

Proposal

HEAT PLAN

A strategy to reduce heat impacts
across Rome's neighbourhoods

ROMA

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across Rome's neighbourhoods

September 2026



ROMA





CONTENTS

FOREWORD

Roberto Gualtieri, Mayor of Roma Capitale

1

WHY A HEAT PLAN

pg. 8

2

WHERE WE ARE: ROME IS ALREADY TAKING ACTION

pg. 19

3

WHERE WE WANT TO GO: BUILDING A HEAT-RESILIENT CITY BY 2035

pg. 37

4

THE PLAN IN ACTION

pg. 42

5

THE CLIMATE SHELTER NETWORK

pg. 55

6

MONITORING AND IMPLEMENTATION

pg. 66

7

HEAT PLANS: INTERNATIONAL EXPERIENCES

pg. 75

GLOSSARY

pg. 90

BIBLIOGRAPHY

pg. 98





FOREWORD

Rome's climate has already changed.

Rising temperatures in our streets and homes are a measurable reality, not merely a matter of perception. Monitoring in recent years confirms a clear trend: heatwaves are becoming more frequent, with more days above 35°C and more tropical nights, when high night-time temperatures make it harder to recover from daytime heat. Cities therefore have a crucial role to play in adapting to extreme heat, reducing risks to people and limiting its impacts on the urban environment.

Roma Capitale's Climate Adaptation Strategy, approved on 14 January 2025, provides the framework for addressing these challenges. Drawing on an analysis of rising temperatures across the city, the Strategy identifies priority actions to reduce risks to people's health and the liveability of neighbourhoods. It also recognises the need to anticipate and prepare for impacts that are likely to intensify as greenhouse gas concentrations in the atmosphere continue to rise.

The Heat Plan of Roma Capitale sets out the priorities and measures needed to address these challenges and adapt the city's spaces to a changing climate - making them safer, more resilient and liveable for all.



Roberto Gualtieri
Mayor of Roma Capitale

We cannot remain inactive in the face of scenarios that risk undermining the functioning of essential infrastructure systems – water, energy, and transport – while disproportionately affecting the most vulnerable groups of the population.

Reducing urban heat is possible: in streets and squares that are currently paved, interventions such as depaving, tree planting, irrigation and shading can reduce perceived temperatures by more than 10°C.

We are the first city in Italy to present a comprehensive strategy to reduce the impacts of heat in its neighbourhoods.

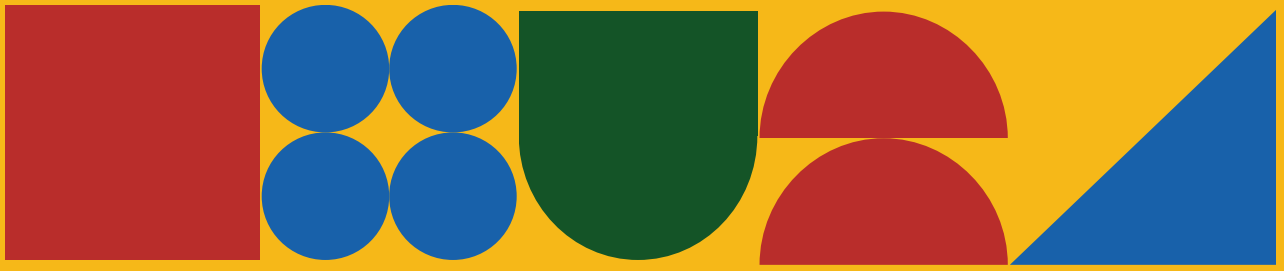
This is a cross-cutting effort involving different departments of the administration. It combines prevention and public awareness measures, support for vulnerable groups and neighbourhoods, scientific monitoring,

and interventions to redesign and cool public spaces, infrastructure and buildings, alongside the development of a network of climate shelters accessible during the hottest days.

Roma Capitale is already taking action to reduce the impact of heat across the city. Measures include stronger support for vulnerable residents and enhanced civil protection; a new approach to the redevelopment of squares and parks; an unprecedented urban forestry programme; extensive depaving of streets and public spaces; and stringent sustainability criteria introduced in the new Building Regulation of the city, in line with the Climate Adaptation Strategy and European directives.

But our ambition goes further. We are strengthening cooperation with cities around the world facing similar challenges, while expanding our partnerships with the scientific community. We also aim to engage the city's stakeholders in improving the Plan and make Rome a living laboratory for climate adaptation, urban liveability and safety.





1

WHY

a Heat Plan

Temperatures in Rome have already risen significantly in recent years. According to climate scenarios developed by the IPCC (Intergovernmental Panel on Climate Change), this trend is expected to continue in the coming decades, with heatwaves becoming more frequent and intense.

The European State of the Climate Report, published in 2026, confirms the scale of this trend: Europe is warming at around twice the global average, at a rate of 0.56°C per decade over the past 30 years, compared with 0.27°C globally.

In cities, rising temperatures are further amplified by the **urban heat island effect**, as asphalt, buildings and other urban surfaces absorb and store heat during the day and release it over the following hours, keeping temperatures high even at night. In Rome, this can result in air temperature differences of up to 5°C between densely built-up neighbourhoods and surrounding peri-urban agricultural areas. The effect is particularly pronounced at night in neighbourhoods with less green space, reducing thermal comfort in both public spaces and homes and affecting overall residents' quality of life.



MONITORING HEAT IMPACTS IN ROME

Prepared by Fondazione CMCC – Euro-Mediterranean Center on Climate Change



Long-term climate records show a clear rise in temperatures across Rome. **Recent years have been among the warmest on record, with 2022, 2024 and 2025 standing out in particular.** In 2024, the average daily temperature across the municipal area reached 19.7°C - the highest value ever recorded and 2.5°C above the 1991–2020 average. Temperatures have remained well above the long-term average in recent years, confirming a sustained warming trend.

The Dataclime climate monitoring platform, developed by CMCC (Euro-Mediterranean Center on Climate Change) for Roma Capitale, shows a marked increase since 2022 in all key heat indicators, including hot days, very hot days, tropical nights and very hot nights. Over the same period, no frost days - days with temperatures below 0°C - were recorded, providing further evidence of the shift in Rome's temperature patterns.

In 2025, temperatures were above the 1991–2020 climate average in almost every month. The largest anomaly occurred in June, when average temperatures were around 4°C above the reference average.

The following table compares selected climate indicators for recent years with the 1991–2020 average. These include average temperature; hot days (maximum temperature above 30°C); very hot days (above 35°C); tropical nights (minimum temperature above 20°C); very hot nights (above 25°C); and frost days (minimum temperature below 0°C). The data are drawn from the CMCC FAIR high-resolution dataset.

Indicators		1991–2020 average	2021	2022	2023	2024	2025
	ANNUAL AVERAGE TEMPERATURE (°C)	17,2	17,5 (+0,3)	18,6 (+1,4)	18,3 (+1,1)	19,7 (+2,5)	18,5 (+1,3)
	HOT DAYS (>30°C)	81	93 (+12)	112 (+31)	97 (+16)	90 (+9)	103 (+22)
	VERY HOT DAYS (>35°C)	25	29 (+4)	52 (+27)	35 (+10)	52 (+27)	41 (+16)
	TROPICAL NIGHTS (>20°C)	76	97 (+21)	107 (+31)	95 (+19)	92 (+16)	101 (+25)
	VERY HOT NIGHTS (>25°C)	7	10 (+3)	23 (+16)	20 (+13)	36 (+29)	18 (+11)
	FROST DAYS (<0°C)	8	5 (-3)	3 (-5)	5 (-3)	0 (-8)	0 (-8)

Table 1: Evolution of temperatures and climate extremes in Rome (CMCC elaboration)

Rising temperatures are reflected in increasingly frequent episodes of extreme heat, particularly during the summer months. In 2025, more than 41 Very Hot Days were recorded, the fourth-highest value since 1991, after 2003, 2022 and 2024. Notably, three of these four highest values have occurred since 2022.

Severe heat stress is also becoming more frequent, driven by the combined effects of high temperatures and humidity. During the summer months, perceived temperatures above 45°C are increasingly common. In 2024, 53 days of extreme heat stress were recorded - 29 more than the 1991–2020 average.



Epidemiological evidence shows that extreme heat poses a **significant health risk**, with hospital admissions and heat-related illnesses increasing during heatwaves and prolonged periods of high temperatures. The risk is greater when temperatures remain high overnight, making it harder to recover from daytime heat. In some neighbourhoods of Rome, heatwaves are associated with higher hospitalisation rates, particularly in areas with older populations, greater social vulnerability and limited access to cooling at home.

Heatwaves increase **health risks for people working outdoors** and can make it more difficult to move around and use public spaces, **affecting the liveability of the city and outdoor economic activities**.

Heatwaves also place **pressure on essential urban infrastructure**. Increased demand for cooling puts additional strain on the energy system, while extreme temperatures can increase the risk of power outages and disrupt communication networks, tram and metro services, and emergency services.

Heat also **affects vegetation and biodiversity**, potentially altering natural ecosystems and their capacity to adapt to a changing climate. Prolonged heat and drought can place trees under water stress, increase tree mortality and contribute to wildfire risk.



IMPACTS OF HEATWAVES



HEALTH AND WELL-BEING

- Heat-related illnesses and hospital admissions
- Increased mortality and morbidity
- Difficulty recovering during the night
- Higher risks for older people and vulnerable groups

URBAN LIVEABILITY & QUALITY OF LIFE

- Reduced comfort in public spaces
- Deterioration of indoor comfort
- Limited use of outdoor spaces
- Reduced daily well-being in the most exposed neighbourhoods



INFRASTRUCTURE & ESSENTIAL SERVICES



- Power outages
- Service disruptions
- Transport disruptions
- Communication failures
- Water resource stress

ECONOMY, EMPLOYMENT & TOURISM

- Risks for outdoor workers
- Reduced productivity
- Lower tourism attractiveness
- Economic impacts for the city



URBAN ECOSYSTEMS & BIODIVERSITY

- Vegetation water stress
- Increased tree mortality
- Higher wildfire risk
- Ecosystem disruption

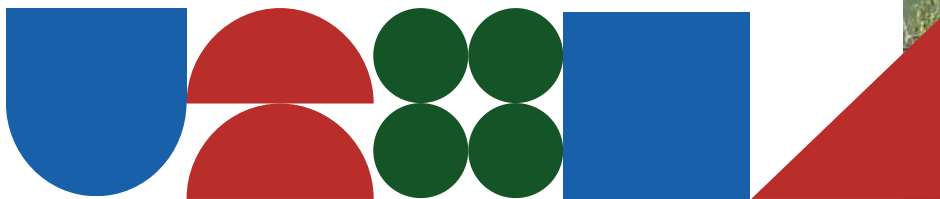
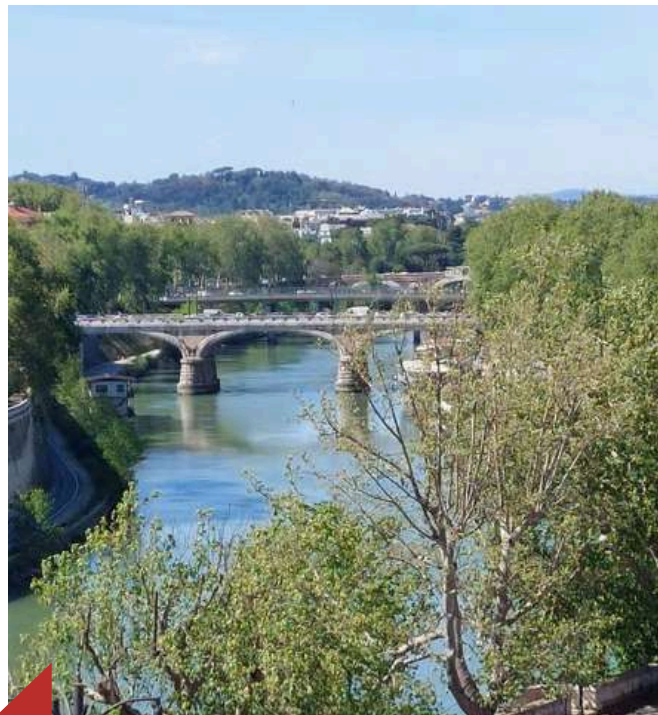


Heat does not affect all neighbourhoods and residents in the same way. Exposure and vulnerability to extreme heat are shaped by a combination of factors, including age, gender and health, as well as where people live, their occupation, socioeconomic conditions and the support available within their communities. Low-income households are particularly vulnerable, especially when poor insulation and lack of cooling make it difficult to keep homes at safe temperatures. The term “**cooling poverty**” describes this lack of access to adequate and affordable ways of keeping indoor spaces cool.

Rome therefore needs to prepare for increasingly severe heat while ensuring that adaptation measures respond to these inequalities. This means providing access to the information, services and support people need during the hottest days, while targeting interventions where exposure and vulnerability are greatest - from adapting buildings and public spaces to creating a network of cool, accessible places where people can find relief from extreme heat. It also requires close collaboration with the scientific community to monitor how heat and its impacts are changing, and to continuously improve the city's response.

Rome's first Heat Action Plan sets out a coordinated response to more frequent and severe heatwaves. Alongside measures to protect people during periods of extreme heat, it introduces longer-term action to adapt public spaces, infrastructure and services, with a particular focus on the neighbourhoods and population groups most at risk.

The Plan sets a clear direction: it defines goals and measures and calls for a collective response to an urgent challenge. It marks the beginning of a longer-term process involving institutions, residents, the scientific community, and economic and social actors, with measures that can evolve as heat risks and conditions change over time.





EVIDENCE ON THE HEALTH IMPACTS OF HEAT

Prepared by the Department of Epidemiology SSR – DEP Lazio

DEP Lazio
Dipartimento di Epidemiologia SSR



SERVIZIO SANITARIO REGIONALE

**ASL
ROMA 1**



**REGIONE
LAZIO**

High temperatures and heatwaves pose a risk to human health. Specifically, health risk depends not only on temperature but also on humidity levels and the duration of the heat event. This risk leads to a spectrum of health effects, ranging from symptoms that do not require or reach clinical attention, such as reduced attention levels, to more severe symptoms that may lead to hospitalisation or death (WHO, 2021; Kriit et al., 2026). Effects occur in the short term, usually within 1–3 days from the temperature peak. It is possible to identify effects directly related to heat, caused by exceeding the physiological capacity for thermoregulation and fluid loss, and effects indirectly related to heat, resulting from worsening health conditions in vulnerable population subgroups, which increase the risk of hospitalisation and short-term mortality (Ebi et al., 2023). The occurrence of these effects can be quantified through epidemiological studies on heatwave episodes and time series analyses. Italy, located in the Mediterranean basin, is particularly exposed to heat and climate change. Epidemiological studies highlight a significant impact of heat and heatwaves among Italian cities (Gasparrini et al., 2015; Di Blasi et al., 2023). A national study estimated that approximately 2.3% of total annual deaths are attributable to heat (Stafoggia et al., 2023).

High temperatures and heatwaves are associated with increased mortality, hospital admissions and emergency visits, mainly due to acute cardiovascular and respiratory effects and the worsening of pre-existing chronic conditions.

Epidemiological studies underline a causal association between heat and specific health conditions, particularly heat-related diseases (cardiovascular, respiratory, neurological and mental disorders, diabetes, and kidney diseases) (Di Blasi et al., 2023). Adverse health effects have also been observed among the elderly, young children, pregnant women, outdoor workers and those exposed to high indoor temperatures (WHO, 2021; Ministry of Health, Heat and Health Guidelines). Living in deprived or particularly hot neighbourhoods, with limited access to green space, as well as inadequate housing and social isolation, can all increase vulnerability to heat, amplifying risks for both individuals and communities.

Defining heat-prevention plans that involve collaboration between local authorities, health and social services, and emergency services is therefore essential to improve adaptation and reduce the health impacts on the population (WHO, 2026; Ministry of Health, Heat and Health Guidelines).

Mapping Heat Vulnerability by Urban Zone in Rome

Mapping heat risk across Rome's neighbourhoods helps target adaptation measures where they are most needed. Drawing on existing research and the IPCC climate risk framework (IPCC, 2022), heat risk is understood as the interaction between three factors: vulnerability (V), population exposure (E) and hazard (H) (Figure 1).

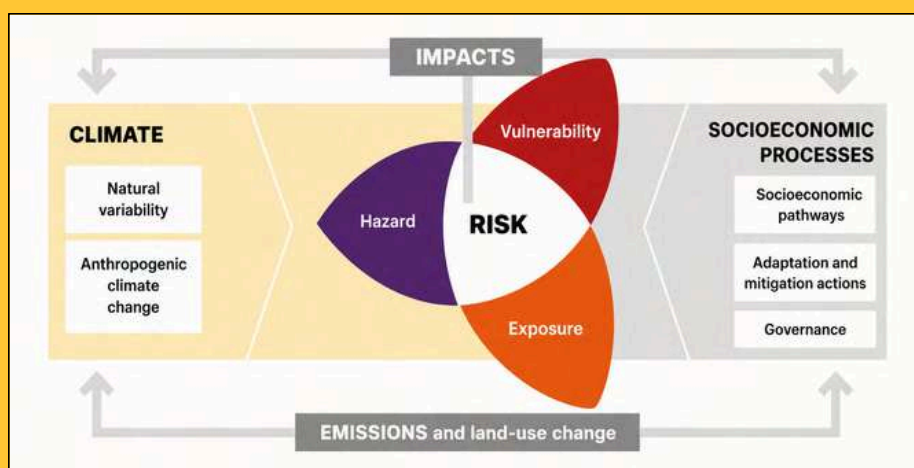


Figure 1. IPCC Framework for the Analysis of Risk from Extreme Climate Event Impacts

The heat risk indicator for Rome was developed at the Urban Zone (ZUR) scale by integrating four dimensions: hazard, exposure, vulnerability, and adaptive capacity. **Hazard** is characterised by mean summer temperature (May–September) and its standard deviation, derived from DEPLAZIO temperature data at 1×1 km resolution. **Exposure** is represented by the proportion of residents aged 75 years and over (ISTAT, 2021 Census). **Vulnerability** combines socio-economic determinants (low educational attainment, share of foreign residents, and a composite deprivation index; Badaloni, Caranci et al., 2025) with health-related determinants, namely the prevalence of conditions associated with increased heat sensitivity. **Adaptive capacity** is captured through the availability of urban green spaces, as a proxy for heat mitigation, and the distribution of healthcare facilities, as an indicator of local response capacity. The resulting composite indicator identifies the highest levels of heat risk in the eastern sector of the city, particularly in Municipalities IV, V, and VIII (Figure 2).

