weather Plan and all the initiatives set up for the Paris 2024 Olympic and Paralympic Games. It is also important to understand the diversity of needs of the people who visit these sites, whether for short visits or longer stays involving a variety of needs such as eating, resting or protection from the heat, etc. Consideration is also being given to the issue of accommodation and support for different categories of people, including those who may be marginalised (addiction problems, homeless people, etc.), as well as taking pets into account.

The City of Paris is currently developing more extensive cooling and sheltering systems in the event of a heat dome. The identification of potential climate shelters is also being considered, in particular with regard to the use of these sites,

which will include a multi-modal approach to enable them to be used over different periods of time (day or season). In addition, there are many operational lessons to be learned about life in these climate shelters, such as the need to anticipate the logistics of securing and equipping them, while taking into account the ability of local residents, especially students and schoolchildren, to adapt in order to maintain the continuity of their usual activities.

Focus on homeless people and the "Plan Grand Chaud" (Extreme Heat Plan)

We need to work with government services to address the need to provide shelter for people living on the streets, who are the first to be affected by a heatwave, as heatwave alerts and outreach activities are not enough. As a result, the city has identified the need to set up a "Plan Grand Chaud" (Extreme Heat Plan) dedicated to people living on the streets. Special "adapted" facilities need to be developed for these people, who often have disabilities, physical or psychiatric conditions and/or pets. This would include extending the opening hours of the ESI (Solidarity and Integration Services) and setting up air-conditioned day centres offering basic services to meet people's immediate needs: food, rest and washing, especially for the homeless.

A number of measures are already in place in the Paris region to deal with heatwaves. These actions are grouped under the Paris Heatwave Plan and the "Paris Adapts" programme, which implements the heatwave adaptation measures of the Paris Climate Action Plan.

The current Paris Heatwave Plan: awareness-raising, prevention and monitoring

In the event of a heatwave, the Paris Heatwave Plan includes **measures adapted** to the evolution of the situation in the Paris region, according to the data provided by Météo France.

In order to protect the general public, the City of Paris implements various measures which are activated by the Paris Police Headquarters according to the alert level to which the territory is subject:

- **Level 1 - seasonal vigilance (green alert):** this level is automatically activated during the summer period, from 1 June to 15 September. The authorities monitor changes in the weather and check that operational systems are functioning correctly. This level may be brought forward and/or extended if weather conditions warrant.

- **Level 2 - heat peaks or temperatures close to thresholds that persist over time (yellow alert):** a period of increased vigilance during which the various players (local authorities, health professionals, social services, volunteers, etc.) prepare for a possible intensification of the heatwave.

- **Level 3 - heatwave (orange alert):** this level is triggered by the Prefect of the *département*. The decision takes into account not only the meteorological alert map, but also the local pollution situation and the context (large gatherings, densely populates areas, etc.).

- **Level 4 - extreme heatwave (red alert):** This level corresponds to an exceptional heatwave, in terms of duration and intensity, combined with problems that go beyond public health, such as drought, overcrowding of hospitals, power cuts and so on.

The main challenge for the City of Paris is to be able to **identify, support and protect people that are vulnerable to heatwaves.** In this case, it's mainly elderly people living alone or people with disabilities.

Numerous permanent measures throughout the summer

Throughout the summer, the first stage of our actions consists of **monitoring the weather** in the Paris region in order to anticipate hot weather.

The city runs a number of **awareness-raising operations**, aimed at informing the people of Paris - and particularly vulnerable people - about the best practices to adopt to protect themselves, the services available to them and the cool places where the people of Paris can find shade and escape from the heat. A **map of "cool islands"** is available on the paris.fr website and is updated regularly.

- There are almost 1,400 cool places where people can escape from the heat in Paris (and counting), including free municipal museums, air-conditioned rooms and the squares, gardens, parks and woodland areas managed by the City of Paris.
- 1,273 fountains installed for summer 2024 in the Paris region, including 173 misting fountains.
- 30 pools were open during the summer of 2024.
- 5 temporary pools are also available free of charge in July and August.
- More than 110 shade structures have been installed in green spaces and 11 in public spaces.
- 140 parks and gardens and the Petite Ceinture tunnel in the 13th arrondissement are open 24 hours a day.
- 90 misting fountains installed by the City of Paris in its green spaces (60 in 2023). There are also 3 new low-pressure misting areas: Parvis de Rosa Parks (19th arrondissement), Rue Emilio Castelar (12th arrondissement) and Place Ambroise Croizat (14th arrondissement).

