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POLICY PAPER – HOW ARE CITIES ANSWERING THE CALL FOR FOSSIL-FREE COOLING?

DISCOVER HOW EUROPEAN CITIES ARE DEALING WITH THE INCREASED NEED OF COOLING WHILE MOVING ON THE DECARBONISATION OF THEIR ENERGY SYSTEM

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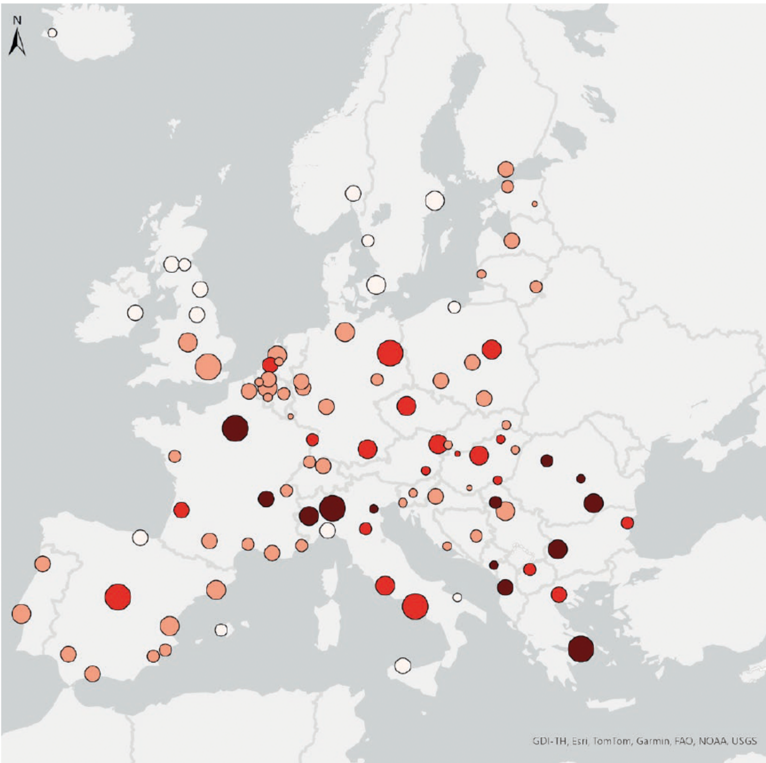
IMAGINE IT'S A SWELTERING SUMMER AFTERNOON. YOU TURN ON THE NEWS AND HEAR THAT YET ANOTHER CITY HAS OPENED EMERGENCY COOLING CENTRES, OFFERING RESIDENTS A TEMPORARY ESCAPE FROM THE SUFFOCATING HEAT. THERE IS TALK OF WATER RESTRICTIONS, OF SCHOOLS ADJUSTING THEIR HOURS TO PROTECT STUDENTS, AND OF WARNINGS ISSUED TO THE ELDERLY AND VULNERABLE, URGING THEM TO STAY INDOORS-NOT JUST TO AVOID THE SCORCHING TEMPERATURES, BUT ALSO TO ESCAPE THE THICK, POLLUTED AIR. THIS IS NO LONGER AN OCCASIONAL EVENT OR A DISTANT CONCERN. ACROSS EUROPE, CITIES ARE ALREADY GRAPPLING WITH INCREASINGLY INTENSE AND MORE FREQUENT HEATWAVES, EACH ONE LEAVING A DEEPER MARK ON PUBLIC HEALTH AND THE QUALITY OF LIFE IN URBAN AREAS[1].