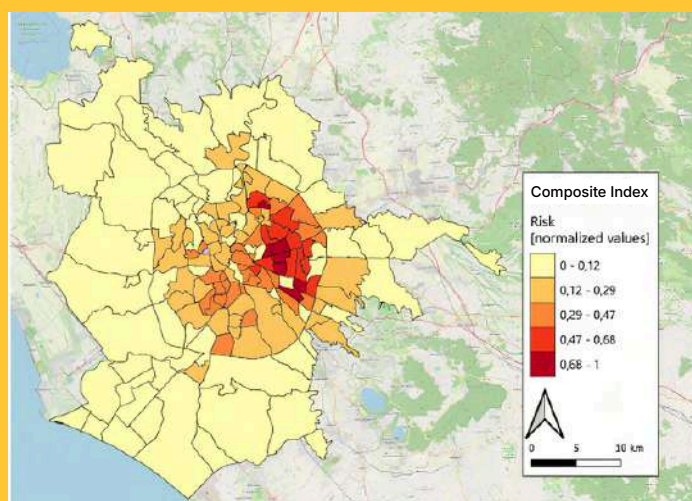


Figure 2. Heat Risk Index by Urban Zones in the Municipality of Rome

Rapid mortality surveillance makes it possible to track mortality trends in near-real time during the summer. Comparing observed deaths with expected levels provides an estimate of heat-related excess mortality. Despite high summer temperatures, no excess mortality has been recorded in Rome in the past three years. In 2022, however, 995 additional deaths were recorded between May and September, corresponding to 14% excess mortality. In 2023, 2024 and 2025, observed mortality remained in line with expected levels (0% excess mortality).

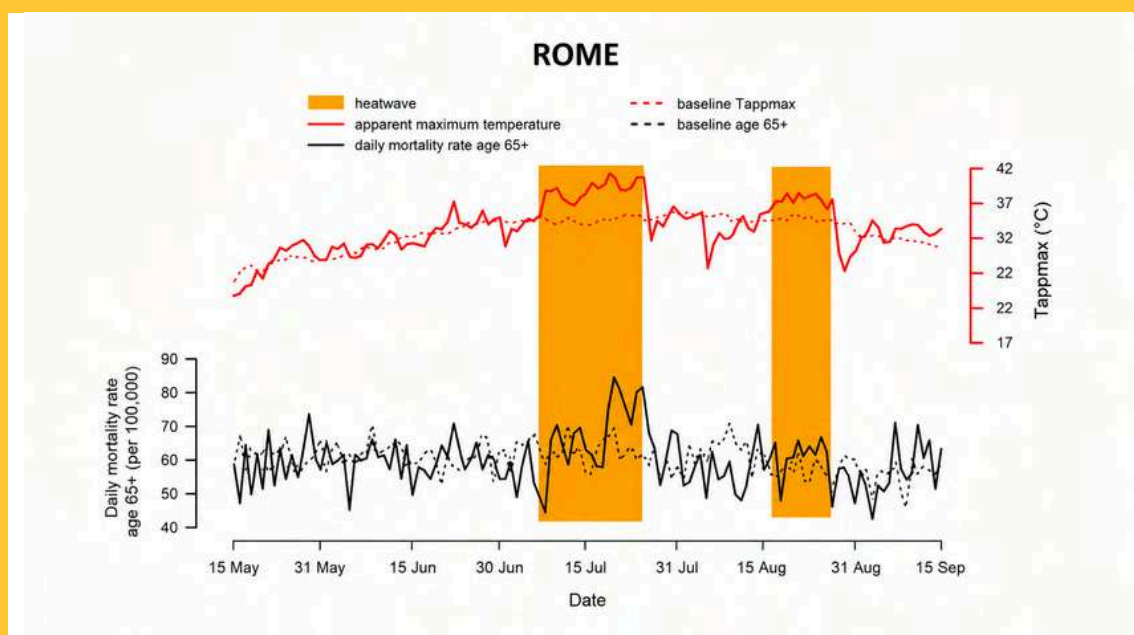


Figure 3. Rome. Daily trends of observed and expected deaths in the 65+ age group and of maximum apparent temperature during the period 20 May – 20 September 2025.

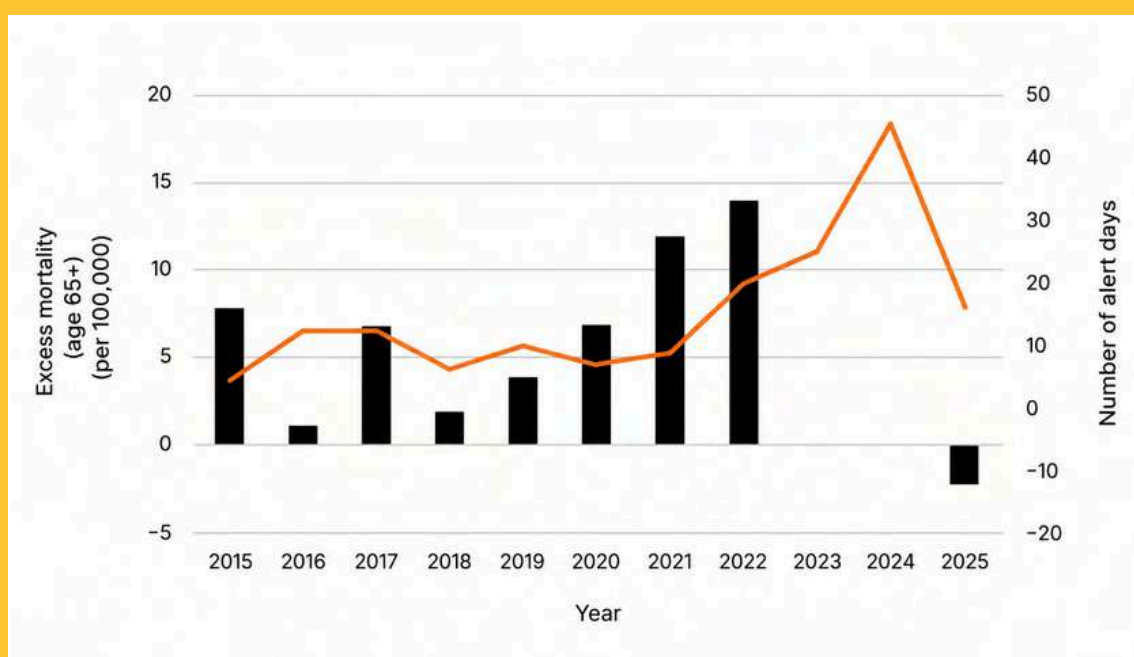
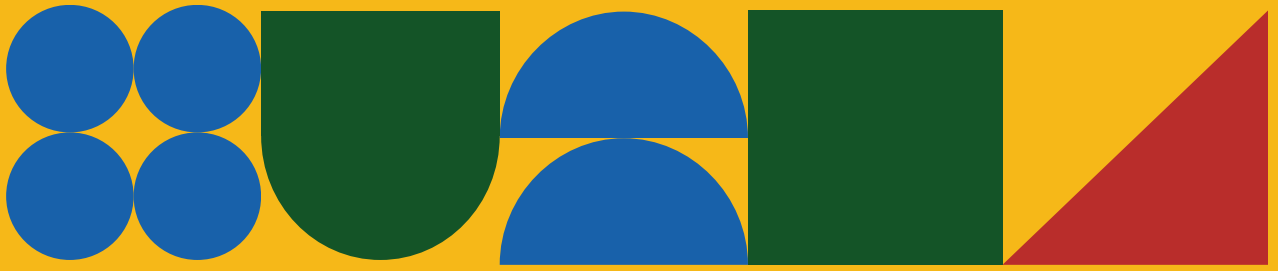


Figure 4. Excess mortality in the 65+ population (black bars) and number of HHWWS level 2 and 3 alert days (orange line).



2

WHERE WE ARE

Rome is already
taking action



Rome is already implementing a wide range of measures to address the growing impacts of climate change, particularly those linked to rising temperatures.

Different departments across the administration are already implementing measures ranging from climate monitoring and adaptation planning to support for vulnerable people and the adaptation of public spaces to reduce heat-related health risks and improve urban liveability.

On 14 January 2025, the City Council approved **Rome's first Climate Adaptation Strategy**. The Strategy sets out priorities, objectives and measures to prepare the city for the increasingly frequent and severe impacts of climate change and strengthen its resilience to future risks. Developed with the support of a broad network of scientific and research institutions, the Strategy draws on an assessment of current climate impacts and risks, meteorological and climate data, and future climate scenarios. It identifies four key priorities for action, including adapting neighbourhoods to rising temperatures and reducing heat-related health risks.

Heat exposure is already a major concern in Rome: recent assessments combining environmental and social vulnerability show that **around 9% of residents live in neighbourhoods particularly vulnerable to prolonged heatwaves.**

Support services for vulnerable groups are essential in a city experiencing increasingly high temperatures. In recent years, the Department of Social Policies and Health has implemented and strengthened various actions and services to reduce the impact of heat on people living on the streets, those suffering from physical or mental health issues, and those living in isolation who are particularly vulnerable to extreme temperatures.

Day services have expanded their capacity, providing people experiencing homelessness with access to safe and cool indoor spaces. These facilities offer showers, changing areas, light refreshments and support in accessing essential services and social inclusion pathways. Services can be accessed directly, through referrals from the Central Operations Room — available 24/7 via the toll-free number 800 440 022 — or with the support of street outreach teams. During periods of extreme heat, outreach teams also provide direct assistance to those living on the streets, helping them find shaded areas and stay adequately hydrated.

Another service for homeless individuals is provided by the **nine “Stazioni di Posta”**: multifunctional centres located in properties owned by Roma Capitale and managed by Third Sector organizations. These centres offer cooled spaces and immediate support to people in social distress, providing basic services such as showers, meals, and healthcare in close collaboration with local social and health services. Access to these centers is the same as for day services.

In addition to the regular network managed by the Social Operations Room, **four air-conditioned tents** provide 24-hour support for people experiencing homelessness during periods of extreme heat. The tents are located



PROTECTING VULNERABLE PEOPLE

Day service centres
Multifunctional support centres
24/7 cooled temporary structures near stations
Street outreach units
Social services helpline
Home assistance for socially isolated people
Farmacap health screenings
Free swimming pool access for people over 70
Blue Points by the Sea
Summer programmes for children
Ferragosto Lunch for older people



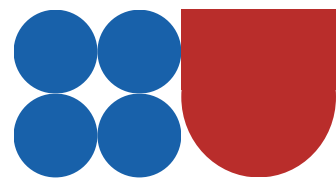
near the city's main railway stations - Termini, Tiburtina and Ostiense - and San Camillo Hospital.

Support during periods of extreme heat also extends to people living alone and with limited support networks. A dedicated service provides daily home-delivered meals and assistance from trained professionals to people experiencing severe social vulnerability and mental health issues. Beyond providing practical support, the service enables regular monitoring of health conditions and helps prevent extreme loneliness. During periods of extreme heat, it also helps ensure that homes are adequately cooled and that vulnerable residents have access to essential water and electricity supplies.

Furthermore, the Department of Social Policies, in collaboration with the Municipalities, funds a range of services for older people and children. During the summer period, **Farmacap**, the company managing municipal pharmacies, provides **free health screenings** (ECG, blood pressure, blood glucose, and cholesterol checks). A dedicated helpline is available to access these services at 800957774. For people over 70, **5.000 free admissions are made available to 18 municipal swimming pools** (up to five admissions per person). In addition, each Municipality organises “**Blue Points by the Sea**”, consisting of free daily beach stays including transport, umbrella and sunbed, and lunch. For children and young people, **summer camps** organised by the Municipalities are funded, together with day trips to Castel Gandolfo. Every year, the traditional ‘**Ferragosto Lunch**’ is organised across all Municipalities, involving more than 3.000 people.

Additional health prevention measures are also planned during summer, including the **Health Days dedicated to older people** at Farmacap facilities, carried out through **mobile medical units**. At these locations, it is possible to measure vital parameters:

- Blood pressure measurement
- Blood glucose testing
- Total cholesterol measurement
- Electrocardiogram (ECG) interpreted through telemedicine
- Cardiac function assessment
- Administration of the Mini-Mental State Examination (MMSE) to assess cognitive impairment and detect potential cognitive decline



Roma Capitale also collaborates with “**Viva gli Anziani!**” programme run by Comunità Sant'Egidio. Active since 2004 and now operating in several neighbourhoods, the programme supports people over 80, with a particular focus on preventing social isolation and reducing the health impacts of events such as heatwaves, epidemics, falls or the loss of a partner. These events can significantly increase the risk of mortality and the need for care. The programme is based on active monitoring, enabling services to proactively reach and support large numbers of older people.

During the summer, the Programme steps up its monitoring activities to prevent heat-related risks, with phone calls, home visits and targeted support reaching more than 8,000 older people across Rome.

Additional preventive measures are also introduced across residential services managed by Roma Capitale, including nursing homes, cohousing facilities, residential communities and small apartments. These include social and recreational activities as well as opportunities for residents to spend periods outside the city during the summer.



The Civil Protection Department of Roma Capitale is the operational reference point for heat and fire-related risk prevention and response. Through its **Operational Coordination Centre (SCIO)**, it provides support for reports and intervention requests, which can be submitted by calling the free number 800 854 854 or 06 67109200.

At the beginning of the summer season, a **Mayor's ordinance sets out measures to prevent wildfires and reduce heat-related risks**. From 1 June to 30 October 2026, activities that could start a fire are prohibited in wooded, agricultural and uncultivated areas across Rome. The ordinance also prohibits open fires, the use of explosives and the launching of rockets, and requires vegetation near buildings to be properly maintained. Green areas must be kept free of flammable materials and excessive vegetation, while private properties larger than 5,000 square metres must have protective buffer strips at least 10 metres wide along their boundaries. Management authorities for parks and protected areas may introduce additional or more stringent requirements.

The ordinance also addresses **heatwave risks and their impacts on outdoor work**, establishing specific measures aimed at reducing the effects of high temperatures on days classified by the Ministry of Health as Level 3 (Heatwave). During the hottest hours (between 12:30 and 16:00) employers - including public service providers - are required to take specific measures to protect workers from heat exposure at construction sites and in the agricultural, construction, logistics and delivery sectors. On days classified as high risk according to the [Worklimate heat-risk map](#), employers must provide appropriate protective measures, including breaks in shaded or cooled areas and, where necessary, ventilation or misting systems. These requirements are set out in the Regional Ordinance on the protection of workers' health and safety.



PREVENTING AND MANAGING EMERGENCIES

Operational Coordination Centre
Summer Fire Prevention Plan
Heatwave Ordinance
Alert and Reporting System
Measures for Outdoor Workers
Procedures for High-Risk Days
Coordination of Emergency Response



Furthermore, Italy has had a **National Operational Plan for the Prevention of Heat-related Health Effects** since 2005. Coordinated by the Department of Epidemiology of Lazio (DEP Lazio), it provides the national framework for the development and implementation of heat-health prevention programmes at regional and local level. Within this framework, the Lazio Region develops a **Regional Operational Plan** for heatwave prevention, coordinating action by Local Health Authorities (ASLs) and involving local healthcare and social services in collaboration with local authorities. Measures are tailored to different levels of heat risk and focus particularly on the most vulnerable groups.

Heat-health prevention activities at national, regional, and local levels include:

CITY-SPECIFIC HEAT-HEALTH WARNING SYSTEM (HHWWS)

The system is based on the relationship between temperature and mortality and triggers prevention measures according to the expected level of risk. It operates from mid-May to mid-September, providing daily forecasts of heat-related health risks for the following three days. Bulletins for Rome and other cities are published on the the Ministry's dedicated web portal, while those for the Lazio Region are available on the DEPLAZIO website. The bulletins are sent daily to Local Health Authorities (ASLs), Civil Protection, and the Municipal Department for Social Services, which activate local information networks to ensure a widespread dissemination of the warnings.

“CALDO E SALUTE” (HEAT & HEALTH) APP

Available online for Android devices through Google Play, the app supports the dissemination of information and facilitate access to heat-health warning bulletins and information on services available across the territory. It also seeks to raise awareness among the most vulnerable groups about heat-related risks and the measures to be adopted during heatwaves.

MONITORING HEAT-RELATED MORTALITY AND EMERGENCY DEPARTMENT VISITS

Rome is one of the cities covered by the national surveillance system monitoring the health impacts of heatwaves. The Rapid Daily Mortality Surveillance System (SiSMG) collects mortality data from the Civil Registry Offices of participating cities, allowing mortality peaks associated with heatwaves to be identified rapidly. The results are published in weekly bulletins, with aggregated data for Northern and Central-Southern Italy, while monthly data are available at city level through the Ministry of Health portal.

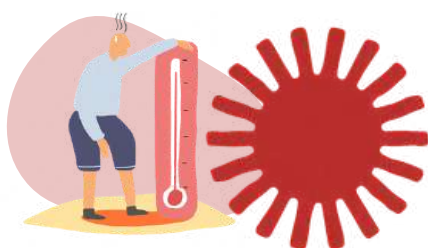
INFORMATION RESOURCES ON HEAT-RELATED RISKS AND PREVENTION MEASURES

Training materials for healthcare professionals and public information resources are available on the Ministry's portal, together with guidelines on protection from extreme heat. The portal also provides brochures and FAQs tailored to different vulnerable groups, with practical advice on preventing heat-related health effects, including hydration, appropriate clothing, keeping homes cool and nutrition.

PUBLIC HELPLINE 1500

From 22 June to 10 September, the Ministry of Health's 1500 helpline is active, providing citizens with information on how to protect themselves from heat, particularly those who are more vulnerable and at higher risk.

HEATWAVE ALERT LEVELS FOR THE PREVENTION OF HEALTH IMPACTS ON THE POPULATION – NATIONAL CIVIL PROTECTION DEPARTMENT



LEVEL 3

Heatwave. High-risk conditions persisting for 3 or more consecutive days.

Alert issued to health and social services.



LEVEL 2

High temperatures and weather conditions that may have adverse effects on population health, particularly among vulnerable population subgroups.

Alert issued to health and social services.



LEVEL 1

Weather conditions that may lead to a Level 2 alert.

Pre-alert for health and social services.



LEVEL 0

Weather conditions with no significant risk to population health.

ROME'S RESPONSE TO HEAT: USEFUL RESOURCES FOR CITIZENS



SOCIAL SERVICES HELPLINE

 **800 440 022**

- Available 24 hours a day, 7 days a week
- Support for vulnerable people and people experiencing homelessness
- Access to day services and multifunctional support centres

ROME CIVIL PROTECTION

 **800 854 854 - 06 67109200**

- Heat-related emergencies
- Wildfires
- Reports and requests for assistance



FREE HEALTH SCREENINGS

 **800 957 774** **FARMACAP** 

- ECG
- Blood pressure
- Blood glucose
- Cholesterol

MINISTRY OF HEALTH

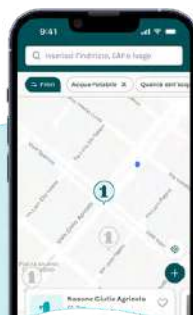
 **1500**

- National information helpline on heatwaves: active from 22 June to 10 September
- Advice and information for citizens and vulnerable groups



"CALDO E SALUTE" APP

- Receive heat-health bulletins
- Check alert levels
- Find information on available services



"ACQUEA" APP

- Find public water fountains, water houses and free drinking water points
- Available in 3 languages

Parks, green spaces and trees play a key role in reducing urban heat by providing shade and cooling. Since 2022, interventions by the Environment Department and Rome's Municipalities have resulted in **more than 67,000 new trees being planted across the city**. Taking into account removals and losses caused by extreme weather events, this represents a **net increase of 38,000 trees** in the city's urban tree stock.