In 2024, the City of Paris produced a **heat risk prevention information document for very young children**. This document is available on the paris.fr website and a number of family-friendly locations. The City of Paris also subsidises 14 parent and child centres that are open during the summer months and provide cool places where people can escape from the heat (air-conditioned or naturally cool areas).

All of these measures come into effect as soon as the green alert level (level 1) is reached.

Level 2 (yellow alert) corresponds to a **short heat peak or relatively high temperatures**, but not excessive.

Local social services and specialist facilities are constantly on the lookout for signs of heatstroke in vulnerable people. When the alert level reaches level 2, the Mayor of Paris can decide to launch certain pre-emptive actions for vulnerable people, including a telephone campaign to contact those listed in the city's "REFLEX" database (see below).

Increased mobilisation in the event of a heatwave alert

Level 3 “Heatwave alert” (orange alert) corresponds to an intense and prolonged heatwave that is likely to pose a health risk, especially to vulnerable or over-exposed people (the elderly, people with chronic diseases, young children, pregnant women, people living in poorly insulated buildings, people working outdoors, etc.).

→ Initiatives to help vulnerable people

Following the law passed on 30 June 2004 in response to the 2003 heatwave, the City of Paris created the **REFLEX database**[9] to ensure that people aged over 60 or with disabilities who so wish can be monitored and assisted in the event of a serious event.

In hot weather, these people are called regularly to identify any health problems, as well as any material or healthcare needs. Depending on their situation, people will be able to benefit from the advice of doctors or social workers, who may decide to activate certain services: home visits by City of Paris staff, the provision of a fan, social assistance, being transferred to a cooler place, etc.

→ Since 2023, the Fabrique de la Solidarité has been organising training for volunteers and outreach activities to encourage vulnerable people to be included in the REFLEX database.

→ Since 2023, information and registration documents for the REFLEX database have been written in FALC (Facile à Lire et à Comprendre - Easy to Read and Understand) to ensure that they are understood as many people as possible.

→ In 2024, the city extended the possibility of registering to people over 60 (previously 65) who are considered vulnerable.

[9] This database, formerly known as CHALEX, is the Paris version of the communal heatwave registers introduced by the French Law of 30 June 2004 on solidarity for the autonomy of elderly and disabled people in response to the heatwave of summer 2003. This law requires Town Halls to register elderly or disabled people who request it, in order to facilitate the intervention of health and social services with these vulnerable groups in the event of the “heatwave” alert and emergency plan being triggered.

→ Initiatives to help the people of Paris

In the event of a heatwave alert, the City of Paris offers several services open to the general public. It provides **17 air-conditioned areas** in 15 arrondissement Town Halls, and has identified the possibility of rapidly opening a further 12 in 2024 in municipal facilities equipped with air-conditioned facilities (senior citizens' clubs, conservatories, etc.) in the event of large crowds. Partnerships have also been established with the managers of private facilities to open additional **cool spaces** where people can escape from the heat (residential and nursing homes, hotel meeting rooms, etc.).

4 Paris museums offer free air-conditioned tours of their permanent collections.

For the duration of the heatwave alert, the City of Paris also plans to open **6 additional parks until midnight,** in addition to the 14 parks that are open under these conditions throughout the summer.

→ Initiatives to help homeless people

The City of Paris **outreach teams** are reinforced in the event of a heatwave to ensure vigilance and to help the homeless. At the same time, a number of day centres offer extended opening hours to provide a place for people to escape from the heat. **Eau de Paris** also provides social outreach services. **10,000 water bottles** will be distributed to homeless people in the event of a heatwave.

Paris adapts to extreme heatwaves

Level 4 "extreme heatwave alert" (red alert) corresponds to an exceptional heatwave, both in terms of duration and intensity, with collateral effects in various sectors (drought, risk of overcrowding in hospitals, risk of power cuts, ceasing of certain activities, etc.).

- → Some of the 12 public showers open in summer (3 by 2023) are open for longer, until 8 p.m.
- → Since 2023, the Fabrique de la Solidarité has developed several training initiatives open to volunteers from Paris and local solidarity players to strengthen actions to support homeless people during heatwaves.
- → The City of Paris publishes an information flyer for homeless people, distributed by social outreach workers and listing all the services available in the event of a heatwave, as well as drinking water supply points in public spaces. This flyer is now written in FALC (Facile à Lire et à Comprendre - Easy to Read and Understand) to ensure that it is understood by as many people as possible.