Figure 1 – Urban Heat Island intensity per city



Urban Centre population
- < 100 000
- 100 000 - 250 000
- 250 000 - 500 000
- 500 000 - 1 000 000
- 1 000 000 - 2 500 000
- ≥ 2 500 000

UHI intensity in °C (90th percentile)
- < 1
- 1 - 1.5
- 1.5 - 2
- > 2

Source: Authors' elaboration on DG REGIO population data and on data by European Environment Agency (2020)

0 300 600 km

Source: Authors' elaboration from https://europa.eu/!Nw6qmG

1 IPCC, Sixth Assessment Report, Chapter 11: Weather and Climate Extreme Events in a Changing Climate

The consequences of rising temperatures are amplified in cities, where the risk of health issues and other heat-related hazards are notably higher. A key factor is urban heat amplification, where city temperatures exceed those of surrounding suburban and rural areas—a phenomenon known as urban overheating or urban heat island.

This temperature disparity arises from several factors: extensive sealed surfaces that absorb and re-emit heat, high population density, and the concentration of heat-emitting infrastructure.

The problem is further compounded by limited ventilation (airflow), a lack of green spaces, and the absence of water bodies that could otherwise help regulate urban temperatures. These conditions alter the city's microclimate, degrade air quality, and intensify the ecological footprint of urban areas through the generation of anthropogenic heat[2].

THIS TREND WILL INTENSIFY.

In 2024, the Earth's global temperature reached a dangerous increase of +1.5°C compared to pre-industrial levels. According to Copernicus observations, the average temperatures of the European spring (March–May) and summer (June–August) were the highest on record for these seasons, at 1.50°C and 1.54°C above the 1991–2020 average, respectively[3].

Key temperature statistics for 2024

Region	Anomaly (vs 1991–2020)	Actual temperature	Rank (out of 85 years)
Globe	**+0.72°C** (+1.60°C vs pre-industrial)	15.10°C	**1st highest** 2nd - 2023
Europe	**+1.47°C**	10.69°C	**1st highest** 2nd - 2020
Arctic	**+1.34°C**	-11.37°C	**4th highest** 1st - 2016
Extra-polar ocean	**+0.51°C**	20.87°C	**1st highest** 2nd - 2023

The European region is defined as 25°W-40°E, 34°-72°N. The extra-polar ocean region is defined as 60°N-60°S. Statistics for *globe*, *Europe* and *the Arctic* refer to surface air temperatures, statistics for *extra-polar ocean* refer to the sea surface temperature. Temperatures for Europe and the Arctic are **over land only**.

Data source: ERA5 • Credit: C3S/ECMWF

PROGRAMME OF THE EUROPEAN UNION · Copernicus · Climate Change Service · IMPLEMENTED BY ECMWF

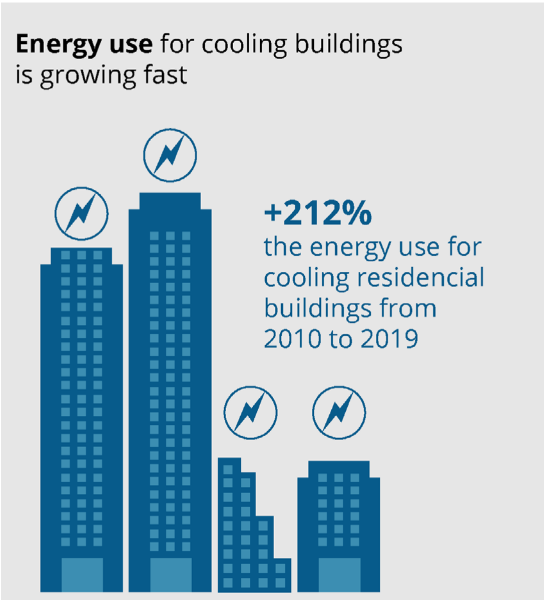
2 Iodice, S., Arbau, L.C., Maistrali, A., Marando, F., Melchiorri M., Proietti, P., Sulis, P., Tainguy, O., Vandecasteele, I., EU cities and heat extremes, European Commission, Ispra, 2024, JRC137891
3 Copernicus, Global Climate Highlights 2024. https://climate.copernicus.eu/global-climate-highlights-2024#:~:text=2024%20had%20a%20global%20average,exceed%201.5%20above%20that%20level.