Today, Rome's public spaces are home to more than 390,000 trees, including 125,000 street trees. The city's trees are mapped through the Greenspaces digital platform, which supports their monitoring, management and replacement where necessary, particularly as climate change places increasing pressure on tree health. Climate vulnerability assessments carried out as part of the Adaptation Strategy have also helped identify priority areas for new planting and urban forestry, directing interventions particularly towards Rome's eastern and southern districts, where the need for action is greatest.

Beyond increasing tree cover, Rome is also expanding access to green space. Since 2021, **publicly accessible green areas have grown by 187 hectares (+4.56%)**, through new parks and neighbourhood green spaces, as well as new riverfront parks along the Tiber. Five riverfront parks have already been completed, reconnecting the city with the river while offering cooler spaces during periods of high temperatures. This expansion is part of a broader programme to create **100 new parks across Rome, with 16 projects already underway with an overall investment of €80 million**. Together with the enhancement of the city's historic villas and gardens, these interventions aim to strengthen Rome's network of accessible green spaces and its wider ecological network.



COOLING THE CITY

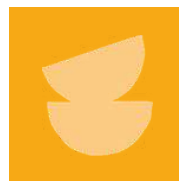
Urban forestry
Planting trees and shrubs
Expansion of green areas
New urban parks
Riverfront parks along the Tiber
Regeneration of historic villas
Interventions in vulnerable neighbourhoods



In neighbourhoods, streets and public squares where people gather and spend time, **depaving and environmental regeneration measures can help reduce the urban heat island effect and improve outdoor comfort**. Since 2024, the Public Works and Environment Departments have implemented **more than 40 projects across Rome**, removing asphalt and other impermeable surfaces and restoring the natural permeability of the ground.

These interventions have transformed **44,501 square metres of impermeable surfaces into permeable ground, while also introducing trees, shrubs and grassed areas**. Across squares, parks and other public spaces, asphalt has been replaced with lighter-coloured, permeable and water-draining materials, helping reduce heat build-up, improve rainwater infiltration and support groundwater recharge. The same approach is being applied to many projects currently under development, progressively extending the use of these materials and solutions across the city.

On 12 May 2026, the Capitoline Assembly approved amendments to **Roma Capitale's Building Regulation**, introducing climate adaptation requirements and measures to reduce the urban heat island effect in private building projects. The revised regulations set mandatory minimum standards for soil permeability, water recovery and reuse, green infrastructure and shading systems, as well as the solar reflectance of roofing and paving materials. They also provide **incentives for green roofs and Nature-Based Solutions (NBS) that go beyond these minimum requirements**, encouraging more ambitious climate adaptation measures in private developments.



TRANSFORMING SPACES & BUILDINGS

Depaving
Permeable surfaces and rain gardens
Cool and reflective materials
Regeneration of squares and streets
New Building Regulation
Green roofs
Nature-Based Solutions
Urban shading
Water recovery and reuse



To support and guide this shift towards more climate-responsive public spaces, the Climate Office of Roma Capitale, with scientific support from Sapienza University of Rome, has developed a **Cool Pavements Atlas**. The Atlas provides practical guidance for the maintenance and regeneration of streets, squares, parks and other public spaces, supporting the use of materials and solutions that can reduce heat exposure and improve outdoor comfort. It includes technical fact sheets on different types of paving, with performance data, references to the Italian Minimum Environmental Criteria (Criteri Ambientali Minimi – CAM), examples of applications and information on how different materials perform under high temperatures. The Atlas highlights innovative solutions, including those already tested in Rome, to improve microclimatic comfort in public spaces during periods of extreme heat.



Rome's **network of public drinking fountains** provides an important source of drinking water during periods of extreme heat, particularly for vulnerable residents and people experiencing homelessness. The network continues to expand and **currently includes 3,294 of the city's iconic drinking fountains ('nasoni')** and **59 public water houses**, providing free access to drinking water across Rome. The **"Acquea" app**, available in three languages, helps residents and visitors locate the nearest drinking water point.

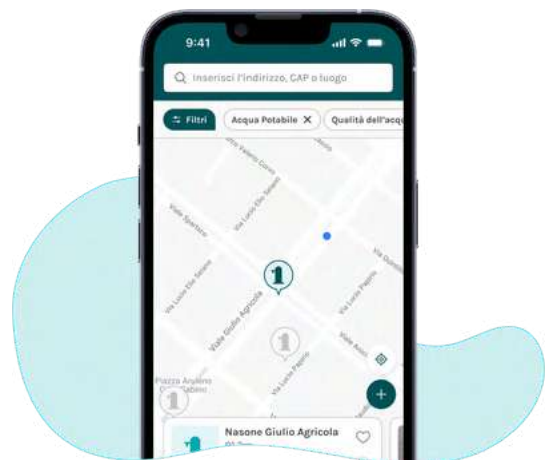
Water also plays an important role in protecting Rome's green spaces from rising temperatures. As heat stress places increasing pressure on vegetation and irrigation needs, **the city is exploring new ways to recover, manage and reuse water, particularly for trees and parks in residential areas and the hottest areas of Rome.** ACEA has launched a study to assess the potential reuse of treated wastewater from Rome's treatment plants and identify the first projects to be developed. In parallel, the Environment Department has signed an agreement with ISPRA to monitor wells located in Roma Capitale's green areas and has funded works to restore and upgrade them for irrigation in existing parks and new parks included in the "100 Parchi per Roma" programme. Other projects are recovering and reusing water from public fountains to irrigate parks and urban gardens, including through water storage tanks and shaded pergolas.

Beyond interventions in public and green spaces, measures are also being introduced to improve indoor comfort in public buildings. In 2025, **heat pumps were installed in 87 school buildings, with an investment of €1.5 million**, focusing on early childhood education facilities and nurseries that remain open throughout June and July. The intervention helps maintain more comfortable indoor temperatures during periods of extreme heat.



ENSURING RESILIENT SERVICES AND INFRASTRUCTURE

Cooling measures in schools & nurseries
Cooling measures in elderly care centres
Network of "nasoni" and water houses
"Acquea" app
Electricity grid resilience plan
Bus stop shelters
Street washing
Strengthening of essential services



Similar measures are being extended to **senior centres**, with work underway to improve cooling across the network. **123 facilities** are already equipped with cooling systems, while 12 additional centres are scheduled to receive heat pumps in 2027 through dedicated funding.

Rising demand for cooling also places increasing pressure on the electricity grid, particularly during periods of extreme heat, when the risk of power outages can increase. ARETI, the company responsible for Rome's electricity distribution network, is investing in **greater system resilience through monitoring and digitalisation**, as well as the **replacement and upgrading of network components**. Measures are also being introduced to reduce response times in the event of failures, including the use of backup generators and additional operational teams.

Adaptation also extends to the city's public transport infrastructure. A programme to install **475 new bus shelters** is underway, providing protection from both sun and rain. Of these, 413 have already been installed across central and outer districts, with the largest share located in the city's outskirts. The new shelters provide shade and protection from heavy rain, improving passenger comfort and reducing exposure to direct sunlight during periods of extreme heat.

Measures to cool streets and public spaces are also being strengthened. Between January and May 2026, AMA cleaned more than 13,260 km of streets each month using street washers, water tankers and sweepers equipped with water-spraying systems. To support these operations, 10 new water tankers have been purchased. Regular washing and sanitisation of waste containers at street collection points also continues. During the summer, these activities are intensified in the hottest neighbourhoods, based on data collected by AMA's Ucronia digital operations centre and sensors installed on service vehicles.



Climate monitoring provides the evidence needed to understand how heat risks are evolving and guide adaptation measures. With technical and scientific support from the Euro-Mediterranean Center on Climate Change (CMCC Foundation), Roma Capitale has developed DATACLIME, a climate monitoring platform based on indicators aligned with Rome's Climate Adaptation Strategy and the National Climate Change Adaptation Plan (PNACC). The platform tracks climate trends, helps build a detailed climate profile for Rome, and supports the identification of adaptation measures that need to be introduced or strengthened.

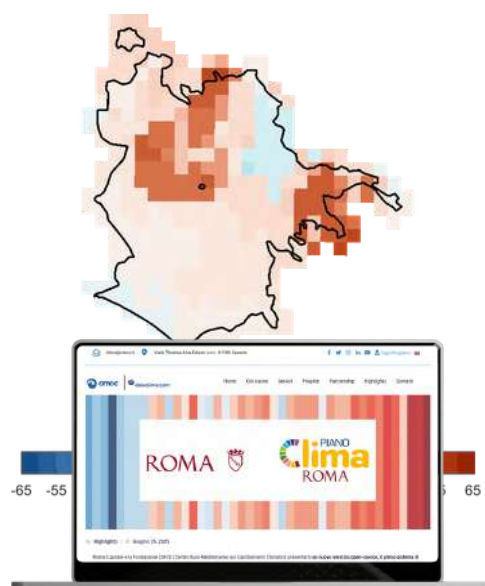
Furthermore, the collaboration between Roma Capitale, ISAC-CNR, and ATAC has enabled the development of a mobile microclimate monitoring system, **MeteoTracker**, based on a network of sensors capable of mapping temperature variations across the city. The pilot project, launched in August 2024, involved the installation of a patented multi-sensor weather device designed for mobile applications (MeteoTracker) on the roofs of 20 buses. Data are georeferenced and transmitted to the cloud in real time, where they can be visualised through an interactive map. Research carried out by ISAC-CNR is enabling the identification of urban areas particularly exposed to the urban heat island effect, by mapping and quantifying thermal anomalies and highlighting the cooling benefits provided by trees and urban parks.

Roma Capitale is also **strengthening cooperation with cities around the world facing similar challenges**. In November 2025, it joined the **C40 Cities “Cool Cities Accelerator”**, which brings cities together to share approaches and commitments to tackle extreme urban heat.



ASSESSING AND MONITORING

Climate Adaptation Strategy
Climate and social vulnerability assessments
DATACLIME – climate monitoring platform
MeteoTracker on ATAC buses
Urban heat island mapping
Collaboration with universities and research centres



The programme promotes the sharing of targets, commitments and best practices to reduce the impacts of extreme heat in urban areas. Through the EU's Technical Support Instrument (TSI), Roma Capitale has been supported in assessing the urban heat island effect in **Centocelle and the Historic Centre**. The work resulted in intervention guidelines developed by ENEA and project proposals for selected areas, which are now being further developed in cooperation with the relevant Municipalities.

In parallel, funding from the European Commission's Horizon programme will support a climate adaptation and urban regeneration project in **Largo Perestrello, Tor Pignattara**, an area particularly exposed to the impacts of extreme heat.



CLIMATE CHANGE: KEY ADAPTATION ACTIONS UNDERWAY IN ROMA CAPITALE

PROTECTING VULNERABLE PEOPLE

Day service centres
Multifunctional support centres
24/7 cooled temporary structures near stations
Street outreach units
Social services helpline
Home assistance for socially isolated people
Farmacap health screenings
Free swimming pool access for people over 70
Blue Points by the Sea
Summer programmes for children
Ferragosto Lunch for older people



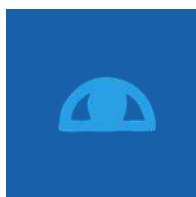
COOLING THE CITY

Urban forestry
Planting trees and shrubs
Expansion of green areas
New urban parks
Riverfront parks along the Tiber
Regeneration of historic villas
Interventions in vulnerable neighbourhoods



ENSURING RESILIENT SERVICES AND INFRASTRUCTURE

Cooling measures in schools and nurseries
Cooling measures in elderly care centres
Network of “nasoni” and water houses
“Acquea” app
Electricity grid resilience plan
Bus stop shelters
Street washing
Strengthening of essential services



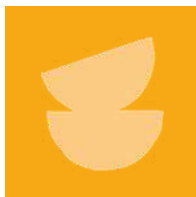
PREVENTING AND MANAGING EMERGENCIES

Operational Coordination Centre
Summer Fire Prevention Plan
Heatwave Ordinance
Alert and Reporting System
Measures for Outdoor Workers
Procedures for High-Risk Days
Coordination of Emergency Response



TRANSFORMING SPACES AND BUILDINGS

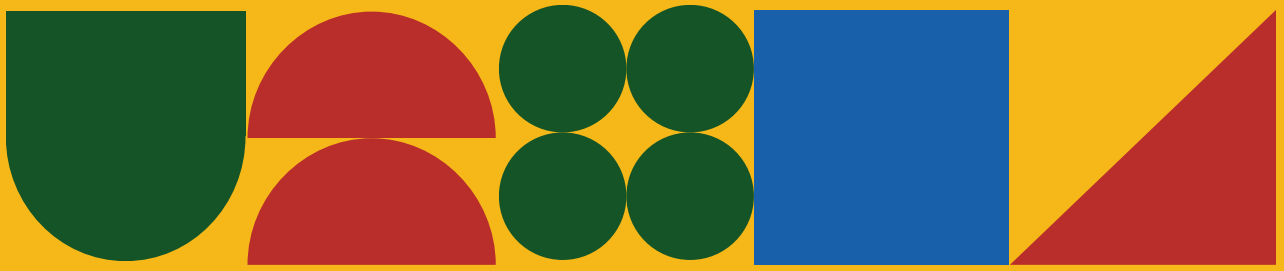
Depaving
Permeable surfaces and rain gardens
Cool and reflective materials
Regeneration of squares and streets
New Building Regulations
Green roofs
Nature-Based Solutions
Urban shading
Water recovery and reuse



ASSESSING AND MONITORING

Climate Adaptation Strategy
Climate and social vulnerability assessments
DATACLIME – climate monitoring platform
MeteoTracker on ATAC buses
Urban heat island mapping
Collaboration with universities and research centres

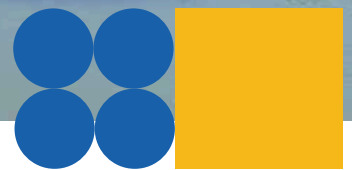




3

WHERE WE WANT TO GO:

Building a heat-resilient
city by 2035



The proposed Heat Plan defines the objectives and actions to strengthen the city's preparedness for a future characterised by more frequent and intense heatwaves.

Addressing extreme heat requires action on several fronts: protecting people's health, particularly the most vulnerable, improving comfort in public spaces, and ensuring that essential urban services remain operational during events that can cause power outages and other disruptions.

The Plan is guided by **a set of values and objectives that provide a common framework for these different areas of action.** They help define priorities and guide the measures to be monitored and adapted over time, as conditions evolve, new challenges emerge and rising temperatures increasingly affect living conditions and well-being across the city.

The Plan's time horizon is 2035. Over this period, civil protection measures, social support services, and warning systems will need to be strengthened, while structural changes will be implemented in public spaces and infrastructure most exposed to climate risks, adapting them to the new climate scenario.

Some measures will be implemented immediately, while others will take longer, as they require additional resources, regulatory changes and agreements with other institutions.

To track progress and ensure transparency, the Plan includes a monitoring system covering all actions. The Plan will be reviewed every five years to assess progress towards its targets and update measures based on the latest available climate and epidemiological data.



Addressing heat impacts in a city like Rome requires the involvement of different municipal departments, each with specific responsibilities, as well as essential service and infrastructure providers, civil protection organisations, Third Sector organisations, health authorities and Rome's Municipalities. This is a complex challenge that cuts across different areas of the administration and requires strong coordination and organisational capacity, as well as clear communication of actions and results.

The draft Heat Plan will be accompanied by **an information and public consultation process aimed at raising awareness, discussing the proposed measures, and engaging a broad range of stakeholders**. Citizens and interested parties will be invited to submit comments, ask questions, and put forward proposals.

After the final approval of the Plan, participation will continue alongside the monitoring of climate trends and the results of the measures implemented, supported by a system of indicators and continued stakeholder engagement in projects and strategic actions.



VALUES

CARE

EQUITY

SCIENCE

RESILIENCE



OBJECTIVES

3

STRENGTHEN
THE RESILIENCE
OF INFRASTRUCTURE
AND NETWORKS

2

ENSURE PEOPLE'S
WELL-BEING IN
PUBLIC SPACES
DURING HEAT
WAVES

1

REDUCE THE IMPACT
OF HEAT ON
PEOPLE'S HEALTH

MEASURES



**PREVENTION, ALERTS
AND SUPPORT FOR PEOPLE,
INFORMATION ON RISKS**

- STRENGTHEN ALERTS, SUPPORT FOR VULNERABLE PEOPLE, PROTOCOLS FOR HEAT WAVES
- STRENGTHEN INFORMATION FOR CITIZENS ON RISKS AND BEHAVIOURS TO ADOPT DURING HEAT WAVES



**MONITORING, SCIENTIFIC
RESEARCH, STRENGTHENING
THE CULTURE OF ADAPTATION**

- CLIMATE MONITORING, PARTNERSHIPS TO EXPAND SCIENTIFIC RESEARCH



**CLIMATE ADAPTATION
OF URBAN SPACES AND
STRENGTHENING RESILIENCE
TO HEAT**

- PRIMARY NETWORKS AND INFRASTRUCTURE
- GREENING
- WATER
- SHADE
- PAVING
- PUBLIC BUILDINGS
- CLIMATE SHELTERS

VALUES

PROTECTING AND SUPPORTING PEOPLE

Extreme heat particularly affects vulnerable people, including older people, those living with health conditions, people experiencing homelessness, and those who live alone or have limited access to support networks. During the hottest days, providing support is essential to prevent health conditions from worsening, ensure access to local services, listen to people's needs, and help address situations of isolation that increase the vulnerability of the most fragile groups.

SCIENTIFIC APPROACH, TRANSPARENCY AND MONITORING

When decisions directly affect people's health, action must be grounded in robust scientific evidence, supported by research, analysis and continuous monitoring in collaboration with scientific institutions. The results must also be transparent and accessible to citizens.

SOCIAL AND TERRITORIAL EQUITY

Epidemiological studies show that heat-related health risks are not evenly distributed across the population. Older people and children are particularly vulnerable, while risks are also higher in parts of the city where the heat island effect is more pronounced. Priority areas for action should therefore be identified by considering both heat exposure and social vulnerability across Rome's neighbourhoods. Socioeconomic conditions can affect people's ability to cope with extreme heat, including access to cooling at home - and the risk of cooling poverty - as well as opportunities to leave the city during the hottest periods.