In terms of health, the red alert differs from the orange alert in that heatwaves can affect the whole population if health recommendations are not followed.

Level 4 would correspond to maximum mobilisation of public authorities, coordinated by the Prefect of Police. The City of Paris crisis unit would be activated to monitor and adapt its systems to the situation.

The City of Paris has never experienced an extreme heatwave, but is preparing for one. For example, the Paris at 50°C crisis exercise simulated an extreme heatwave and the implementation of exceptional measures. As a result of this exercise, the City of Paris is planning to reinforce its measures in the event of an extreme heatwave.

A number of activities in public spaces would be cancelled or held at different times. Measures aimed at the most vulnerable people or those living on the streets would be significantly expanded (e.g. by extending the working hours and outreach services of the Municipal Police and Prevention Department's Assistance Unit for the Homeless, and the possibility of transferring certain homeless people to cooler areas). Last but not least, the supply of cool spaces where people can escape from the heat would be significantly increased, whether in municipal facilities or in private buildings through partnerships (e.g. rooms in private residential and nursing homes, in hotels partnered with the City of Paris, or the requisitioning of municipal facilities such as certain multi-purpose halls with air-conditioned facilities).

Developing and expanding infrastructure adaptation measures (cool areas and revegetation)

Systems and practices for adapting to heatwaves are already in place, but the crisis exercise highlighted the importance of developing and expanding them, in particular by increasing the number of shade structures and misting systems in public spaces, and continuing the thermal renovation of buildings and the revegetation of the city.

Misting system installed as part of the annual "Paris Plage" summer programme

The “Paris adapts to climate change” strategy

Revegetation

Revegetation is the first step in adapting to heatwaves, as it provides double cooling through the phenomenon of evapotranspiration and the shade provided by trees. The City of Paris has set itself the target of clearing 100 hectares and planting 170,000 trees by the end of the mandate. The “Cours Oasis”, “Rues aux Écoles” and “Embellir votre quartier” programmes all contribute to this objective of reducing the amount of tarmac or similar surfaces and revegetation. In the context of climate change, the revegetation of the City of Paris raises questions about the water requirements of plants and how plant species will adapt to the future climate. The non-potable water network is an initial response to the watering issues in the streets around schools since the start of the programme.

Lighter pavement and road surfaces

The use of light-coloured pavements and road surfaces has a positive effect on reducing the urban heat island effect by reflecting a significant proportion of the sun’s energy without storing it. These surfaces therefore stay cooler and help to cool the city at night. During the day, however, they can make pedestrians feel even warmer, because they receive more sunlight. The use of light-coloured surfaces must therefore be carefully considered in relation to the intended use of the urban space.

The “Paris Adapts” programme plans to install around thirty white reflective roofs (known as “cool roofs”) by the end of the mandate. This will enable us to test the best configurations for using this solution in terms of the habitability of buildings and urban cooling.

Increased access to water

Access to drinking water is absolutely essential in hot weather. For a number of years now, the City of Paris has had a dense network of drinking fountains. Today, there are more than 1,200 drinking fountains, with over a hundred misting fountains installed by summer 2024. An additional network of summer misting fountains is also being installed in parks and gardens throughout the city.

More shade

In hot weather, shade is one of the most effective thermal comfort solutions for pedestrians, protecting them from the sun’s rays. The shade of trees is the most refreshing, but it’s not always possible to plant them in the city (underground cables, pipes, the metro, etc.). To alleviate this situation, Paris is planning to install street furniture that will provide shade in summer: shade structures. 11 experimental installations have been installed since 2022. More installations are planned for 2025.

A combination of solutions for new uses by the City of Paris

Urban heat is a complex physical phenomenon with several components (urban heat island, pedestrian experience, etc.) and requires a combination and planning of cooling solutions. Some of these solutions require new management and maintenance methods, especially for seasonal solutions (misting systems, shade structures, etc.). Adapting to heatwaves in the Paris region also means changing lifestyles and the way urban space is used: adapting working hours, seeking shade during the day, opening parks at night, etc.

Organising human resources and adapting working conditions to extreme heatwaves

Another area of work concerns **organising human resources to deal with crisis situations, particularly heatwaves**. This issue, which has already been raised by the thematic working groups, needs to be developed in greater depth, as it is both important and complex.