Mitigation is critical in addressing climate change by reducing greenhouse gas emissions, while adaptation measures are equally essential to lessen exposure and vulnerability and to strengthen the resilience and adaptive capacity of cities. According to the “Cities Refresh Campaign”[4] of the Covenant of Mayors, extreme heat is the most frequently targeted climate hazard in urban adaptation strategies.

This underscores an urgent and growing need to deliver on climate objectives. Central to this effort is the decarbonisation of energy systems. But how can cities implement sustainable, low-carbon solutions to cool their environments? And how can they effectively balance climate mitigation with the need to adapt to rising temperatures?

In this policy paper, discover an overview of public cooling policies at the European level and explore cities in action.

1. KEY FACTS AND FIGURES



Source: EEA, Zero Carbon Hub, 2015; Kolokotsa, 2015; Eurostat

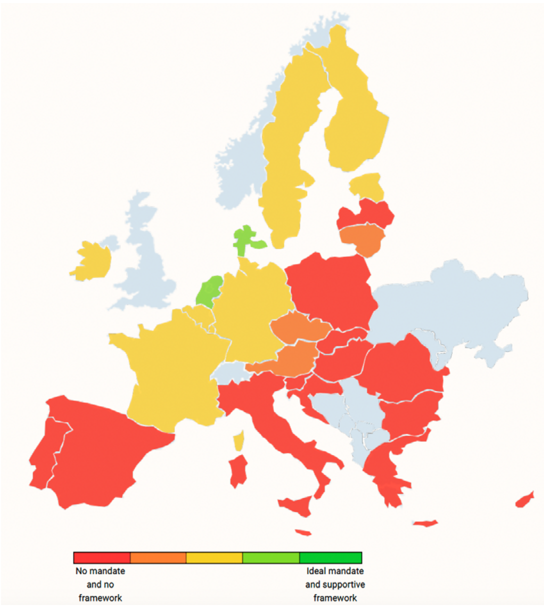
The issue of cooling (both for indoor and outdoor environments) has only recently caught the attention of policymakers. While the European Union has primarily focused on decarbonising electricity and -lately- heat production, the increasing number of deadly heatwaves has raised the level of interest. In 2025, together, heating and cooling account for half of the final energy consumption and nearly a quarter of CO_2 emissions. However, these figures mainly concern heat production. Cooling needs still represent less than 1% of the combined heating and cooling consumption of buildings. Nevertheless, obtaining an exact figure is challenging. At the European level, Eurostat does not monitor energy use for cooling in its energy balances. This is because most space cooling is provided by electric air conditioning units, and European statistics do not differentiate how electricity is used—for cooling, lighting, or other purposes[5].

In the 19 euro-area countries, the amount of final energy used for cooling in residential buildings tripled between 2010 and 2019. During summer 2022, the need for cooling became a serious issue in Greece, Italy, Spain and other countries as a result of long-lasting and repeated heatwaves (Copernicus, 2022) combined with high energy prices and the war in Ukraine[6]. All studies agree that energy use for cooling buildings is likely to increase, and, as a result, the share of energy used for that purpose will also increase. The share of energy used for cooling, both in residential and non-residential buildings, could be between 8% and 9% in 2050, compared with only 2% in 2012[7].

4 https://eu-mayors.ec.europa.eu/en/Cities-Refresh
5 Estimation of European Union residential sector space cooling potential, Mindaugas Jakubcionis, Johan Carlsson, Energy Policy – Vl.101, 2017. https://www.sciencedirect.com/science/article/pii/S030142151630653X
6 EEA, Cooling buildings sustainably in Europe: exploring the links between climate change mitigation and adaptation, and their social impacts, 2022
7 Kranzl, L., et al., 2018, updated in 2021), Hotmaps Heating & Cooling outlook until 2050, EU-28

Moreover, cooling systems can be a significant source of carbon emissions due to their high electricity demand, particularly during peak periods when grids often rely on fossil fuel-based generation. Many existing systems use hydrofluorocarbon (HFC) refrigerants, which are potent greenhouse gases with a high global warming potential. Furthermore, the widespread use of inefficient cooling technologies exacerbates overall energy consumption and contributes to increased emissions.