COMMUNITY RESILIENCE

In a future scenario of rising global temperatures and more frequent periods of extreme heat, strengthening community resilience will be essential. This requires fostering mutual support among neighbours, especially towards the most vulnerable people, as well as individual responsibility in adopting appropriate behaviours during the hottest days and building a widespread culture of prevention across communities and institutions.

1

REDUCING THE IMPACT OF HEAT ON PEOPLE'S HEALTH

Protecting vulnerable people, strengthening prevention and alert systems, informing citizens about risks, and ensuring access to essential services during heatwaves.

2

ENSURING LIVEABLE URBAN SPACES DURING HEATWAVES

Reducing the direct impacts of heat in urban public spaces by improving the microclimatic conditions of squares, streets, and public transport stops, helping to reduce perceived temperatures.

3

STRENGTHENING INFRASTRUCTURE AND NETWORK RESILIENCE

Reliable energy, water, mobility, and communication infrastructure is key to maintain essential services during the hottest days, preventing disruptions and protecting vulnerable people from worsening health conditions while maintaining adequate comfort conditions in workplaces.

GOALS



4

THE PLAN IN ACTION

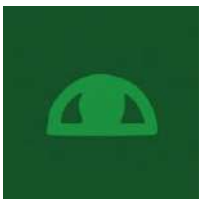
Ten priority actions have been identified to prepare the city for more frequent and intense heatwaves.

The actions address the different dimensions of heat adaptation, from adapting urban spaces and protecting and informing people to strengthening scientific research and climate monitoring. They are grouped into **three thematic areas**, with each action comprising a set of specific measures:



PREVENTION, EARLY WARNING, SUPPORT FOR VULNERABLE PEOPLE AND RISK COMMUNICATION

Protecting people's health during heatwaves requires a coordinated response involving social services, Civil Protection, healthcare services, and institutional communication. The aim is to develop shared protocols for rapid and targeted action, with specific attention to vulnerable groups and outdoor workers, while strengthening risk communication among the organisations involved. The response to heat goes beyond emergency management: it requires a local support network able to reach vulnerable people before situations become critical, through neighbourhood services, community networks, and integrated cooperation between social care and local healthcare services.



MONITORING, RESEARCH AND CLIMATE ADAPTATION AWARENESS

Heat adaptation choices must be based on updated data and scientific evidence, and shared with citizens to achieve lasting results. Monitoring, research, and a widespread culture of adaptation are closely interconnected: without monitoring there is no evidence to guide action; without research it is not possible to identify where and how to intervene; without awareness even the most effective measures may fail to reach those who need them most. Climate impacts vary across neighbourhoods, age groups, and social conditions. Monitoring these differences, producing clear analyses, and providing accessible information to citizens and stakeholders are essential to build an effective, equitable, and adaptable heat response over time.



ADAPTING URBAN SPACES AND STRENGTHENING HEAT RESILIENCE

Temperatures in Rome's public spaces during heatwaves can vary significantly between neighbourhoods, depending on tree cover and green space, soil permeability, building density and surface materials. The hottest areas often coincide with densely populated neighbourhoods with limited green infrastructure, where large numbers of people may also be exposed to extreme heat. Improving the microclimatic conditions of public spaces is therefore a matter of health, environmental quality and social equity. At night, the urban heat island effect is particularly pronounced in neighbourhoods with less vegetation, as surfaces that absorb heat during the day continue to release it for hours. This makes it harder to recover from daytime heat and reduces opportunities to use and enjoy outdoor spaces. Addressing this challenge requires targeted interventions in squares, streets, public transport stops and resting areas, combining tree planting, depaving, shading and evaporative cooling solutions. Urban infrastructure must also be able to withstand increasingly severe heat. Energy and water networks, transport and communication systems all provide essential services that need to remain operational during heatwaves. Specific actions therefore focus on strengthening their resilience and ensuring continuity of essential services during periods of extreme heat. As climate risks evolve, monitoring and public consultation will help refine and update the Plan's actions over time. This may include adapting the organisation of activities and services during the summer to cooler times of day, developing protocols for extreme heat events, and further assessing risks and appropriate adaptation measures for particularly vulnerable facilities, such as hospitals and prisons, in cooperation with the relevant authorities.



Each of the ten priority actions is presented in the following pages with a factsheet outlining its scope, priority measures, the Roma Capitale departments and external organisations involved, monitoring indicators, and links to the Plan's values and objectives.

1.

STRENGTHENING HEATWAVE EARLY WARNING SYSTEMS, SUPPORT FOR VULNERABLE PEOPLE AND RESPONSE PROTOCOLS



Heatwaves can have significant impacts on people's health, particularly among the most vulnerable groups. Early warning of heat events, targeted information on protective behaviours, direct support during periods of extreme heat, and the adjustment of working hours and conditions for outdoor workers can help reduce risks to people's health. The way forward is to strengthen existing actions to tackle poverty and social exclusion, provide emergency support to people experiencing homelessness, and enhance coordination among relevant municipal departments and healthcare services.

MEASURES TO BE IMPLEMENTED

- Strengthen heatwave early warning systems and home-based support services for vulnerable people.
- Ensure support for people experiencing homelessness during the hottest days through services coordinated by the Social Operations Centre (SOS - Sala Operativa Sociale), providing information and access to daytime facilities.
- Define protocols for outdoor work in implementation of the Mayor's ordinances on wildfire prevention and heatwave risk management.

ROMA CAPITALE DEPARTMENTS INVOLVED

- Social Policies and Health Department
- Civil Protection Department
- Human Resources Department
- Communication Department

PARTNER ORGANISATIONS

- Department of Epidemiology - DEP Lazio
- Croce Rossa Italiana (Italian Red Cross)
- Third Sector Organisations

INDICATORS

- Number of days with active heatwave alerts and corresponding activation of operational plans [days/year]
- Number of home-based and outreach support interventions during heatwaves [n/year]
- Approval of the outdoor work protocol [yes/no]

RELATED VALUES

01, 02, 04

RELATED GOALS

01

2.

STRENGTHENING HEAT RISK COMMUNICATION AND PUBLIC AWARENESS



Informing citizens about health risks during heatwaves, recommended protective behaviours, and alerts issued ahead of relevant events is essential to strengthen prevention. Several institutions are already engaged in this area during the summer period: Civil Protection, Roma Capitale, the Ministry of Health, DEP Lazio, and ASL (Local Health Authorities) coordinate information tools including daily forecast and alert bulletins, prevention guidelines published on the Ministry's website, the 1500 public information helpline, and the "Caldo e Salute" app, which provides access to bulletins and information on available local services. However, these tools do not reach all population groups equally: the most vulnerable people, including older people living alone, people experiencing homelessness, and communities facing language barriers, need dedicated information channels and community-based communication approaches that go beyond digital channels.

MEASURES TO BE IMPLEMENTED

- Strengthen risk communication and heatwave prevention measures through shared formats and tools among the different institutions involved.
- Organise a Roma Capitale information campaign starting in May on heatwaves, related risks, and protective behaviours, in collaboration with the relevant departments, emergency and information helplines, and available apps.
- Develop partnerships with organisations working with migrant and foreign communities to overcome barriers to accessing information on heat-related risks.

ROMA CAPITALE DEPARTMENTS INVOLVED

- Communication Department
- Civil Protection Department
- Social Policies and Health Department

PARTNER ORGANISATIONS

- Department of Epidemiology - DEP Lazio
- IOM (International Organization for Migration)
- Croce Rossa Italiana (Italian Red Cross)
- Third Sector Organisations

INDICATORS

- Heatwave communication campaigns launched before the summer season [yes/no]
- Initiatives and partnerships with organisations and associations [n]

RELATED VALUES

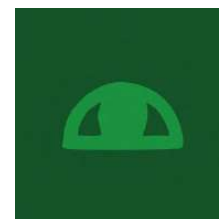
01, 02, 03, 04

RELATED GOALS

01

3.

CLIMATE MONITORING AND SCIENTIFIC PARTNERSHIPS



In recent years, daytime and night-time temperatures have increased significantly compared with the 1991-2020 reference period. Monitoring ongoing changes through climate indicators and scientific analyses is essential to update climate adaptation choices. Expanding research activities and scientific collaborations serves two main purposes: on the one hand, improving understanding of climate change and its effects; on the other, producing accessible information for citizens, researchers, and other stakeholders.

MEASURES TO BE IMPLEMENTED

- Strengthen climate monitoring through the installation of new sensors, starting from neighbourhoods most exposed to heatwave risks, and update indicators to reflect new evidence.
- Expand scientific collaborations to carry out research and data analysis, promote integrated monitoring activities, and investigate the health impacts of heat and related risks.

ROMA CAPITALE DEPARTMENTS INVOLVED

- Ufficio Clima (Climate Office)

PARTNER ORGANISATIONS

- CMCC
- AMA
- CNR
- ENEA
- ISPRA

INDICATORS

- Climate monitoring stations installed [n]
- Scientific partnerships established [n]

RELATED VALUES

01, 02, 04

RELATED GOALS

01, 02, 03

4.

CRITICAL NETWORKS AND INFRASTRUCTURE

Ensuring the continuity of essential services



Ensuring the resilience of energy, water, transport, and communication infrastructure is essential during heatwaves, as blackouts and service disruptions can affect the functioning of essential urban services. Strengthening interventions on these networks, adapting strategies to new climate conditions, sharing expertise among operators, and coordinating actions are key elements for the city's climate resilience.

MEASURES TO BE IMPLEMENTED

- Strengthen adaptation measures for energy, water, transport, and communication networks to ensure service continuity through efficient management and resource optimisation.
- Ensure stronger coordination of resilience actions across networks, identifying critical nodes and priority infrastructures, sharing research findings and monitoring results to adapt measures and support implementation processes.

ROMA CAPITALE DEPARTMENTS INVOLVED

- Public Works Department
- Civil Protection Department
- Municipal Districts
- Climate Office

PARTNER ORGANISATIONS

- ARETI
- ACEA AT02
- ATAC
- FS
- AMA

INDICATORS

- Number of service disruptions during the summer period [n/summer]
- Critical nodes with implemented resilience measures [n]

RELATED VALUES

01, 03, 04

RELATED GOALS

01, 03

5.

URBAN GREEN

Strengthening the network of parks and gardens, and increasing tree coverage in every neighbourhood



Trees and urban green systems play a key role in reducing heat impacts in cities: they lower perceived temperatures through shading and evapotranspiration, improve air quality, and increase comfort in public spaces. Rome has launched a structured programme for planting trees along streets and in parks and creating new green areas, which requires continuity and targeted interventions in areas with higher thermal exposure and lower tree canopy coverage.

MEASURES TO BE IMPLEMENTED

- Develop an updated mapping of Rome's public green areas within the new "Piano del Verde e della Natura" framework, to be presented in 2026, including the calculation of a heat mitigation index by census section to identify priority areas for intervention based on surface temperatures and resident vulnerability.
- Continue the programme for planting new street trees and trees in parks, prioritising areas with higher heat exposure and lower existing tree canopy coverage.

ROMA CAPITALE DEPARTMENTS INVOLVED

- Environmental Protection Department
- Municipal Districts
- Climate Office

PARTNER ORGANISATIONS

- CREA
- CMCC
- CNR
- ISPRA
- ENEA

INDICATORS

- New trees planted, by Municipality [n/year]
- Increase in green surface areas [m²/year]
- Percentage of Rome's population with access to a public green space within a 15-minute walk from home [%]

RELATED VALUES

02, 03, 04

RELATED GOALS

02

6.

WATER RESILIENCE

Strengthening the network of public drinking fountains and water reuse systems for irrigation



Water plays a key role in improving comfort in public spaces during periods of extreme heat. Rome has an extensive network of public drinking fountains and water houses, providing free access to drinking water across the city. Fountains, water features and irrigation can also help cool parks and public spaces, while irrigation supports urban vegetation and evapotranspiration, contributing to local temperature regulation during hot weather. Roma Capitale is also developing projects to reuse water from wastewater treatment plants, fountains and monitored wells for the irrigation of green spaces, alongside interventions based on Nature-Based Solutions (NBS).

MEASURES TO BE IMPLEMENTED

- Strengthen the network of public drinking fountains and water houses, prioritising areas with higher thermal and social vulnerability, and improve communication on their location through digital applications.
- Promote irrigation of new parks and urban redevelopment projects, prioritising areas closer to vulnerable neighbourhoods, through the reuse of treated water and the use of monitored wells.
- Implement environmental regeneration projects aligned with the objectives of EU Regulation 2024/1991 (Nature Restoration Law), through the reuse of treated wastewater from purification plants.
- Provide water features in parks and public spaces to improve comfort during heatwaves.
- Strengthen street washing activities during heatwaves, prioritising the most vulnerable neighbourhoods.

ROMA CAPITALE DEPARTMENTS INVOLVED

- SIMU Department (Infrastructure Development Coordination and Urban Maintenance Department)
- Environmental Protection Department
- Climate Office
- Municipal Districts

PARTNER ORGANISATIONS

- ACEA ATO2
- AMA
- ISPRA

INDICATORS

- Operational public drinking fountains [n]
- Green areas equipped with active irrigation systems [n]
- Water reuse projects for irrigation implemented [n]

RELATED VALUES

01, 02, 03, 04

RELATED GOALS

01, 02

7.

URBAN SHADING

Creating a network of shaded public spaces and pedestrian routes



Public spaces fully exposed to the sun during periods of extreme heat can pose a health risk, particularly for people waiting at bus stops or moving around the city on foot. Squares and playgrounds can also become difficult to use without adequate shade. Reducing these risks requires a better understanding of where people are most exposed to heat as they move through the city and access services and public spaces. Roma Capitale therefore aims to identify shading solutions for areas where tree planting and other urban forestry measures are not feasible, prioritising locations with higher thermal exposure and social vulnerability.

MEASURES TO BE IMPLEMENTED	• Develop a mapping of areas with the highest shading needs, including mobility hubs, playgrounds, squares, and parks. • Identify priority pedestrian routes to be shaded through tree planting, starting from the most vulnerable neighbourhoods. • Implement shading interventions through artificial structures in priority public spaces identified through the mapping, where tree planting is not feasible.
ROMA CAPITALE DEPARTMENTS INVOLVED	• Public Works Department • Environmental Protection Department • Climate Office • Municipal Districts
PARTNER ORGANISATIONS	• ATAC • FS
INDICATORS	• Mapping of priority areas requiring shading interventions completed [yes/no] • Artificial shading structures installed [n] • Length of tree-lined pedestrian routes [km]
RELATED VALUES	02, 03, 04
RELATED GOALS	02

8.

DEPAVING

Reducing soil sealing and improving material solar reflectance



Impermeable surfaces such as asphalt and concrete absorb heat during the day and release it at night, intensifying the urban heat island effect. Depaving, restoring soil permeability through vegetation and permeable materials, and using high-reflectance surfaces can help reduce perceived temperatures in frequently used public spaces, improve thermal comfort and support better management of the urban water cycle. Roma Capitale aims to identify the areas and public spaces with the highest levels of soil sealing in order to prioritise interventions, building on ongoing depaving measures and the minimum permeability requirements introduced by the Municipal Building Regulations.

MEASURES TO BE IMPLEMENTED

- Identify priority depaving areas based on heat exposure and social vulnerability maps, with priority given to squares, playgrounds, and areas with higher surface temperatures.
- Implement depaving interventions and replace impermeable pavements with permeable and high solar reflectance materials in frequently used public spaces, prioritising public transport stops, main pedestrian routes, playgrounds, and areas with higher surface temperatures.
- Integrate soil permeability and solar reflectance criteria, as defined by Ministerial Decree 23 June 2022 (Minimum Environmental Criteria for street infrastructure) and the applicable CAM requirements for green areas, into the design of public space interventions.

ROMA CAPITALE DEPARTMENTS INVOLVED

- Public Works Department
- Environmental Protection Department
- Climate Office
- Municipal Districts

PARTNER ORGANISATIONS

- CMCC
- ENEA
- ISPRA
- CNR
- ATAC
- FS

INDICATORS

- Depaved surface area [m²/year]
- New permeable or draining surfaces created [m²/year]
- Share of interventions carried out in areas classified as highly vulnerable from a thermal and social perspective [%]

RELATED VALUES

02, 03, 04

RELATED GOALS

02

9.

PUBLIC BUILDINGS

Accelerating renovation through climate adaptation measures



Rising summer temperatures are increasingly affecting thermal comfort in public buildings and spaces. This particularly concerns educational facilities for children aged 0–6, elderly centres, public buildings, and facilities used by Roma Capitale staff. Several energy efficiency and renovation projects have already been implemented, and these efforts need to be continued through an integrated approach that incorporates climate adaptation objectives. Future renovations should include solutions such as green areas, shading systems, water management, and high solar reflectance materials (cool materials), in line with the Minimum Environmental Criteria (CAM) established by the Ministry of Environment and Energy Security for public procurement.

MEASURES TO BE IMPLEMENTED	• Complete energy efficiency upgrades and install cooling systems in all educational facilities for children aged 0 - 6, prioritising buildings located in areas with higher thermal exposure. • Complete the installation of cooling systems in elderly centres and public buildings used by Roma Capitale staff. • Develop climate adaptation and renovation projects for courtyards and outdoor areas of public buildings, starting with schools. • Apply the Minimum Environmental Criteria (CAM) for buildings, established by Ministerial Decree 23 June 2022 of the Ministry of Environment and Energy Security (MASE), in public building renovation projects.
ROMA CAPITALE DEPARTMENTS INVOLVED	• SIMU Department • School Department • Environmental Protection Department • Municipal Districts
PARTNER ORGANISATIONS	• Risorse per Roma • ENEA
INDICATORS	• Educational facilities for children aged 0–6 equipped with cooling systems [n and % of total] • Public and staff buildings equipped with cooling systems [n and % of total] • Climate adaptation and renovation projects implemented in school courtyards and public building outdoor areas [n]
RELATED VALUES	01, 03, 04
RELATED GOALS	01, 02

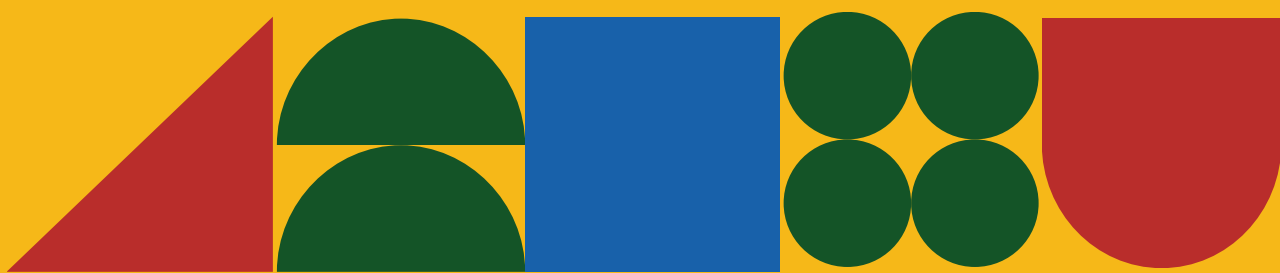
CLIMATE SHELTERS

Creating an accessible network of safe and cool spaces during heatwaves



Heatwaves do not affect everyone equally: people living alone, those without access to cooling at home, residents of neighbourhoods with limited tree cover and outdoor workers are among those at greater risk. Climate Shelters provide free, accessible spaces where people can find relief from extreme heat. Roma Capitale has defined minimum criteria for the different categories within the network: indoor and outdoor climate shelters, municipal accommodation facilities for people experiencing homelessness, and complementary cooling infrastructure. The network builds on existing facilities that are already part of community life and provide social, cultural and recreational activities beyond periods of extreme heat. The aim is to progressively expand the network by involving private facilities and Third Sector organisations through a participatory process.