The City of Paris has already made **arrangements for its staff in the event of hot weather**. Each year, before the summer period, the Secretary General sends all departments general instructions on how to organise work in the event of hot weather, drawn up in conjunction with the drawn up in conjunction with the HRD's Occupational Risk Prevention Office.

These are general preventive measures to be implemented by management:

- Flexible working hours, including staggered starting and finishing times;
- Postponing the most strenuous tasks (either to another day or to a cooler time of day);
- Ensuring that staff have adequate breaks and increasing them where necessary;
- Avoiding working alone;
- Providing access to water.

These instructions are then implemented in each department by the departments responsible for occupational risk prevention:

- Specific equipment for personnel in public spaces: clothes adapted to the summer period, caps for the Department of Green Spaces and the Environment and the Municipal Police and Prevention Department, cool bags for the Real Estate, Logistics and Transport Department and the Department of Green Spaces and the Environment, water bottles for the Municipal Police and Prevention Department, air-conditioned vehicles for the Sanitation and Water Department, etc.
- Adapted working arrangements: an early start at 6 a.m. for some staff at the Department of Green Spaces and the Environment who work all day, the suspension of certain physical activities by the Municipal Police and Prevention Department (training in the DOJO, bicycle patrols, etc.), the organisation of patrols by the Municipal Police to encourage breaks in cool places where they can escape from the heat, etc.
- Providing air-conditioned rooms throughout the City of Paris. Some buildings are air-conditioned (e.g. the Bédier building on the Avenue de France). The teams are also equipped with fans.

Developing cooperation and consultation between the various players through a shared risk culture

A second area of work concerns the **development of a "risk culture"** through crisis exercises, involving citizens and developing it within organisations and institutions. The Paris at 50°C exercise demonstrated the value of training, coordinating and involving citizens in crisis exercises of this kind, which would be worth repeating. **Concerted action and cooperation between players are resilience factors.**

In addition to considering the issues to be addressed in future crisis exercises, it would be worthwhile to continue thinking about the method to be used. Large-scale exercises, whether tabletop or in the field, require considerable logistics and preparation, and provide an opportunity to work on coordination and perimeter management between the various players. On the other hand, more targeted, smaller-scale exercises enable us to focus on specific variables and explore them in greater depth.

Having a single geographic location for a full-scale exercise, with fewer different players, would allow us to explore and exploit the scenario storyline in its entirety. Finally, regular workshops or role-playing exercises can help players to better understand each other's problems and better prepare themselves for impacts that may affect all players. In fact, this format allows us to devote time to dialogue when needed, which is not possible with exercises that create a fictional bubble. Workshops and role-playing exercises are essential for working with the various players.

The Paris at 50°C exercise highlighted the need to consult and jointly develop the entire project with all of the players mobilised during the exercise, in order to generate support and develop scenario storylines that are as close as possible to the issues at stake for each player.

The exchange of expertise during the scenario development phase is essential in order to respond appropriately to the issues raised by the partners involved. Stakeholders have regularly expressed the wish to be more involved in the whole process, especially in the scenario development phase of the full-scale exercise.

A major point raised by both partners and the City departments in the feedback report is the need to increase the number of crisis exercises, in order to be better prepared for crises and to improve crisis management practices within organisations through regular training. A good understanding of each other's roles enables us to coordinate effectively and activate these collaborations and contacts quickly in the event of a crisis. The participants also appreciated the coordination structures put in place during the tabletop exercise, both by the Paris Police Headquarters and the City of Paris. They all stressed the importance of further developing these tools and forums for exchange between local stakeholders.

Simulated crisis room in the Maison 13 Solidaire, 13 October 2023

The feedback report unanimously stressed the importance of increasing the number of crisis exercises in order to develop more effective cooperation habits, in a format to be adapted.

It would be interesting to organise "mini exercises", focusing on a single variable, on a regular basis. In summary, different types of exercises could be carried out in the future for different risks (and not just heatwaves):

- major mobilising full-scale exercises and tabletop exercises to put a major issue on the agenda for the Paris region, raise awareness and mobilise all those involved: once a year;
- full-scale or tabletop exercises that are more limited in terms of subject, scope and the players involved (or even carried out entirely internally) in order to deepen the issues identified in the context of these major exercises, or internal studies and work: several times a year;
- regular role-playing exercises organised as workshops with all those involved to make collective progress in responding to specific risk situations: several per year.