2. EU STATE OF PLAY



Source: EU Tracker, Energy Cities, 2024

In November 2023, the European Union updated its recast Renewable Energy Directive, introducing new targets for the heating and cooling sector. The recast directive sets a binding goal of a 1.1 percentage point increase per year in the share of renewables from 2026 to 2030. For district heating and cooling networks, an indicative target of a 2.2 percentage point annual increase in renewable energy use is set. Since these targets apply to both heating and cooling together, it is not yet clear how they will specifically impact cooling. In addition, the recast of the Energy Efficiency Directive, adopted in September 2023, introduces further measures for the decarbonisation and efficiency of the cooling sector, treating it on equal footing with heating. For instance, Article 25 requires a cost-benefit analysis to identify the most resource- and cost-efficient ways to meet heating and cooling demands while following the "energy efficiency first" principle. It also introduces a requirement for local authorities with more than 45,000 residents to implement heating and cooling plans. These local plans offer a strategic opportunity to promote collective solutions at the city level, as opposed to relying on individual—often inefficient—cooling systems. Article 26 defines efficient heating and cooling networks based on their share of renewable energy, waste heat, and cogenerated heat. It is worth noting that the EU has also classified heating and cooling networks as "enabling activities" in the transition of the energy sector within its sustainable finance taxonomy. This classification makes them eligible for the green label, allowing them to be considered for sustainable finance initiatives.[8]

But how are member states performing and how are cities supported?

8 Report on capacity-building measures (D4.2), Decarb City Pipes 2050, Julien Joubert (ENC), June 2024. https://decarbcitypipes2050.eu/wp-content/uploads/2024/01/D4-2_Report_on_capacity-building_measures_with-annexes-V2.pdf

During the years 2015-2019, only 6 Member States have reached the target to increase the share of renewable energy sources by 1.1 percentage point in their final heating and cooling demand. None of the 8 Member States with the highest energy demand for heating and cooling have reached this objective during the same period[9]. Energy Cities' ***EU Tracker*** highlighted that while member states are lagging behind in transposing the new provisions on local heating and cooling plans, they are also overlooking the challenge around cooling decarbonisation[10]. Municipalities are essential but they need appropriate support such as: technical expertise and knowledge, access to energy data, appropriate funding and an adequate regulatory framework (check out ***Energy Cities' recommendations***). Today, most EU Member States have insufficient or limited data on existing cooling demands and even less insight into future trends. Without a clear understanding of future developments, designing policies to enhance energy efficiency in this sector becomes impractical.

Aside from renewable energy targets, the EU adopted regulations to avoid the use and emissions of hydrofluorocarbons (HFCs). However, due to different thermodynamic and safety properties of the alternatives, there is no 'one size fits all' solution. The F-gas regulation[11] seeks to phase out the use of HFCs with high global warming potential by promoting alternatives and strengthening enforcement. Those requirements apply to manufacturers, installers and to end-life cycle.

3. SOLUTIONS FOR SUSTAINABLE COOLING

TO REACH CLIMATE NEUTRALITY BY 2050, THE EU MUST REDUCE ITS GREENHOUSE GAS EMISSIONS. SO HOW CAN CITIES PROTECT THEIR CITIZENS WHILE ACTING ON THE CLIMATE EMERGENCY? VARIOUS SOLUTIONS CAN BE CONSIDERED WHEN WORKING ON COOLING:

» **Technological solutions** can provide fossil-free alternatives, such as district cooling or individual air conditioning units (if powered by renewable sources).

District cooling is a system that provides centralised cooling to multiple buildings or an entire district through a network of insulated pipes. Chilled water is produced in a central plant and distributed to consumers, offering energy-efficient, cost-effective, and environmentally friendly cooling compared to individual air conditioning units. This solution can provide collective and clean cooling. For more information and figures on district cooling, check out the presentations of ***our online Community of Practice***[12].