MEASURES TO BE IMPLEMENTED	• Publish and update the interactive map of climate shelters, accessible through a website and mobile device, including information on opening hours, services, and walking routes to reach the nearest shelter. • Launch a participatory process to involve private facilities and third-sector organisations. • Carry out pedestrian accessibility analyses of the climate shelter network to identify coverage gaps in the most vulnerable areas and guide the expansion of the network towards priority locations.
ROMA CAPITALE DEPARTMENTS INVOLVED	• Climate Office • Social Policies and Health Department • Municipal Districts • Environmental Protection Department • Cultural Activities Department
PARTNER ORGANISATIONS	• DEP Lazio • Croce Rossa (Italian Red Cross) • Third Sector Organisations
INDICATORS	• Climate shelters published on the public map, by category [n] • Residents living within a 15-minute walk of a recognised climate shelter [%] • Residents over 65 living within a 15 minute walk of a recognised climate shelter [%] • Residents in vulnerable areas living within a 15 minute walk of a recognised climate shelter [%]
RELATED VALUES	01, 02, 04
RELATED GOALS	01, 02



5

**THE CLIMATE
SHELTER
NETWORK**
of Roma Capitale



What are Climate Shelters

Climate shelters are **publicly accessible and free places where people can reduce their exposure to heat during heatwaves, preventing dehydration and reducing the risk of heat-related illness and deaths**. Indoor climate shelters rely on active cooling systems, which are a mandatory requirement; outdoor shelters rely on natural cooling mechanisms, such as shade and vegetation evapotranspiration. Examples of climate shelters include public libraries, elderly centres, and museums with free access, as well as parks with sufficient tree canopy to provide effective cooling.

What defines Climate Shelters is not their specific function, but three key characteristics: they are public, free of charge, and provide thermal protection together with social, cultural, and recreational co-benefits.

Climate shelters are neither healthcare facilities nor emergency services activated only during heat alerts. **They are permanent components of the city's infrastructure and local public service network**. They are based on three principles: **inclusiveness** (being open to everyone regardless of income, age, or social condition); **free access**; and **proximity** (a goal of the network as a whole rather than a requirement for each individual shelter, as the people most exposed to heat risks are often those with the lowest mobility).

Climate shelters do not address the underlying causes of urban heat: they cannot replace urban greening or improvements to the thermal performance of buildings. Their role is nonetheless crucial: they provide protection when extreme heat poses an immediate risk to people's health and lives.

Epidemiological research shows that spending even a few hours in a cooled environment during a heatwave significantly reduces the risk of heat-related mortality, particularly among older people and those with chronic health conditions.

The benefits extend beyond physical health: access to cooled spaces during the hottest periods of the year reduces stress and anxiety associated with prolonged heat exposure, improves sleep quality and cognitive performance, and contributes to maintaining work productivity.

Indoor climate shelters rely on active cooling, which requires energy and may generate greenhouse gas emissions. This trade-off needs to be recognised. However, even as Rome becomes greener and more resilient - with more trees, fewer impermeable surfaces and better-performing buildings - heatwaves will continue to pose a risk to public health. Indoor cooling therefore remains an essential adaptation measure, providing safe spaces during periods of extreme heat.

Within the framework of the Heat Plan, **climate shelters complement long-term mitigation measures such as urban forestry, the reduction of impermeable surfaces, and the energy renovation of the building stock.** The effectiveness of climate shelters does not depend only on their availability, but also on how they are integrated into the everyday life of neighbourhoods.

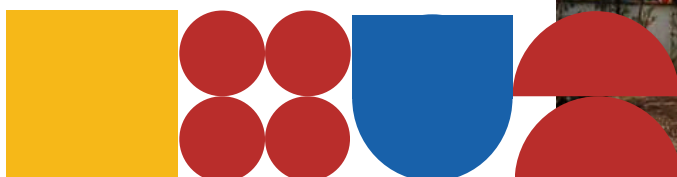


A truly effective climate shelter is not simply an air-conditioned room: it is a place that people already use for cultural, recreational, and social activities, regardless of emergency situations. It is this everyday use that determines their protective effect on health. A climate shelter embedded in neighbourhood life can **reach vulnerable people before a heatwave becomes critical, reduce social isolation** - one of the main risk factors associated with heat - and **build local support networks that remain active even on days without heat alerts**.

Why are Climate Shelters important

The impacts of heatwaves does not unfold evenly across the population. Risk increases with older age, the presence of chronic cardiovascular and respiratory conditions, and social isolation, which reduces the likelihood of receiving support during critical periods. These factors are compounded by an often overlooked dimension: **cooling poverty**, namely the inability to afford adequate cooling in one's own home. Many households do not have air conditioning, or cannot afford to use it for extended periods due to energy costs. The homes most exposed to overheating are generally those belonging to older building stock, often lacking adequate thermal insulation and located in densely populated neighbourhoods. Under these conditions, during prolonged heatwaves, indoor temperatures can exceed outdoor temperatures. Public and free climate shelters address both dimensions: they provide protection for people who are physically vulnerable and for those who do not have access to adequate cooling at home. Free access is a necessary but not sufficient condition: research shows that actual use of shelters decreases significantly as distance increases, particularly among population groups with reduced mobility. For this reason, the Heat Plan **sets the objective that every resident of Rome should have access to a climate shelter reachable within a 15-minute walk, based on a threshold calibrated to the walking speed of older people**.

Roma Capitale's Climate Shelters network aims to reduce these inequalities by expanding access to safe and comfortable spaces across the city, in collaboration with public institutions, Third Sector organisations and private companies.



Types of Climate Shelters

The climate shelter network is organised into four categories. The first two - **indoor and outdoor climate shelters** - form the core of the network and must meet specific, verifiable criteria to be formally recognised as climate shelters. Municipal accommodation facilities for people experiencing homelessness form a separate category, as they are accessible only to a specific group of users. Cooling infrastructure complements the network by providing additional protection from extreme heat and is mapped without requiring formal recognition.

Municipal accommodation facilities play a key role in protecting people experiencing homelessness, who face particularly high heat-related health risks due to prolonged outdoor exposure, often compounded by chronic health conditions and social isolation. Including these facilities in the map helps make existing support more visible and accessible.

Cooling infrastructures include **public drinking fountains** and “**Case dell’Acqua**” (public water houses), **which provide access to drinking water**, as well as **municipal swimming pools offering free access to residents over 70**. In a subsequent phase, new misting systems and water features, currently being implemented along some streets and in public spaces across the city, will also be mapped.



MINIMUM REQUIREMENTS FOR CLIMATE SHELTERS



INDOOR CLIMATE SHELTERS

CRITERIA



Presence of active **cooling systems**



Free access



Free drinking water



Accessible to everyone, including people with disabilities



Equipped with **toilets**



Equipped with **seating areas**



Presence of **co-benefits**



OUTDOOR CLIMATE SHELTERS

CRITERIA



Adequate environmental quality: presence of vegetation providing heat mitigation compared with the surrounding urban context (quantified through the cooling index), or swimmable water bodies.



Free and unrestricted access

Rome's Climate Shelter Map

Several spaces in Rome meet the criteria established for indoor and outdoor climate shelters. **An initial mapping has been developed**, combining information on these locations with data on other relevant services that provide important co-benefits (such as public drinking fountains).

Building the network required a systematic process of data collection, verification, and mapping, carried out by the Climate Office of Roma Capitale through a Geographic Information System (GIS). This system enabled the georeferencing of all facilities and their spatial representation across the municipal territory.

For **indoor Climate Shelters (178 facilities in total)**, the mapping included publicly owned or publicly managed facilities meeting the criteria outlined above:

- **Senior Centres (124)**
- **Municipal Libraries (33)**
- **Study rooms (14)**
- **Free Museums and Museums with free admission for residents (5)**
- **Cultural and Civic Centres (2)**

A georeferenced dataset was created for all facilities, including location, opening hours and summer closures, air conditioning, contact details, official website and a Google Maps link. Users can select any point on the map to view facility information and get directions. Data were collected from official sources and cross-checked for accuracy.

Figure 5 shows the distribution of indoor and outdoor climate shelters, accommodation facilities for people experiencing homelessness, and cooling infrastructure across Rome.

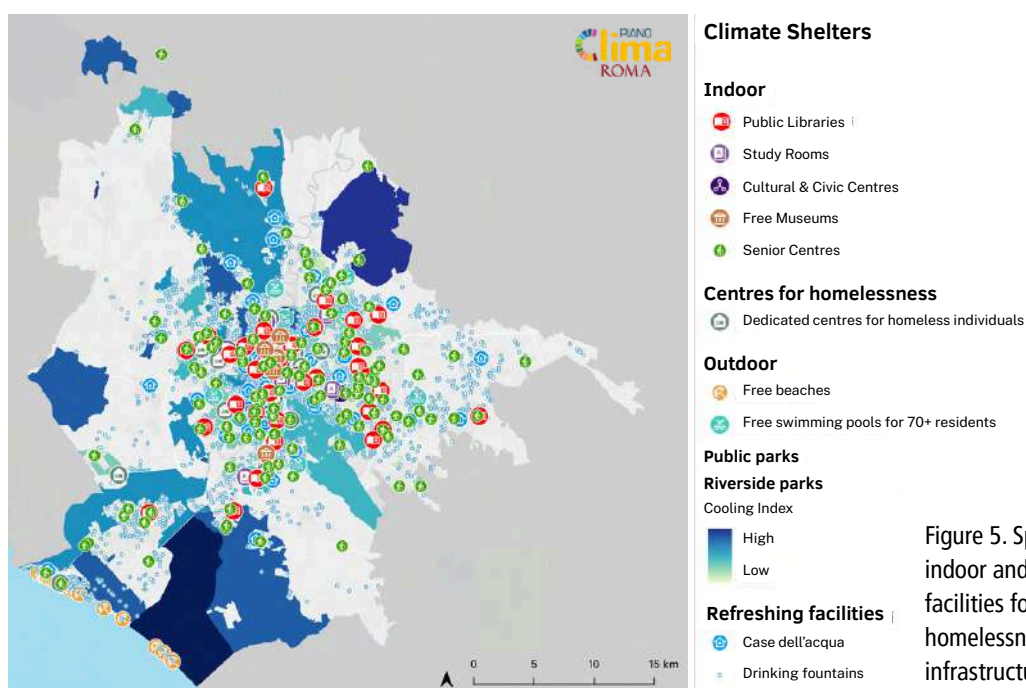


Figure 5. Spatial distribution of indoor and outdoor climate shelters, facilities for people experiencing homelessness, and cooling infrastructure across Roma Capitale.

For outdoor climate shelters, the mapping uses a heat mitigation index based on key biophysical characteristics, including surface albedo, evapotranspiration, vegetation, water bodies, and building density and height. Calculated using the InVEST ecosystem services model, the index ranges from 0 to 1, with higher values indicating greater cooling capacity. Applied across Rome's 1,280 km² municipal area, the index provides a city-wide assessment of the cooling capacity of parks and gardens, reflecting factors such as tree canopy, vegetation and evapotranspiring surfaces. All public parks are included in the map, regardless of their score, allowing users to compare nearby green spaces and identify those offering greater relief from heat.

The mapped outdoor climate shelters are 482 in total:

- **Public parks (453)**
- **Tiber riverfront parks (8)**
- **Public beaches (21)**

Figure 6 shows the spatial distribution of outdoor climate shelters: public parks and Tiber Riverfront Parks with their corresponding cooling index, public beaches, and municipal swimming pools offering free access to residents over 70.

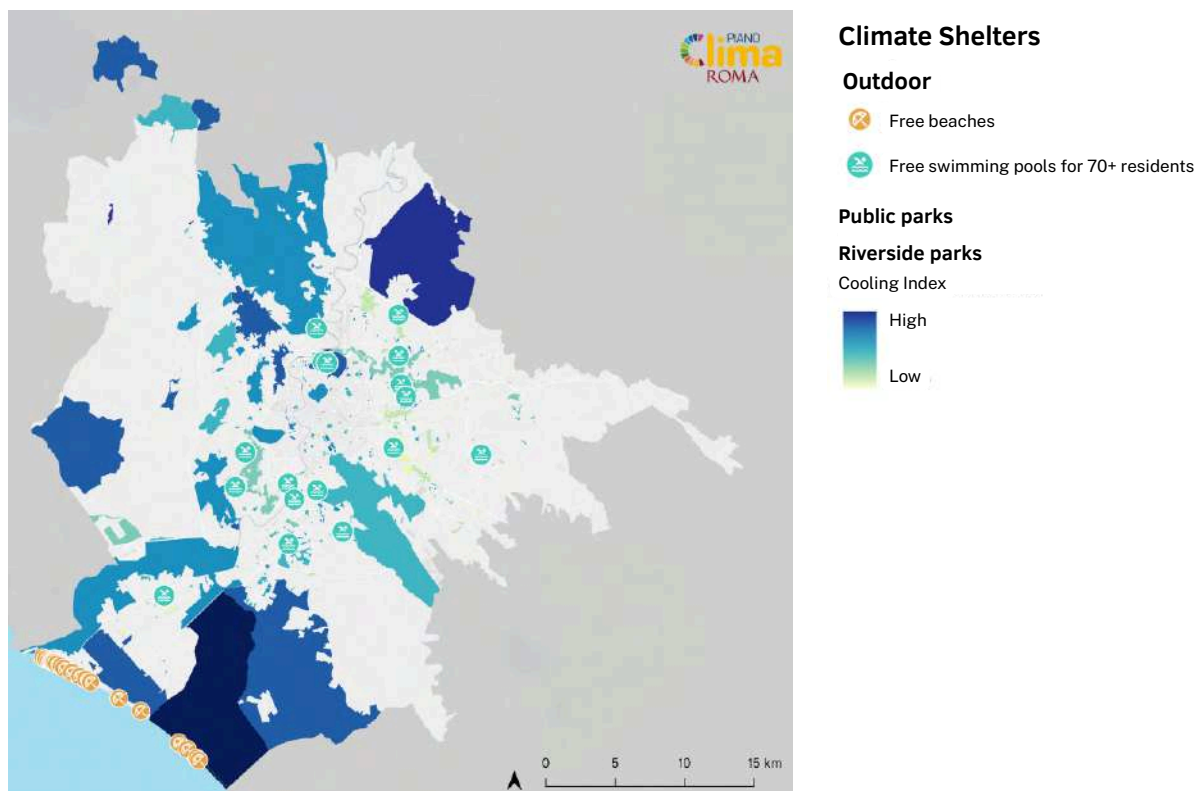


Figure 6. Spatial distribution of outdoor climate shelters across Roma Capitale: public parks and Tiber Riverfront Parks represented according to their cooling index (from dark blue, indicating high cooling capacity, to yellow-green, indicating low cooling capacity), public beaches, and municipal swimming pools offering free access to residents over 70.

The interactive map

The data collection, verification, and analysis activities described in the previous section have resulted in a public interactive map developed by the Climate Office of Roma Capitale, accessible from both desktop computers and mobile devices at romaperilclima.it and through the [GeoRoma](#) app.

The aim is to help users find the nearest climate shelter, check walking distance, opening hours and available services, and get directions.

Research shows that awareness of the location of climate shelters is one of the main factors determining their actual use. Making this information immediately accessible through a visual and georeferenced format is a condition for

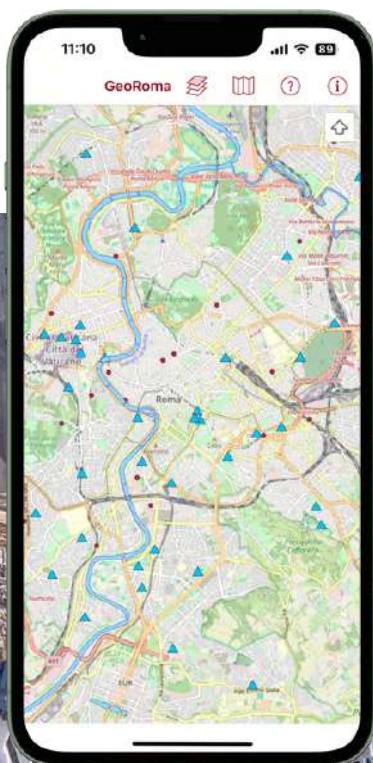
the effectiveness of the network, rather than a mere technological choice. It facilitates access for people facing difficulties during a heatwave, residents who are unfamiliar with local services, caregivers supporting vulnerable people, and social and healthcare workers. More specifically, the map enables users to:

View all climate shelters nearby, with filtering options by category;

Select the nearest climate shelter, indoor or outdoor, based on the user's location;

Open directions in Google Maps with a single tap;

Access key operational information, including opening hours, possible summer closures, and accessibility features.



A bottom-up network approach: voluntary applications and civic participation

The network of public climate shelters represents the backbone of the system, but it is not sufficient to ensure comprehensive coverage across a city as large and diverse as Rome, where needs vary considerably between neighbourhoods. For this reason, the Heat Action Plan provides for a **voluntary application process open to non-municipal facilities that meet the defined criteria and wish to join the network on a voluntary basis, including neighbourhood associations, cultural centres, third-sector organisations, and others.**

Residents' local knowledge and lived experience provide insights that institutional mapping alone cannot capture. Places that already play an established social role in their neighbourhoods can also provide relief from extreme heat if they offer air conditioning or adequate shade, without requiring new infrastructure. **Formal recognition as a climate shelter does not create a new space: it makes an existing community resource more visible and accessible.** This is particularly important for communities that may face linguistic, cultural or other barriers in accessing public services. A cultural centre where different languages are spoken, a place of worship used by a particular community, or the premises of a local association may already be places where people feel welcome and connected. Building on these trusted community spaces can help the network connect with people who may be harder to reach through traditional public services.

Building the network also through these spaces means not only expanding its coverage, but making it more equitable and inclusive.

In this respect, Rome is looking to the experience of Barcelona, which has developed a participation protocol for non-municipal facilities, defining minimum verifiable criteria, mutual commitments between the Municipality and participating facilities, and annual monitoring procedures.