Students from the École Providence primary school in the Petite Ceinture tunnel, converted into a classroom for the crisis exercise.

Promoting a risk culture by increasing public awareness and involvement in risk prevention and crisis management

→ Raising public awareness and develop appropriate behaviour in the event of a heatwave

Awareness-raising and information campaigns on heatwaves, their impact on health and the steps to be taken need to be developed by adapting communications for different audiences, both adults and schoolchildren. For example, the classes involved in the Paris at 50°C exercise benefited from a support and awareness-raising programme on various climate issues developed by the Climate Academy.

Another way to raise awareness is to encourage the sharing of simple, straightforward practices and adaptation and cooling solutions. In particular, the exercise highlighted a strong demand in schools for awareness-raising workshops for school staff on both the health impacts and the behaviours to be adopted, including advice on the correct use of blackout blinds or similar, how to cool students quickly in the event of heatstroke, the correct use of fans, and so on.

The Paris region has a wealth of resources and resilient infrastructures: whether in terms of the public services available in the area, the quality of its networks (electricity, drinking water, telecommunications, etc.), or its associations and citizens, the Paris region is undeniably a solid and resilient territory. The challenge highlighted by the exercise is to maintain these assets over time, particularly in the event of a prolonged heat dome.

→ Disseminating a risk culture among the general public

In addition to the issue of heatwaves, the exercise demonstrated the need to disseminate a risk culture among the general public, which requires the adoption of a collective dynamic and the direct involvement of citizens. While involving the public in crisis exercises helps to spread a risk culture, a number of precautions need to be taken. The exercise tested the role of citizens, who are at the forefront of preparing for, preventing and contributing to crisis management. This is part of a more general paradigm shift in the role and place of the citizen in the event of a crisis: from a vision of a passive citizen who needs to be rescued, to a vision of a citizen who plays an active role in risk prevention and crisis management. The exercise highlighted the central role of social ties and solidarity in the event of a crisis, for example: intergenerational support from secondary school students preparing a space to welcome the elderly, life-saving training to help people in case of fainting, etc.

The exercise highlighted several key success factors for mobilising participants in a crisis exercise: the use of tools to target different audiences in order to have “captive” participants or those who can be mobilised over time (schoolchildren, employees, local residents, etc.); identifying and multiplying the points of contact with citizen relays, and making this a long-term process; involving local residents throughout the entire project, particularly when developing the scenario; daring to give them a more prominent role

during the exercise, as participants showed great willingness to take on roles during the exercise.

When it comes to developing a risk culture, the press plays an important role in raising awareness. It contributes to the development of an educational and didactic approach to the dissemination of risk culture and issues related to heatwaves. The press reports compiled by the Communication Department show how the media can play a role in informing and educating people on these issues. They also explained the challenges and objectives of the exercise very well.

In other words, the process of developing a risk culture and resilience requires the involvement of a wide range of players, in many different ways, and not just the public authorities.

→ Strengthening local solidarity as a lever for resilience

Local solidarity is an essential lever of individual and collective resilience, as numerous sociological studies have shown. While these forms of solidarity can never be imposed from above, they can be encouraged by strengthening the bonds of understanding and conviviality between neighbours (neighbourhood parties, welcoming newcomers to the neighbourhood, etc.), fostering a sense of togetherness (neighbours helping neighbours, etc.), informing the general public about what they can do to help vulnerable people in a crisis situation, and providing training so that everyone is familiar with the right reflexes to protect themselves and those around them.

Students simulating food poisoning


CHEF D'INTERVENTION
CROIX-ROUGE FRANÇAISE
CROIX-ROUGE FRANÇAISE


PARIS
À 50°C
OBSERVATION

5. CONCLUSION

Organised as part of the review of the Paris Resilience Strategy and linked to the 2024-2030 Climate Action Plan, the Paris at 50°C exercise was a highlight for the City of Paris in 2023. It was an unprecedented and innovative crisis exercise in terms of its ambition and level of participation, and was a source of much learning, confirming the value of testing crisis situations in a practical way, involving both local players and residents. The City of Paris intends to organise similar exercises in the coming years.

Since this approach has attracted the interest of a large number of cities both in France and abroad, as well as a wide range of institutional players, the City of Paris has decided to share the resources, tools and lessons learned through a series of seminars and events, and also by distributing a methodology kit to help other cities to implement this type of exercise.

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VILLE DE
PARIS


PARIS
AT 50°C