9 Renewable space heating under the revised Renewable Energy Directive. Directorate-General for Energy (European Commission), E-Think, Fraunhofer ISI, TU Wien, Viegand Maagoe , Öko-Institut e.V. 2022
10 EU Tracker Findings and recommendations, Energy Cities, Loar Halleröd & Nicolas Raimondi, September 2024. ***https://energy-cities.eu/wp-content/uploads/2024/09/EU-analysis-Heating-and-Cooling_Update2024.pdf***
11 F-Gas Portal : ***https://climate.ec.europa.eu/eu-action/fluorinated-greenhouse-gases/f-gas-portal_en***
12 ***https://energy-cities.eu/event/join-the-discussion-how-can-we-cool-our-cities/***

MARSEILLE (FRANCE) & VIENNA (AUSTRIA)

As Southern European cities face rising temperatures, Marseille (France) shows how local features—such as being near the Mediterranean Sea—can help with cooling. The city is making bold strides in decarbonising both heating and cooling through the use of sea thermal energy, an innovative technology that utilises seawater for climate control. Currently, Marseille operates two such systems—Massileo[13] and Thassalia—with a combined 4.4 km of piping powered entirely by the sea. These networks have already achieved an 80% reduction in CO_2 emissions related to energy production, and further expansion is underway. To maximise the benefits of this approach, urban planning must also incorporate elements such as shading, reflective surfaces, and green infrastructure. Without these complementary strategies, cities risk continued dependence on inefficient and environmentally damaging cooling systems, worsening both the energy and climate crises[14].

In Vienna (Austria), Wien Energie is constructing a new district cooling centre at the MedUni campus. In this system, chillers produce cold water for room cooling, powered by electricity and district heating. The chilled water is distributed throughout the building via a dedicated pipe network using specialised installation systems, which extract heat from indoor spaces. This extracted waste heat is then upgraded using a heat pump and reused by the MedUni. The result is a highly efficient energy cycle: Wien Energie not only meets all of MedUni's cooling needs in the summer, but also supplies a significant portion of its heating requirements in the winter.

Individual air conditioning units can be a solution; however, inefficient individual air conditioning units and the misuse of fluorinated gases or ozone-depleting substances present false solutions in cooling the built environment. While standalone air conditioning units (air-to-air) can be an easy fix, the appliance most often relies on fossil fuel-based electricity. Additionally, these units release waste heat into the urban environment, exacerbating the urban heat island effect and increasing overall cooling demand. Their widespread use does not provide a scalable or energy-efficient solution for sustainable urban cooling. Fluorinated gases, including hydrofluorocarbons (HFCs), have a high global warming potential, trapping significantly more heat than CO_2. Leaks from cooling systems and improper disposal further contribute to climate change. Similarly, ozone-depleting substances (ODS) such as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) have historically contributed to stratospheric ozone depletion, increasing ultraviolet radiation exposure and environmental risks. To ensure sustainable cooling, policies should prioritise energy-efficient cooling technologies, such as district cooling and passive design strategies, alongside the transition to low-global-warming-potential refrigerants.

Regardless of the technology used, the efficiency of any cooling system is ultimately determined by the building's performance. Proper insulation is essential to reducing cooling demand, highlighting the importance of integrating cooling considerations into renovation projects—such as the selection of materials, insulation levels, and shading strategies.

13 https://www.edf.fr/collectivites/le-mag/le-mag-collectivites/territoires-realisations/massileo-a-marseille-l-eau-de-mer-souffle-le-chaud-et-le-froid
14 https://eu-mayors.ec.europa.eu/en/marseilles-sea-side-detox

» **Integrated urban planning** is a key element to achieve cost-effective cooling policies. Integrated urban planning involves designing cities with strategies that reduce heat and improve thermal comfort. It combines urban design, green spaces, energy-efficient buildings, and cooling technologies to manage urban heat islands, optimise energy use, and enhance climate resilience, ensuring sustainable and equitable cooling solutions for all residents. At national level, National Building Renovation Plans can become a powerful leverage to boost the integration of cooling solution in the built environment[15]. In parallel, housing policies must also address cooling needs to ensure access to affordable and decent living conditions.