Vulnerability, accessibility and priority intervention areas

The climate shelter map becomes most useful when combined with data on vulnerability to extreme heat. The network should be expanded where it is needed most: in neighbourhoods where high heat exposure and population vulnerability combine to create the greatest risk.

The urban heat island map identifies areas of Rome with higher surface temperatures. It is based on a cooling index that reflects key biophysical characteristics, including surface albedo, evapotranspiration, vegetation and water bodies, and building density and height.

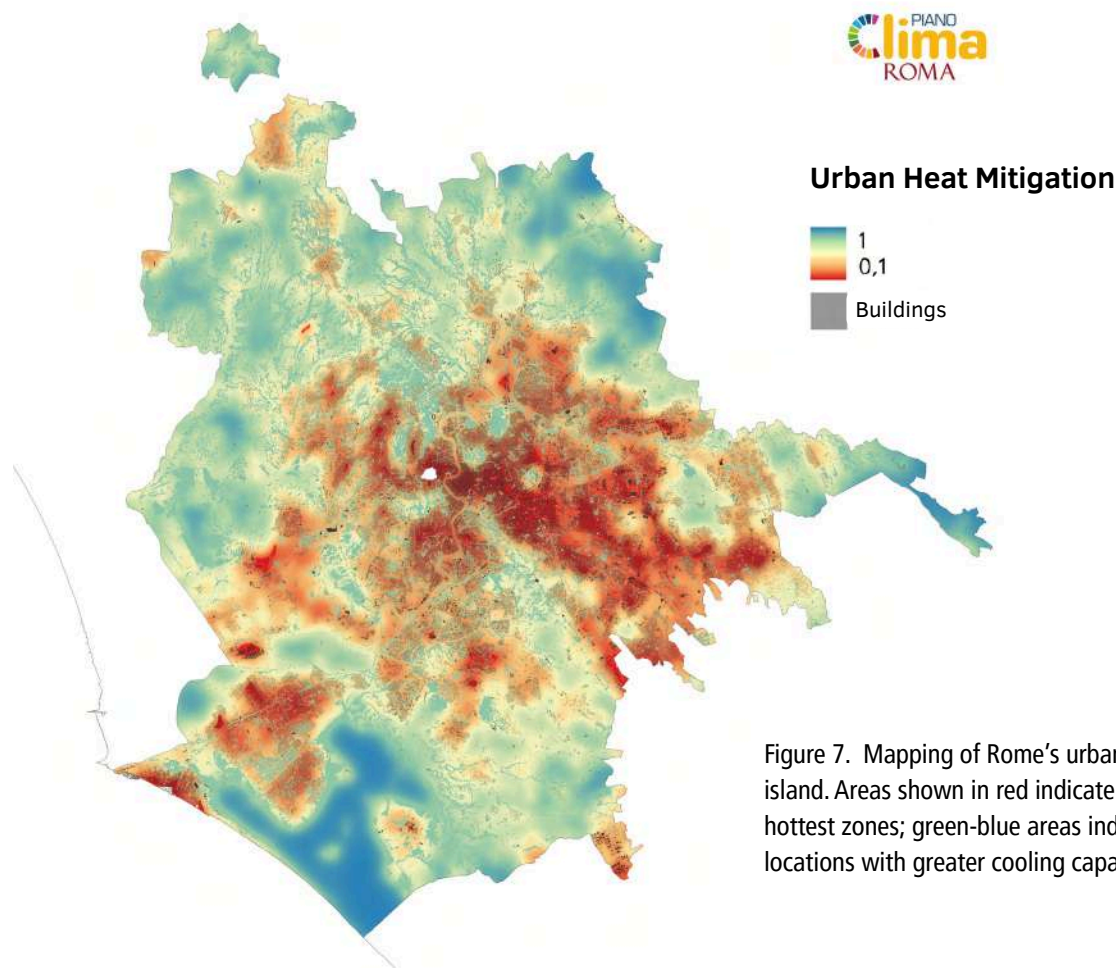


Figure 7. Mapping of Rome's urban heat island. Areas shown in red indicate the hottest zones; green-blue areas indicate locations with greater cooling capacity.

By combining the heat exposure map with socio-demographic indicators of population sensitivity, a heat vulnerability map was developed for the entire city. A pedestrian accessibility analysis was also carried out to identify areas where residents cannot reach an existing climate shelter within a 15-minute walk.

The next step will combine these two analyses to identify priority gaps in the network, focusing expansion on neighbourhoods where high vulnerability coincides with limited access to climate shelters.

Progress will be monitored annually through a set of quantitative indicators, including the number of mapped climate shelters by category; the share of residents within a 15-minute walk of a shelter; the share of residents aged 65 and over within a 15-minute walk, adjusted for walking speed; and the share of residents in areas of high social vulnerability with access to a climate shelter. **The ultimate goal is for every resident of Rome, regardless of where they live, their socioeconomic circumstances or their mobility, to be able to reach a climate shelter within a 15-minute walk.**





6

MONITORING AND IMPLEMENTATION



The proposed Heat Plan is part of the implementation of Roma Capitale's Climate Adaptation Strategy and brings together a wide range of institutional, economic and social stakeholders across several complementary areas of action.

To ensure its effectiveness, **the Plan establishes an integrated monitoring and evaluation framework structured around two levels: monitoring ongoing climate change**, to assess the evolution of risk conditions and update the knowledge base, and **monitoring the implementation of measures**, to evaluate their effectiveness and guide any future revisions of the Plan.

Following its initial adoption, the Plan will be open for public consultation until 30 November 2026, with final approval by the Capitoline Assembly expected in early 2027, allowing the first measures to be launched ahead of the summer season.

The consultation phase has three main goals. First, to **inform citizens about the Plan**, its proposed measures and the actions that will be taken to protect people during heatwaves, adapt public spaces and promote behaviours that can help reduce heat-related risks. Second, to **encourage scientific discussion** around the proposed measures, bringing together relevant expertise, identifying opportunities for further research and experimentation, and strengthening the partnerships needed to advance the Plan's objectives. Third, to establish a **structured dialogue with stakeholders**

through dedicated meetings and working groups, as part of an ongoing process that will accompany the implementation of the Plan through to 2035.

COMMENTS FROM CITIZENS, ASSOCIATIONS AND INTEREST GROUPS

The draft Plan is available on the website romaperilclima.it

Citizens can submit comments, suggestions or questions until 30 November 2026 by writing to: pianoclima@comune.roma.it

Meetings and workshops

The proposed measures will be further discussed with researchers, associations, businesses, social organisations and citizens through a programme of thematic sessions, meetings across Rome's Municipalities, and other activities shaped together with stakeholders:

Cooling the city through urban greening and nature-based solutions

The role of shading in reducing heat in public spaces

Ongoing projects to reduce the impacts of heatwaves

Workshop: Expanding Rome's Climate Shelter Network – priorities and criteria

Mobile workshop: Climate adaptation projects in Eastern Rome

Workshop with IOM: Raising awareness of heat-related health risks among migrant communities



Alongside the public consultation, **thematic working groups** will bring together key stakeholders across the city to discuss the proposed measures in greater depth, clarify the roles of different actors in their implementation, and create the conditions for coordinated action.

The working groups will support the Plan's implementation over time, **building on participatory processes already underway through the Climate Adaptation Strategy and Roma Capitale's Climate City Contract, approved in 2025.**

The working groups will involve:

- Business organisations
- Companies operating in infrastructure, energy and water networks
- Trade unions
- City Agricultural Conference
- General States of Green Spaces
- Environmental associations and third-sector organisations
- Research institutions and universities

The process will be supported by **communication and training activities** aimed at different stakeholders, with the objective of strengthening local networks, sharing operational tools, and enhancing the capacity of each actor to contribute to the implementation of the measures.

Internal governance will build on the arrangements already established for the implementation of the Climate Adaptation Strategy. Coordination will remain with the "Climate Action Plan" working group, led by the Climate Office and involving departments across the administration, as established by Memorandum No. 74/2023.





Monitoring and Evaluation

Monitoring is a key component of the Heat Action Plan. It will track changes in climate and temperature patterns across the city, as well as thermal comfort in public and private spaces. This will include:

The **DATACLIME monitoring platform and annual report**, developed with technical and scientific support from the Euro-Mediterranean Center on Climate Change (CMCC), with a set of indicators to track progress and inform updates to the Plan's measures;

The deployment of **meteorological and climate sensors** across the city, through scientific and technical partnerships with research institutions, associations and businesses, to monitor temperatures and the impacts of heatwaves, prioritising the most vulnerable areas;

Mobile monitoring campaigns, including **Meteotracker**, developed in collaboration with ISAC-CNR and ATAC to collect georeferenced temperature data across Rome's neighbourhoods and display them in real time on an interactive map;

The **mapping of all accessible public green spaces and the calculation of their cooling index**, to help prioritise urban forestry and new tree planting.

Secondly, monitoring will assess the results of the Plan's actions and help identify where priorities need to be adjusted. The monitoring system is structured around three components:

Progress monitoring, through periodic checks on the implementation of actions, based on process indicators;

Effectiveness assessment, through analysis of the outcomes achieved against the Plan's goals, using outcome indicators;

Scheduled review, with annual updates based on the data collected at the end of the summer season (September–October) and a comprehensive review every five years.

The following table sets out key indicators for each of the Plan's actions, together with their unit of measurement and the entity responsible for monitoring. The indicators were selected for their relevance, measurability and feasibility, taking into account the technical and administrative capacity of the organisations involved.

For some actions, particularly those related to climate shelters and urban greening, **spatial equity indicators** will assess whether interventions reach the areas and population groups most vulnerable to heat. The monitoring system will combine existing datasets from ARPA Lazio, local health authorities (ASL) and the Regional Health Service Epidemiology Department with data from planned scientific partnerships. Climate shelter monitoring will distinguish between the four categories: indoor and outdoor climate shelters, accommodation facilities for people experiencing homelessness, and cooling infrastructure.

Monitoring will be coordinated by the Climate Office, working with the departments responsible for each measure.

Table 2. Monitoring framework for Roma Capitale Heat Plan

	Action	Indicator	Unit of measurement
	1. Strengthening heatwave early warning systems, support for vulnerable people and response protocols	Days with active heatwave alerts and activation of operational plans	days/year
		Number of home-based and street-based support interventions during heatwaves	n/year
		Approval of the outdoor work protocol	yes/no
	2. Strengthening risk communication and public awareness of heatwaves	Communication campaigns launched before the summer season	yes/no
		Initiatives and collaborations with organisations and associations	n
	3. Climate monitoring and scientific partnerships	Climate monitoring stations installed	n
		Active scientific partnerships	n
	4. Critical networks and infrastructure: ensuring the continuity of essential services	Number of service disruptions during the summer period	n/summer
		Critical nodes with adaptation measures implemented	n
	5. Urban green: strengthening the network of parks and gardens, and increasing tree coverage in every neighbourhood	New trees planted, broken down by Municipal District	n/year
		Increase in public green areas	m ² /year
		Population with access to a public green space within a 15-minute walk	%



Action	Indicator	Unit of measurement
6. Water resilience: strengthening the network of public drinking fountains and water reuse systems for irrigation	Operational public drinking fountains	n
	Green spaces equipped with operational irrigation systems	n
	Water reuse interventions implemented for irrigation	n
7. Urban shading: creating a network of shaded public spaces and pedestrian routes	Development of a map of priority areas for shading interventions	yes/no
	Artificial shading structures installed	n
	Length of tree-lined pedestrian routes	km
8. De-sealing urban surfaces: reducing soil sealing and improving material solar reflectance	De-sealing urban surfaces	m ² /year
	New permeable or drainage surfaces created	m ² /year
	Share of interventions implemented in areas classified as having high thermal and social vulnerability	% and n
9. Public buildings: accelerating renovation through climate adaptation measures	Educational facilities for children aged 0–6 equipped with cooling systems	n and total %
	Public and publicly used buildings equipped with cooling systems	n and total %
	Climate adaptation and regeneration projects implemented in school courtyards and open spaces of public buildings	n
10. Climate shelters: creating an accessible network of safe and cool spaces during heatwaves	Climate shelters included in the public map, broken down by category	n
	Residents aged 65+ living within a 15-minute walk of a recognised climate shelter	%
	Residents living within a 15-minute walk of a recognised climate shelter	%
	Residents living in vulnerable areas within a 15-minute walk of a climate shelter	%



Funding the Actions

The Plan identifies 30 measures across 10 priority actions to reduce the impacts of extreme heat across Rome's neighbourhoods. Their implementation will require different approaches, responsibilities and levels of investment.

Some measures fall directly within the responsibilities of the municipal administration and **build on initiatives already underway**. The Plan brings these activities within a common heat adaptation framework, strengthening their contribution to the Plan's objectives and improving coordination across the administration.

Other measures will require **new plans, protocols or regulatory provisions, as well as collaboration with external organisations**. The Plan also provides for partnerships and agreements to support research, analysis and monitoring activities.

Measures concerning infrastructure networks are mainly **subject to national regulatory frameworks**, which in some cases allow investments to be financed through tariffs of the relevant public services. Further technical studies will be needed to identify priority projects to strengthen network resilience, including upgrades to infrastructure, connections and critical nodes, and improvements to management, monitoring and control systems. These studies will also help define investment needs and identify potential funding sources. The coordination working group involving the relevant utilities will support the development of resilience strategies and priority measures.

Additional investment will be required for measures involving new infrastructure and projects. These include urban greening and its long-term maintenance; water recovery and reuse for irrigation and public-space cooling; natural and artificial shading; depaving; energy renovation and cooling systems in public buildings, particularly early childhood facilities, senior centres and municipal offices; and the development of indoor and outdoor climate shelters.

Based on currently available information, the measures planned for the first five years of the Plan are expected to require an investment of approximately €50 million, subject to further assessment of individual interventions. This estimate covers integrated measures for depaving, shading, urban forestry and water management, prioritising the most vulnerable neighbourhoods and population groups.

For some measures, such as the energy renovation of school buildings, the Conto Termico incentive scheme can cover up to 100% of eligible costs, subject to the maximum amounts established for each type of measure.

For other interventions, possible national funding opportunities will be further explored through the **National Climate Change Adaptation Plan (PNACC)**, as well as through **European funding programmes** supporting environmental, building and urban regeneration interventions. To advance the implementation of these measures, both financial and technical support from the **European Investment Bank (EIB)** and **Cassa Depositi e Prestiti (CDP)** will be important, as Roma Capitale is already working with these institutions in several areas through dedicated public–private partnerships.

Overall, implementing the Plan will require a coordinated approach to investment planning and financing, combining municipal resources, national incentives, European funding and other financial instruments. As individual projects are developed, investment needs can be defined more precisely and matched with the most appropriate funding opportunities.



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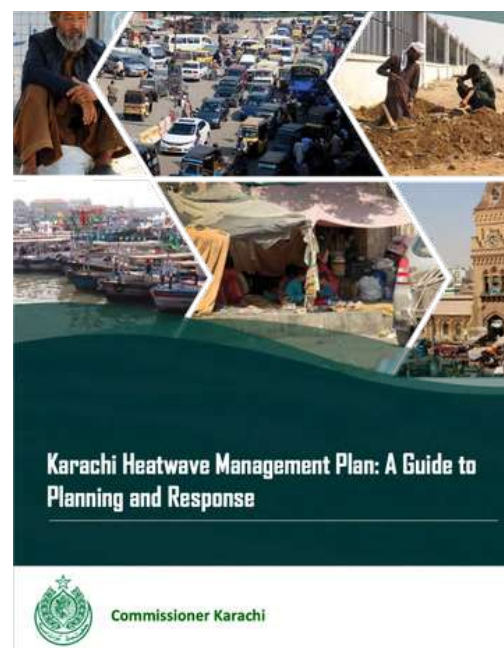
HEAT ACTION PLANS

International experiences

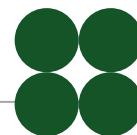
In recent years, a growing number of cities have developed specific tools to address extreme urban heat, including action plans, resilience strategies, operational protocols and climate shelter networks. Rome's Heat Action Plan draws on these experiences to inform its values, goals and measures.

The cities were selected based on climatic and urban similarities with Rome, the solutions they have developed, and the availability of adequate documentation. The analysis focuses on approaches, tools and measures that could be adapted to Rome's specific context: a Mediterranean city of 2.8 million people, with a diverse urban fabric, significant territorial inequalities, a building stock largely unprepared for extreme heat, and a complex administrative structure.

The cities analysed cover three broad geographical and climatic contexts: **European and Mediterranean cities** (Barcelona, Vienna, Athens, Paris and Madrid), **North American cities** (Boston, New York, Phoenix and Los Angeles), and cities across **other global regions and climate contexts** (Sydney, Buenos Aires, Ahmedabad, Karachi and Freetown). This diversity provides insights into solutions that may be transferable not only from a technical perspective, but also in terms of governance, equity and participation. **For Rome, the aim is to identify approaches that could be adapted to its specific context, while strengthening collaboration and knowledge exchange through international networks.**



THE EUROPEAN AND MEDITERRANEAN CONTEXT



#ATHENS Resilience Strategy 2030

#BARCELONA Pla Calor 2025-2035

#PARIS Plan Climat 2024-2030

#VIENNA Wiener Hitzeaktionsplan

THE NORTH AMERICAN CONTEXT



#BOSTON Heat Resilience Solutions for Boston and Chinatown Heat Action Plan

#LOS ANGELES County Heat Action Plan (CHAP)

#NEW YORK Cool Neighborhoods NYC

#PHOENIX Heat Response Plan

OTHER GLOBAL REGIONS AND CLIMATE CONTEXTS



#AHMEDABAD Heat Action Plan

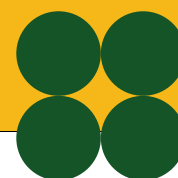
#BUENOS AIRES Red de Refugios Climáticos e Plan de Acción Climática 2050

#FREETOWN Freetown Heat Action Plan

#KARACHI Heatwave Management Plan

#MEDELLÍN Plan de Acción Climática (PAC) 2020-2050

#SYDNEY Greater Sydney Heat Smart City Plan (2025-2030)



BARCELONA | PLA CALOR 2025-2035

Climate shelters IVAC Vulnerability Index Climate justice Neighbourhoods

<https://www.barcelona.cat/barcelona-pel-clima/ca/pla-clima/pla-calor>

Among the cities analysed, Barcelona stands out for the breadth of its documented approach to urban heat and the range of measures already in place. The Pla Calor 2025–2035, adopted by the Ajuntament de Barcelona with a ten-year horizon, is structured around seven objectives and covers multiple dimensions of heat adaptation, from health protection and communication to the transformation of public spaces and climate justice.

A particularly relevant element for Rome is **Barcelona's climate shelter network**. In summer 2025, the city operated **a network of 400 free-access climate shelters providing protection from extreme heat**. With this coverage, **99% of residents live within a ten-minute walk of a shelter, with the goal of reaching 100% by 2030**. The network includes libraries, museums, schools, pharmacies, sports facilities and shaded parks, making use of spaces and facilities already embedded in the urban fabric rather than relying on new infrastructure. This approach directly informed Measure 10 of Rome's Heat Action Plan.

Another relevant element is the **IVAC tool**, a neighbourhood-level heat vulnerability index combining data on temperature, green space, income, age and population density. The index helps target resources towards neighbourhoods with higher vulnerability, including both physical measures and communication activities. The *Transformem els patis* programme has also converted 130 school courtyards into green spaces accessible to surrounding communities.

Climate justice is a core principle of Barcelona's approach. Historically disadvantaged neighbourhoods are prioritised to address structural inequalities linked to long-standing disparities in access to green infrastructure and high-quality public space.

VIENNA | WIENER HITZEAKTIONSPLAN

Interdepartmental governance Annual cycle Public drinking fountains Cool zones

<https://www.wien.gv.at/spezial/hitzeaktionsplan/>

The Wiener Hitzeaktionsplan stands out for two features that distinguish it from most European plans: its innovative **governance structure** and its **annual review cycle**.

The Vienna Heat Action Plan is overseen by a *Lenkungsgruppe* (steering group) bringing together six municipal departments, supported by four thematic working groups covering communication, education, health and social affairs, public space, as well as a scientific advisory committee. For each measure, the Plan identifies the department responsible and the other bodies involved in implementation.

The Plan follows an annual cycle of implementation and review. Each autumn, measures implemented during the previous summer are evaluated; during winter, they are refined and new measures are developed; spring is used to prepare for the next summer season; and from May–June onwards, public information and awareness campaigns are launched.

Vienna also provides a useful benchmark for public drinking water infrastructure, with 1,600 drinking fountains serving a population of 2 million - equivalent to 80 fountains per 100,000 residents. This provides a useful reference for assessing the scale and spatial distribution of Rome's own network.

ATHENS | RESILIENCE STRATEGY 2030

Quantified data

Chief Resilience Officer

Mediterranean urban heat island

Green and blue corridors

http://resilientcitiesnetwork.org/downloadable_resources/Network/Athens-Resilience-Strategy-English.pdf

Among the cities analysed, Athens shares many characteristics with Rome: a Mediterranean climate, a building stock largely unadapted to extreme heat, and a strong urban heat island effect, with temperature differences of 6–10°C between the city centre and surrounding areas.

Data play a central role in Athens' approach to extreme heat. During the July 1987 heatwave, approximately 1,300–1,500 heat-related deaths were recorded. Subsequent research found that each additional degree of temperature was associated with a 5.2% increase in mortality, a 6% increase in air pollution, a 10% decrease in retail sales and a 4.1% increase in electricity consumption. These figures show how the impacts of extreme heat extend beyond health to the economy and urban systems. The severity of the risk was again evident in summer 2021, when Greece recorded more than 2,300 excess deaths between late July and mid-August, including around 1,400 in the first week of August alone.

A distinctive feature of Athens is the appointment of a **Chief Heat Officer in 2021**, a dedicated role coordinating the city's response to extreme heat. Athens was the first European city and the second worldwide, after Miami, to introduce this position.

PARIS | PLAN CLIMAT 2024-2030

Cooling islands

Cours Oasis

Arrondissement-based approach

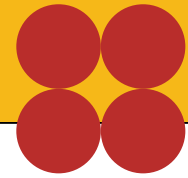
Cool roofs

paris.fr/pages/paris-pour-le-climat-2148

The Paris Climate Plan 2024–2030 is the fourth edition of the city's climate plan. While not specifically a heat action plan, it includes a significant set of measures to prepare the city for increasingly severe heatwaves. Paris has already experienced a temperature increase of 2.3°C compared with the pre-industrial era.

Paris has developed a **network of “îlots de fraîcheur” (cooling islands) across the city**. The goal is that by 2030 every resident will be within a seven-minute walk of a cool place, both during the day and at night. The network already includes more than 1,300 cool places, 161 of which are open at night. The **Cours Oasis programme** has transformed 130 school courtyards into green spaces accessible to surrounding communities, while the “1,000 toits anti-surchauffe” programme focuses on improving the thermal performance of roofs most exposed to heat.

Another important feature is the **neighbourhood-based approach**: for the first time, the Plan is being implemented across all 17 arrondissements, each with its own local adaptation strategy.



THE NORTH AMERICAN CONTEXT

BOSTON | HEAT RESILIENCE SOLUTIONS FOR BOSTON AND CHINATOWN HEAT ACTION PLAN

Spatial equity and redlining 7 benefit categories Cool spots Neighbourhood plan

boston.gov/departments/climate-resilience/heat-resilience-solutions-boston
resilientcitiesnetwork.org/wp-content/uploads/2025/09/250722-CMS-Heat-Action-Plan-1.pdf

The Heat Resilience Solutions for Boston Plan (2022) is particularly relevant for the way it places **equity at the centre of heat adaptation**.

The Plan combines neighbourhood-level temperature data with historical redlining maps. Redlining was a discriminatory housing and lending practice that restricted access to mortgages in predominantly African American and Hispanic neighbourhoods from the 1930s onwards. The analysis shows that historically redlined neighbourhoods are on average almost 3°C hotter, with fewer trees and green spaces and more asphalt.

The Plan also introduced an evaluation framework based on seven categories of benefits: temperature reduction, immediate heat relief, adaptive capacity, public health, economic opportunity, environmental benefits and climate justice. This makes it possible to assess different measures not only for their technical effectiveness, but also for their wider social and environmental benefits.

The Chinatown Heat Action Plan (2025) shows how this approach can be applied at neighbourhood level. The Plan emerged after the neighbourhood's cooling centre was closed for renovation in summer 2024 and a timely alternative was not available. It was then **co-developed** over eight months by residents, community organisations, municipal departments and healthcare staff.

NEW YORK | COOL NEIGHBORHOODS NYC

Heat Vulnerability Index Be a Buddy NYC Home care assistants Targeted allocation

nyc.gov/resiliency

Cool Neighborhoods NYC (2017) is New York City's heat action plan, with a budget of \$106 million structured around mitigation, adaptation and monitoring. A key feature is the introduction of the **Heat Vulnerability Index (HVI)**, developed by the NYC Department of Health and Mental Hygiene in collaboration with Columbia University, combining mortality data from 2000 to 2011 with physical and social variables. The HVI guides the geographical allocation of investments.

The **Be a Buddy NYC** programme builds neighbourhood-based support networks in high-risk areas through the involvement of volunteers trained to carry out phone check-ins and door-to-door visits during heat emergencies. The measure is based on the recognition that most heat-related deaths in New York occur in uncooled homes rather than outdoors. Training nearly 8,000 home care assistants to recognise signs of heat-related illness and connect residents with municipal services is another measure that could be readily adapted to Rome.

PHOENIX | HEAT RESPONSE PLAN

Annual operation plan

Assigned responsibilities

24-hour cooling centres

Homeless individuals

phoenix.gov/administration/departments/heat/heat-response-programs/heat-response-plan.html

Phoenix is the US city with the most operationally advanced heat action plan among those analysed. The Heat Response Plan is updated annually, adopted through a City Council resolution and published with the level of detail of an emergency management plan. The Plan identifies **specific actions with assigned responsibilities, allocated budgets and outcome indicators**. The city has established an **Office of Heat Response and Mitigation with dedicated staff**, representing an example of a **coordinated system for forecasting, alerting and response**, with protocols automatically activated when heat alert thresholds are exceeded.

LOS ANGELES COUNTY | COUNTY HEAT ACTION PLAN (CHAP)

CHAP Data Viewer

Equity

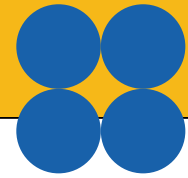
Cool public spaces

Resilient buildings

<https://cso.lacounty.gov/ourcounty-plan/cso-current-initiatives/county-heat-action-plan/>

The Los Angeles County Heat Action Plan, adopted in February 2026, is structured around three objectives: cool public spaces, heat-resilient buildings, and communication and safety programmes. The CHAP stands out for its **systematic use of community-scale vulnerability data**, made available through a **public CHAP Data Viewer** that enables each municipality in the metropolitan area to plan targeted interventions for its own territory.

THE SOUTHERN HEMISPHERE AND DEVELOPING COUNTRIES CONTEXT



SYDNEY | GREATER SYDNEY HEAT SMART CITY PLAN (2025-2030)

Chronic stress and acute shocks Infrastructure cascading failures Social isolation Cool Suburbs Assessment

wsroc.com.au/projects/project-turn-down-the-heat/greater-sydney-heat-smart-city-plan

The Greater Sydney Heat Smart City Plan 2025–2030, adopted in 2025, was developed through 370 interviews and the involvement of stakeholders from health, planning, infrastructure, emergency management and the community sector. A particularly useful feature is its **distinction between two types of heat impacts: chronic heat stress and acute heatwave shocks**, which can trigger cascading effects across urban systems. The Plan illustrates this through the 2009 Melbourne heatwave, when power outages affected up to 500,000 homes and businesses, more than 1,300 train services were cancelled due to rail expansion, and emergency health services came under severe pressure. During the week of 26 January–1 February, 374 excess deaths were recorded.

Research by the Sydney Environment Institute also highlights the **social impacts of extreme heat**. While the 2013 Blue Mountains bushfires strengthened neighbourhood networks, research on the record summer of 2016–17 found that extreme heat in Penrith had the opposite effect, increasing social isolation, reducing daily and social activities, and making it more difficult to access services. This has important implications for heat preparedness: information alone is not enough; **neighbourhood support networks need to be in place before extreme heat occurs**.

BUENOS AIRES | RED DE REFUGIOS CLIMÁTICOS AND PLAN DE ACCIÓN CLIMÁTICA 2050

Voluntary participation Heat alerts Near-zero cost

buenosaires.gob.ar/gcaba_historico/planes-de-accion-climatica-de-la-ciudad/tercer-plan-de-accion-climatica-2050-2021-2025

buenosaires.gob.ar/adaptacion/red-de-refugios-climaticos-de-la-ciudad-de-buenos-aires

Buenos Aires has developed two specific tools to address extreme heat emergencies. The **Red de Refugios Climáticos**, established in 2022 and updated annually, includes **64 spaces across the 15 Comunas of the city**: indoor spaces with air conditioning (schools, libraries, community centres and shopping centres) and outdoor spaces with shade and greenery. The shelters are georeferenced on a public map, accessible through Google Maps, and **activated on a voluntary basis by the hosting institutions**.

Managed by the Subsecretaría de Ambiente, the programme is open to any public or private institution providing a cool, comfortable space with free access. Participating institutions receive official recognition, signage, information materials and access to certified climate change training. The Subsecretaría provides no additional staff or medical assistance: **shelters are not healthcare facilities but temporary cooling and resting spaces**.

The activation mechanism is particularly relevant. The spaces are not permanently open as shelters: they are **activated only during extreme heat events, without interfering with their ordinary functions**. When an alert is issued, the Subsecretaría contacts the focal point of each participating institution to request activation. This model addresses one of the main challenges of climate shelter programmes: the cost of operating dedicated spaces throughout the summer season. In Buenos Aires, **the cost for participating institutions is almost zero, and the network can expand through voluntary participation without requiring significant additional budgets**. The Plan de Acción Climática 2050 adds a strong training dimension: the Programa de Adaptación frente a Eventos Climáticos Extremos has trained more than 7,700 people since its launch in 2017.

MEDELLÍN | PLAN DE ACCIÓN CLIMÁTICA (PAC) 2020-2050

Municipality-level heat island mapping

Multi-indicator vulnerability index

Heat-resilient infrastructure

Inclusive climate action

medellin.gov.co/es/wp-content/uploads/2024/03/PAC_Medellin_Libro_Digital.pdf

The Medellín Climate Action Plan (PAC) 2020–2050, developed with methodological support from C40 Cities and adopted in 2021, is not specifically a heat action plan, but includes a well-developed approach to urban heat. The PAC maps the urban heat island effect at comuna level using land surface temperature, identifying higher temperatures in densely built areas with limited public space, particularly in Comuna 5 (Castilla) and the industrial areas of Comuna 15 (Guayabal).

Heat exposure is assessed alongside **indicators of urban vulnerability, including population density, quality of public space, access to basic services, age and income**. Together, these indicators help identify the areas most at risk, including recently developed settlements on the urban–rural fringe, where unplanned urbanisation has resulted in limited green space and access to services. This combination of heat exposure and social vulnerability is also found in approaches used in Barcelona, New York and Karachi.

Another relevant feature is the **link between mobility infrastructure and urban heat**. The PAC includes resilient transport infrastructure designed to reduce both the impacts of extreme rainfall and the urban heat island effect. Heat is therefore addressed not only as a health risk, but also as an issue for urban planning and infrastructure.

Inclusive climate action is another core component of the PAC, with measures aimed at directing benefits towards vulnerable neighbourhoods through improvements to public space and the expansion of green infrastructure.

AHMEDABAD | HEAT ACTION PLAN

Measured lives saved

4 level heat alert system

15 operational partners

Cool Roofs Program

nrdc.org/sites/default/files/ahmedabad-heat-action-plan-2018.pdf

Ahmedabad was the first city in South Asia to develop a dedicated heat action plan in 2013, following the 2010 heatwave that caused 1,344 excess deaths compared with the seasonal average. The Plan has produced measurable results: a 2018 study published in the Journal of

Environmental and Public Health estimated that the Plan prevented approximately 2,380 deaths in total during 2014-2015, equivalent to around 1,190 per year, compared with the 2007-2010 baseline.

The Plan is structured around **four main strategies**: public awareness and risk communication; early warning system and inter-agency coordination; training of healthcare providers; and reduction of heat exposure. The central operational element is the **four-level colour-coded heat alert system** (White, Yellow, Orange, Red), which triggers specific and differentiated actions for each agency involved. Coordination responsibility is assigned to a designated **AMC Nodal Officer**, with defined tasks before, during and after the hot season. The Plan includes operational checklists for 15 different stakeholders, with specific actions for the pre-season phase, the active season and post-season evaluation. During a Red Alert, power cuts are prohibited, schools close and their buildings become daytime shelters, and construction activities are suspended during peak heat hours.

The Ahmedabad Heat Action Plan is relevant for three main reasons. It demonstrates that **clear inter-institutional coordination** and designated responsibilities can deliver measurable results. It gives particular attention to outdoor workers through dedicated Labour Department actions, including shifting working hours during Red Alerts. It also includes the **Cool Roofs Program**, with mandatory measures for public buildings, voluntary measures for residential buildings and subsidies for low-income housing.

KARACHI | HEATWAVE MANAGEMENT PLAN

Adapted from Ahmedabad Spatial analysis of heat-related deaths Utility involvement Night-time temperatures

ghin.org/resources/karachi-heatwave-management-plan-a-guide-to-planning-and-response

The Karachi Heatwave Management Plan (2017) is Pakistan's first heat action plan, developed with international technical support (CDKN) after the June 2015 heatwave, which caused more than 1,200 deaths and 65,000 heat-related illness cases in less than ten days. The Plan is particularly relevant because it explicitly states that it was developed following the Ahmedabad model, recognised as the first South Asian city to systematically address the health impacts of extreme heat.

Karachi introduced two original methodological contributions. The first is **the spatial analysis of 2015 heat-related deaths**, mapped at Town and Union Council level to identify vulnerable areas. The distribution of deaths reflected urban characteristics (density, lack of green space and building quality) more than thermal exposure alone. This approach is directly comparable with Boston's redlining analysis and New York's HVI, confirming that heat vulnerability has structural, not only climatic, drivers. The second contribution is the three-level alert system (Yellow, Orange, Red Emergency), with thresholds based on both daytime maximum and night-time minimum temperatures. The consideration of **night-time temperatures**, which limit physiological recovery, is an element often underestimated in European heat plans.

A further relevant element is the governance structure, which explicitly includes energy and water utilities as plan actors with defined responsibilities. K-Electric has a formal MoU with the Pakistan Meteorological Department: when extreme heat is forecast, the company commits to reducing or suspending power cuts in the most vulnerable areas. Similarly, the Karachi Water and Sewerage Board has priority water supply obligations during emergencies.

This approach addresses the gap highlighted by the Melbourne 2009 case analysed by Sydney: heat is not only a health issue, but a systemic risk requiring the active involvement of essential infrastructure operators.

FREETOWN | FREETOWN HEAT ACTION PLAN

Chief Heat Officer Africa

Informal settlements

Market women

Replicability

fcc.gov.sl

The Freetown Heat Action Plan (2025) is the first heat action plan in Africa and stands out globally for its **governance model and community-led approach**. Freetown is the capital of Sierra Leone, with 1.2 million inhabitants, 35% of whom live in 82 informal settlements. The country is among the world's most climate-vulnerable countries. The Plan was developed under the leadership of Mayor Yvonne Aki-Sawyer, C40 Cities co-chair, with operational guidance from Eugenia Kargbo, Freetown's Chief Heat Officer since 2021 and the first person in Africa to hold this role. Her work has become a reference model for heat adaptation in Africa through the global network of the Adrienne Arsht-Rockefeller Foundation Resilience Center.

The Plan is structured around three objectives, seven targets and twelve action pathways.

Freetown's physical context is particularly challenging: over the past 50 years, the population has increased almost tenfold, reaching 1.2 million inhabitants, while natural land cover has decreased by 70%. Informal settlements, 95% of which are built with corrugated zinc sheets - a material with high heat absorption capacity - can be up to 6°C warmer than surrounding areas. Average annual temperatures range from 29°C to 33°C, with monthly peaks close to 36°C. The Plan responds through three main pillars.

The first pillar is **communication and community engagement**, aiming to reach 60% of residents by 2030 through multi-channel campaigns, a youth and women programme (**Climate Heat Ambassadors**), and a three-level early warning system to be established by 2026.

The second is **equitable physical adaptation**: the **#FreetownTheTreeTown** programme aims to plant 5 million trees by 2028, with digital monitoring of each tree and an 82% survival rate; shading structures in the city's 17 open-air markets, where around 2,300 women work, improve working conditions; and reflective roofs piloted in the informal Kroobay neighbourhood using recycled materials have reduced indoor temperatures by 6°C.

The third pillar is **financial governance**: the Plan aims to mobilise \$10 million in seed funding by 2028 to scale adaptation solutions, with specific benefits for women and residents of informal settlements.

The table compares the analysed plans against sixteen attributes, selected according to their relevance for the measures included in Rome's Heat Plan.