STUTTGART (GERMANY) & MARSEILLE (FRANCE)

In Stuttgart (Germany) —a major industrial hub— cooling breezes are a scarce but vital resource. The city sits in a river valley, encircled by hills that trap heat and pollution, creating an especially harsh environment during the hot season. To counter this, Stuttgart has developed several "ventilation corridors"—broad, tree-lined streets that channel fresh air from the surrounding hills into the urban core. Additionally, building restrictions are enforced in certain zones to prevent new developments from obstructing natural airflow. A Climate Atlas was developed for the Stuttgart region, presenting the distribution of temperature and cold air flows according to the city's topography and land use. Based on this information, a number of planning and zoning regulations were recommended that also aim at preserving and increasing open space in densely built-up areas. As a result, over 39% of the Stuttgart area is protected, green areas (urban forests, trees in parks and in streets) have been expanded and ventilation corridors have been preserved from urban expansion[16].

To address rising summer heat, Marseille (France) is part of the European Cool Noons project, developing two "cool paths" with shaded, ventilated, and water-integrated routes. Designed through citizen workshops, the project prioritises cooling strategies like increased vegetation, shaded areas, and improved air circulation. By summer 2025, new public space features will help cool the city, with maps guiding residents and tourists to these cooler areas[17].

Source: Quartier du Panier – Ville de Marseille

MARSEILLE (FRANCE)

15 https://caneurope.org/content/uploads/2025/06/Briefing-National-Building-Renovations-Plans.pdf
16 https://climate-adapt.eea.europa.eu/en/metadata/case-studies/stuttgart-combating-the-heat-island-effect-and-poor-air-quality-with-green-ventilation-corridors
17 https://eu-mayors.ec.europa.eu/en/%20Refreshing-Marseille-with-cooler-greener-and-accessible-public-spaces

» **Nature-based** solutions can provide additional benefits, improving air quality and biodiversity in dense urban areas. Nature-based solutions use natural systems like vegetation, green roofs, urban forests, and water bodies to mitigate heat. These solutions enhance urban cooling, reduce the urban heat island effect, improve air quality, and increase biodiversity, while providing sustainable, cost-effective alternatives to traditional cooling methods.

BESANÇON (FRANCE) & POZNAŃ (POLAND)

In Besançon (France), the city centre was among the warmest place in the city. Place de la Révolution, framed by heritage buildings and archaeological history, was once entirely paved over. While visually striking, the square lacked shade or comfort. It was a space to pass through, not linger in. The city wanted to reclaim this space for both people and nature. Recently, the city began transforming the square: planting young trees, introducing wild grasses, placing benches, and using more permeable ground materials. The goal? To make the square a cool, welcoming place for socialising, relaxing, playing and meeting, while also buffering the city against heat and heavy rains. Though discrete for now, those young trees will one day form a dense, cooling canopy. This strategy was helped by the creation of a local heat map. This mapping exercise acted as a turning point in Besançon's adaptation planning, sounding the alarm on exactly how climate affects our built environment, and how our built environment intensifies climate events. The city adopted broader strategies that connected climate, water, and urban planning. For example, the Plan Ô combines water flow maps, drought plans, and infrastructure upgrades to prepare for the extremes to come[18].

In Poznań (Poland), the city has made it a priority to restore and develop one of its most important urban planning assets: the "green wedges and rings system" that cools the city. Nature-based solutions are being implemented to overcome the current fragmented distribution of green wedges and rings. Nature-based solutions in kindergarten and school gardens support ventilation and cooling in the city as well as contribute to climate change adaptation[19].