-  Attribute present and documented in the Plan
-  Attribute not documented or not verifiable based on the available sources

	BARCELONA	VIENNA	BOSTON	SYDNEY	ATHENS	NEW YORK	PARIS	BUENOS AIRES	PHOENIX	LA COUNTY	AHMEDABAD	KARACHI	FREETOWN	MEDELLÍN
EARLY WARNING SYSTEM														
EQUITY AS A GUIDING PRINCIPLE														
INTER-DEPARTMENTAL GOVERNANCE														
CLIMATE SHELTER NETWORK														
DEDICATED HEAT PLAN														
GREEN & BLUE INFRASTRUCTURE														
TRAINING OF SOCIAL & HEALTH OPERATORS														
PROXIMITY PROGRAMMES/ BUDDY SYSTEMS														
ANNUAL MONITORING														
NEIGHBOURHOOD VULNERABILITY INDEX														
NEIGHBOURHOOD FOCUS/ SCALE OF INTERVENTION														
UTILITY INVOLVEMENT IN PLAN GOVERNANCE														
PUBLIC DRINKING WATER														
SPECIFIC MEASURES FOR OUTDOOR WORKERS														
PUBLIC SPACE SHADING														
CHIEF HEAT OFFICER OR DEDICATED FIGURE														

The comparison with international experiences has influenced five main dimensions of Rome's Heat Plan:

VALUES AND OBJECTIVES

In the plans analysed from Boston, New York and Barcelona, equity is not treated as a separate measure, but as a principle guiding the plan as a whole. It informs resource allocation, the identification of priority neighbourhoods and the development of vulnerability indices. This approach informed Rome's Heat Plan, which includes a specific objective to reduce inequalities in heat exposure and risk, prioritising the most vulnerable neighbourhoods and population groups.

SPATIAL VULNERABILITY INDEX

Five of the experiences analysed use spatial vulnerability mapping to identify priority areas for action: Boston and New York (HVI), Barcelona (IVAC), Sydney (Cool Suburbs Assessment) and Karachi (spatial mapping of heat-related deaths in 2015). These approaches combine data on heat exposure, environmental conditions and social vulnerability to produce neighbourhood-level maps that help guide investment and interventions. Building on these approaches, Rome's Climate Office identified Municipio V as the priority area for a pilot study on non-institutional climate shelters and for testing this type of analysis in the Rome context.

CLIMATE SHELTER NETWORK

Rome's climate shelter network combines elements from four international cases. From Barcelona, it adopts the underlying logic of a dense citywide coverage, a mix of indoor and outdoor spaces, and publicly accessible georeferenced mapping. From Vienna, it adopts the model of Cool Zones: free cooling spaces located in already frequented places, without dedicated infrastructure. From Buenos Aires, it draws the operational mechanism: voluntary participation of host institutions, activation during heat alerts and near-zero operating costs for participants. From Boston Chinatown, it incorporates the category of non-institutional shelters (healthcare facilities, universities and schools) as neighbourhood support points in areas with limited public space coverage.



INTERDEPARTMENTAL GOVERNANCE AND INVOLVEMENT OF UTILITIES

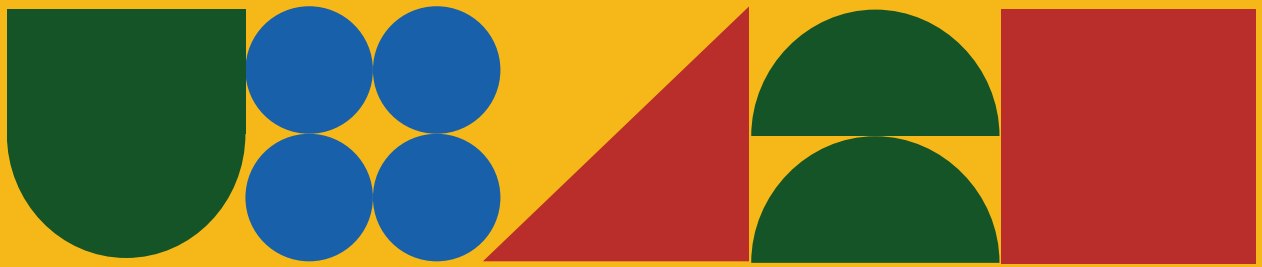
Regarding governance, three experiences are particularly relevant for Rome's Heat Plan. Vienna formalised a steering group involving six municipal departments and four thematic working groups. Barcelona assigns each measure a designated responsible entity and identifies all structures involved in implementation. Athens established a Chief Heat Officer reporting directly to the Mayor, with a dedicated mandate for heat adaptation policies. Karachi adds a dimension often missing from European plans: K-Electric and the water utility are formal actors within the Plan, with written obligations for service provision during heat emergencies. For Rome, this translates into the explicit involvement of public utilities not only as service operators, but as climate governance actors, with defined roles and responsibilities within the Plan.

ANNUAL REVIEW CYCLE

Several of the plans analysed include a regular cycle of monitoring, evaluation and review. Vienna evaluates the measures implemented during the previous summer each autumn, reviews and refines them during winter, prepares for the next season in spring, and launches its communication campaigns from May–June onwards. Phoenix follows a more formal annual process: the Plan is adopted each year by City Council resolution, with clearly defined actions and responsibilities, and includes a mandatory post-season review. Ahmedabad and Karachi show that similar review cycles are also used in very different institutional contexts: in both cities, a post-season report is published and shared with the stakeholders involved at least one month before the following summer season begins.







GLOSSARY



ALBEDO

The fraction of incoming solar radiation reflected by a surface compared with the amount received. Surfaces with high albedo reflect more solar radiation and contribute to reducing heat accumulation, while dark surfaces such as asphalt have low albedo and absorb more energy, increasing urban temperatures. Surface reflectance is therefore one of the key parameters for heat mitigation strategies.



BLUE INFRASTRUCTURE

Urban spaces, networks and features that incorporate or manage water, including public fountains, water bodies, rivers, misting systems and drinking water points. Blue infrastructure can help cool public spaces, improve thermal comfort and provide access to water during heatwaves.



CLIMATE ADAPTATION

A set of measures aimed at reducing the vulnerability of people, infrastructure and places to the current and expected impacts of climate change. In the context of Rome's Heat Action Plan, climate adaptation includes both physical measures in urban spaces, such as green infrastructure, depaving and climate shelters, and operational measures, including early warning systems, communication and training.

C40 CITIES

A global network of more than 100 cities working to address climate change. C40 provides technical support, methodologies and opportunities for cities to share knowledge and experience in developing climate mitigation and adaptation strategies. Rome is a member of the network and has drawn on C40 resources and approaches in developing its Heat Action Plan.

CLIMATE CHANGE

A long-term change in average climate conditions and patterns, driven today primarily by human-induced greenhouse gas emissions. According to the European State of the Climate, climate change is driving sustained warming across Europe, with impacts on temperatures, extreme weather events and climate-related risks.

CLIMATE JUSTICE

A principle recognising that the impacts of climate change are distributed unevenly across populations and territories due to social, economic and historical factors. In the context of Rome's Heat Plan, climate justice implies prioritising interventions in neighbourhoods with higher heat exposure, lower availability of green spaces and greater social vulnerability.

CLIMATE RESILIENCE

The capacity of a system, territory, community or individual to anticipate, withstand, adapt to and recover from climate-related impacts while maintaining essential functions. Climate resilience requires integrated approaches combining physical interventions, governance mechanisms, monitoring systems and social measures.

CLIMATE SCENARIO

A projection of future climate conditions developed through mathematical models based on assumptions regarding GHG emissions and other climate drivers.

CLIMATE SHELTER

A publicly accessible indoor or outdoor place where people can find temporary relief during heatwaves through cooling, shade, ventilation, access to drinking water or other adaptation services. In the context of Rome's Heat Plan, climate shelters are certified spaces forming a distributed network across the city. They include both indoor and outdoor facilities and are identified through a public interactive map according to their characteristics, accessibility and available services.

CO-BENEFITS

Additional benefits generated by an intervention beyond its primary climate objective. In the context of climate shelters, co-benefits may include cultural, recreational, social or environmental functions that improve the attractiveness and continuity of use of a space, helping to reach vulnerable people before heat emergencies occur and reducing social isolation during heatwaves.

COOLING CENTRE

An internationally used term referring to publicly accessible, usually air-conditioned spaces opened during heatwaves to provide temporary relief from extreme heat. Cooling centres are commonly included in heat action plans, particularly in North American cities. In the context of Rome's Heat Plan, cooling centres represent a specific type of indoor climate shelter, while the broader concept of climate shelters also includes outdoor shaded spaces and other cooling locations.

COOLING POVERTY

A condition in which households or individuals do not have access to adequate cooling systems, or cannot afford the energy costs required to maintain safe indoor temperatures. Cooling poverty is a key dimension of vulnerability to extreme heat, as prolonged heatwaves can make homes without adequate cooling unsafe and increase exposure to health risks.



DATACLIME

A climate monitoring platform developed by the Euro-Mediterranean Center on Climate Change (CMCC) for Roma Capitale. It collects, processes and visualises temperature and heat-risk indicators at municipal scale, with annual updates. It is one of the technical tools supporting the monitoring of Rome's Heat Plan and the periodic update of vulnerability assessments.

DEPAVING

The removal of impermeable surfaces (such as asphalt, concrete and artificial paving) and their replacement with permeable materials or vegetated soil. Depaving reduces heat accumulation in urban surfaces, improves rainwater infiltration and contributes to the mitigation of the urban heat island effect. Rome's Heat Plan identifies depaving as one of the priority structural measures, particularly in areas with higher thermal vulnerability.



EARLY WARNING SYSTEM

A forecasting and communication system that enables preventive measures to be activated before an extreme climate event produces significant impacts. In the context of Rome's Heat Plan, the early warning system defines temperature thresholds that trigger operational protocols at different alert levels (typically yellow, orange and red).

EXCESS MORTALITY

The number of deaths exceeding the expected level for a given period, calculated using historical mortality data. Excess mortality is one of the main indicators used to assess the health impacts of heatwaves and other extreme events.

EVAPOTRASPIRATION

The combined process through which water is transferred from soil and vegetation to the atmosphere through evaporation and plant transpiration. Vegetation and permeable surfaces enhance evapotranspiration, helping to cool the surrounding environment and reduce urban temperatures.



GREEN INFRASTRUCTURE

A network of natural and semi-natural elements integrated into the urban environment, including trees, parks, gardens, street vegetation, green roofs and green walls. Green infrastructure contributes to urban cooling through shading and evapotranspiration, reducing heat accumulation and improving thermal comfort.

GLOBAL WARMING

The long-term increase in the average temperature of the Earth's surface, mainly associated with rising concentrations of greenhouse gases in the atmosphere. Global warming contributes to the increasing frequency and intensity of extreme heat events and related climate risks.



HEAT HEALTH WARNING SYSTEM (HHWS)

A heat-health alert system operating in Rome and other provincial capitals of Lazio during the summer season (16 May-16 September). The system is managed by the Lazio Regional Health Service Epidemiology Department (ASL Roma 1), which issues daily bulletins based on 72-hour weather forecasts and defines four risk levels: Level 0 (no risk), Level 1 (pre-alert), Level 2 (high temperatures affecting vulnerable groups), and Level 3 (persistent heatwave lasting three or more consecutive days).

HEAT MITIGATION INDEX

An indicator derived from the biophysical characteristics of an urban area, including albedo, evapotranspiration, vegetation type and density, presence of water bodies, and building density and height. Values close to 1 indicate surfaces with greater cooling capacity, while lower values identify areas with higher heat accumulation. The index supports the identification of priority areas for mitigation and adaptation measures, including nature-based solutions, depaving interventions and climate shelters.

HEAT PLAN

A planning instrument defining prevention, preparedness, response and long-term adaptation measures to reduce health and social risks associated with heatwaves, with particular attention to vulnerable populations. Rome's Heat Plan is the first dedicated heat resilience planning instrument adopted by the city and has a long-term horizon to 2035.

HEATWAVE

A prolonged period of unusually high temperatures exceeding climatic reference thresholds for a specific geographical area. In Italy, the Heat Health Warning System defines heatwave thresholds according to local climatic conditions. Night-time temperatures are a critical factor because insufficient cooling during the night prevents physiological recovery from daytime heat and increases health risks.

HOT DAYS, VERY HOT DAYS, TROPICAL NIGHTS AND VERY HOT NIGHTS

Climate indicators used to measure the intensity of extreme heat in urban areas. Hot Days are days when the maximum temperature exceeds 30°C, while Very Hot Days are days when the maximum temperature exceeds 35°C. Tropical Nights are nights when the minimum temperature remains above 20°C, while Very Hot Nights are nights when the minimum temperature exceeds 25°C. These indicators are particularly relevant for assessing heat-related health risks, as persistently high night-time temperatures can limit physiological recovery from daytime heat exposure. CMCC monitoring for Rome shows a significant increase in the frequency of these indicators in recent years.



IPCC (INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE)

An intergovernmental body established in 1988 by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO). The IPCC assesses and synthesises scientific knowledge on climate change, its impacts and possible response options through periodic assessment reports supporting governments and policymakers.



MICROCLIMATE

The local climatic conditions that differ from the general climate of an area due to the physical characteristics of the surrounding environment, including vegetation, surface materials, building geometry and solar exposure. Microclimatic variability within cities contributes to differences in temperature and thermal comfort conditions between neighbourhoods.

MONITORING AND EVALUATION (M&E)

A structured system for periodically assessing the progress of the Heat Plan measures, evaluating their effectiveness against the Plan's objectives and updating actions based on collected data. The Monitoring and Evaluation system of Rome's Heat Plan includes annual verification after the summer season and a structural review every five years.



NATURE-BASED SOLUTIONS (NBS)

Interventions that use natural processes and ecosystems to address environmental and social challenges, including extreme heat in urban areas. In the context of Rome's Heat Plan, NBS include tree planting, the creation of parks and vegetated areas, depaving interventions and the restoration of permeable soils. They contribute to urban cooling, biodiversity enhancement and climate adaptation.

NATIONAL CLIMATE CHANGE ADAPTATION PLAN (PNACC)

The Italian national planning document defining priorities, objectives and reference actions for adapting to climate change at national, regional and local level. Rome's Heat Plan is aligned with the PNACC framework and uses monitoring indicators consistent with national adaptation objectives.



POWER OUTAGE

A temporary interruption of electricity supply. During heatwaves, the risk of power outages can increase due to higher cooling demand and reduced performance of electricity infrastructure exposed to high temperatures. Power outages during extreme heat events can trigger cascading impacts on essential urban systems, including transport, healthcare and communication services.



REFLECTANCE / SOLAR REFLECTANCE

The capacity of a surface to reflect incoming solar radiation rather than absorb it and convert it into heat. Materials with high solar reflectance, used for roofs, pavements and building surfaces, can reduce heat accumulation and contribute to mitigating the urban heat island effect.

ROME CLIMATE ADAPTATION STRATEGY

The planning document approved by the Capitoline Assembly on 14 January 2025, defining Rome's climate adaptation priorities with a 2050 horizon. Rome's Heat Plan is part of this strategic framework as a specific operational instrument addressing heat risk.



SOCIAL VULNERABILITY

A condition of fragility resulting from economic, social or relational factors that reduce the capacity of individuals or groups to access resources and protect themselves from risks, including extreme heat. Social vulnerability is a key component of heat vulnerability assessments and supports the identification of priority areas and populations.

SISMIG (DAILY MORTALITY RAPID SURVEILLANCE SYSTEM)

A near-real-time epidemiological surveillance system collecting mortality data from registry offices of major Italian cities. It enables the timely detection of mortality peaks potentially associated with heatwaves. Results are published periodically by the Italian Ministry of Health, with city-level information available through dedicated monitoring reports.

SPATIAL EQUITY

A principle ensuring that climate adaptation resources and interventions are distributed according to territorial differences in exposure, vulnerability and capacity to respond. In the context of Rome's Heat Plan, spatial equity means prioritising neighbourhoods with higher heat exposure, lower availability of green infrastructure and greater social vulnerability.

SPATIAL VULNERABILITY INDEX

An analytical tool combining climatic, environmental and socio-demographic data to identify urban areas at higher risk during heatwaves. It considers the overlap between exposure to extreme temperatures and factors affecting the capacity of populations to cope with heat, including age, health conditions, income and social isolation. Areas with the strongest overlap between these conditions are identified as priority areas for intervention.



THERMAL COMFORT

The condition in which people do not experience excessive heat or cold in indoor or outdoor environments. Thermal comfort depends on air temperature, humidity, ventilation, solar radiation and other environmental factors. Improving thermal comfort in public spaces is one of the objectives of Rome's Heat Plan.



URBAN COOLING

The set of natural and artificial processes and interventions aimed at reducing perceived temperatures and improving thermal comfort in urban areas.

Urban cooling measures include green infrastructure, shading, water-related solutions, depaving, reflective materials and cooling systems.

URBAN HEAT ISLAND (UHI)

The phenomenon whereby urban areas experience higher temperatures than surrounding rural or greener areas due to the accumulation and release of heat by artificial surfaces such as asphalt, concrete and buildings. The urban heat island effect is influenced by urban density, surface materials, vegetation availability and building geometry, and contributes to temperature differences between neighbourhoods.

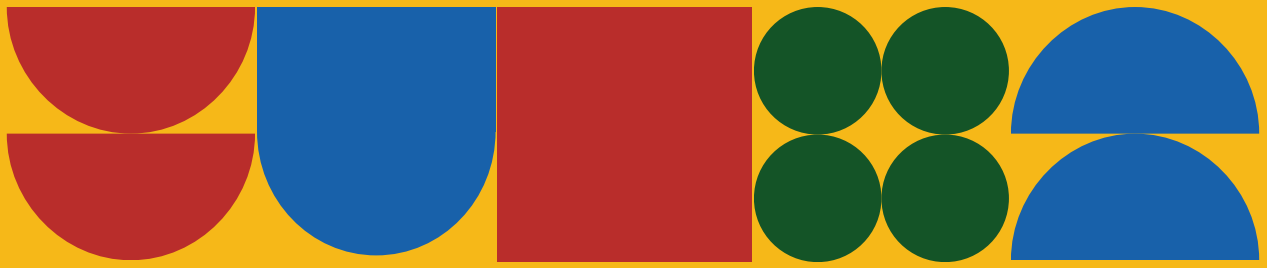
URBAN SHADING

The reduction of direct solar radiation through natural elements (such as tree canopies) or artificial structures (such as shelters, pergolas, canopies and shading systems). Shading reduces perceived temperatures in public spaces and improves thermal comfort during the hottest hours of the day. Rome's Heat Plan includes the development of shaded spaces and routes among its structural adaptation measures.



WATER STRESS

A condition in which available water resources are insufficient to meet the needs of people, ecosystems or urban services. In cities, water stress can be intensified by rising temperatures and prolonged drought periods, affecting vegetation health, urban cooling capacity and the availability of water services during heatwaves.



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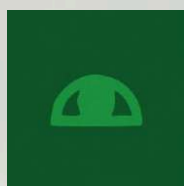
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HEAT PLAN

A strategy to reduce heat impacts
across Rome's neighbourhoods



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