Source: Besançon's Heat Mapping, Energy Cities, 2025

BESANÇON (FRANCE)

18 https://energy-cities.eu/people-and-nature-at-the-heart-of-resilience/
19 https://climate-adapt.eea.europa.eu/en/mission/solutions/mission-stories/natural-playgrounds-and-schoolyards-story17

» **Energy sufficiency measures** must be at the core of any cooling solution. For IPCC author Yamina Saheb, sufficiency policies are “a set of measures and daily practices that avoid the demand for energy, materials, land, and water while delivering human wellbeing for all within planetary boundaries”. This framing draws a clear line between sufficiency and efficiency, a closely related concept that relies on technical progress rather than reduced demand[20]. In the context of cooling, sufficiency measures range from improving energy efficiency to resource-wise usage and behavioral change.

For instance, smarter building design—prioritising high insulation, passive shading, reflective facades, and shared conditioned spaces— can help curb redundant cooling demand. Peak demand management, such as delaying air conditioning or moderating setpoints to 24–25 °C, alleviates grid stress and avoids fossil-fuel backup. Cultural norms also, such as adapted clothing in offices during warm spells further support comfort with lower energy use.

VALENCIA (SPAIN) & PUGLIA REGION (ITALY)

In Valencia (Spain), the city is building a heat-resilient city through a network of climate shelters, low-tech cooling solutions, and community engagement—protecting vulnerable groups from rising temperatures with adaptive planning and coordinated local action. The Coolturate project (2023–2024), funded by the ***Energy Poverty Advisory Hub (EPAH)***, trained over 30 local agents on summer energy poverty and heat adaptation. The programme offered two tracks: one focused on household-level interventions (e.g., ventilation, shading, low-tech cooling), and another on community-scale strategies[21].

In the Puglia Region (Italy), authorities have enacted an ordinance to limit outdoor agricultural work during peak heat. Although the evaluation of its effects will take time, this measure is already raising awareness about heat related injuries in the workforce[22]. The WORKCLIMATE project is a two-year national initiative aimed to assess the impact of environmental thermal stress on workers’ health and productivity and to identify interventions to reduce the risk. As part of the project, an integrated weather-climatic and epidemiological heat warning system has been developed to improve knowledge on the effect of thermal stress conditions on workers and to estimate the social costs of injuries at work.

Source: Example of Climate Shelter on the Climate Change Observatory.
© Valencia Clima I Energia, 2025.

VALENCIA (SPAIN)

20 Sufficiency : The missing pillar for a resource-wise Europe, Energy Cities, Selma Guyon, 2023 - ***https://energy-cities.eu/wp-content/uploads/2023/12/Sufficiency-the-missing-pillar-for-a-resource-wise-Europe.pdf***
21 ***https://eu-mayors.ec.europa.eu/en/Valencia-Climate-Shelters-Network***
22 ***https://climate-adapt.eea.europa.eu/en/metadata/case-studies/protecting-outdoor-agricultural-workers-from-extreme-heat-in-puglia***

4. BEYOND COOL AIR

MITIGATION AND ADAPTATION MEASURES TO THE EFFECTS OF CLIMATE DISRUPTION ARE NOT JUST A TECHNOLOGICAL DEBATE, AND THEY SHOULD NOT BE. PUBLIC POLICIES FOR DECARBONISATION AND ADAPTATION MEASURES ARE ALSO POLITICAL AND SOCIAL. BEYOND PROVIDING COOL AIR, DECISION MAKERS - INCLUDING CITIES - SHOULD CONSIDER THE FOLLOWING:

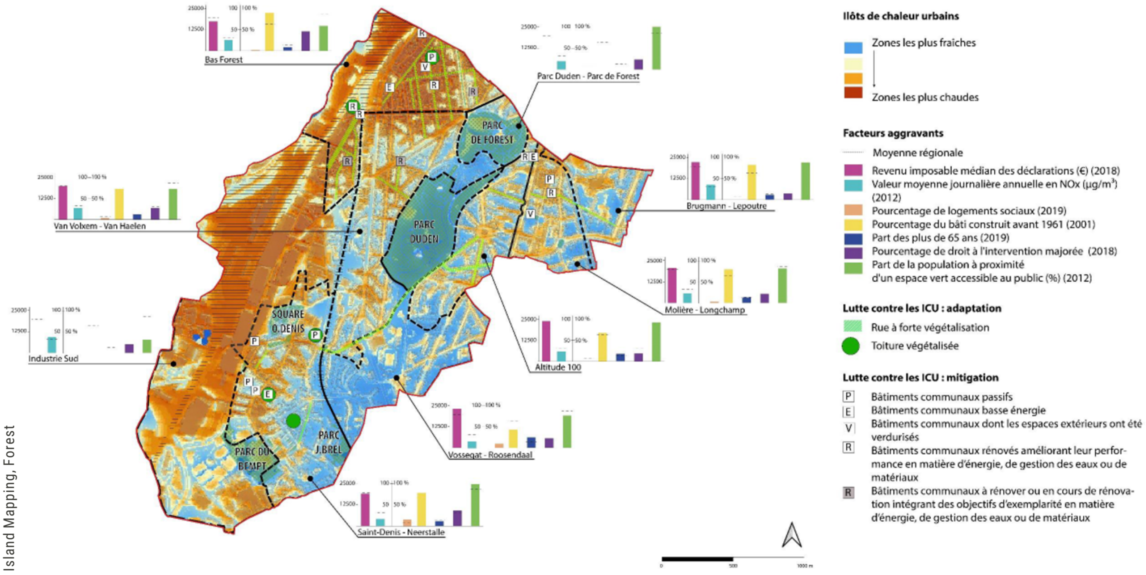


Figure 14. Répartition des ilots de chaleurs urbains et mesures communales d'adaptation et de mitigation aux ICU (2022), revenu imposable médian des déclarations (€) (2018), valeur moyenne journalière annuelle en NOx (µg/m³) (2012), pourcentage de logements sociaux (2019), pourcentage du bâti construit avant 1961 (2001), part des plus de 65 ans (2019), pourcentage de droit à l'intervention majorée (2018), part de la population à proximité d'un espace vert accessible au public (%) (2012), à l'échelle des quartiers forestois. (Sources : Bruxelles-Environnement ; Monitoring des quartiers ; AIM; 2018 Commune de Forest, 2022.)

Source: Heat Island Mapping, Forest

» **Protecting the most vulnerable** – Already existing social and environmental inequalities amplify the negative effects of climate disruption. The most vulnerable carry a double burden. Recognising this, the municipality of Forest (Belgium) emphasised the importance of addressing these disparities in its climate plan. A study[23] led by the city revealed that residents of less green neighborhoods and older housing are disproportionately affected by the "urban heat island" effect. These communities also tend to have lower-than-median taxable incomes. Additionally, certain groups—such as the elderly and those who spend extended periods outdoors—are particularly vulnerable. Therefore, the need and access to cooling solutions vary. To develop effective solutions, municipalities must actively involve citizens in policymaking. Local authorities have numerous ways to engage the community, including citizen assemblies, co-creation processes, consultations, surveys, and public meetings. By integrating diverse perspectives, cities can create more inclusive and equitable climate strategies. Check out ***the report of our Community Of Practice #2***[24].

23 INSTITUTIONNALISER LES INÉGALITÉS ENVIRONNEMENTALES : LE CAS DU PLAN D'ACTION CLIMAT FORESTOIS, De Muynck and al, 2022. ***https://www.researchgate.net/publication/364677402_Institutionnaliser_les_inegalites_environnementales_le_cas_du_Plan_d%27Action_Climat_Forestois***

24 ***https://energy-cities.eu/event/join-the-discussion-how-can-we-cool-our-cities-2***

BRUSSELS-CAPITAL REGION'S (BELGIUM)

The Brussels-Capital Region's (Belgium) project to green school yards is a good example of co-creation (also in Barcelona, Paris and Rotterdam). The initiative focuses on transforming traditional, often concrete-dominated schoolyards into more natural and green spaces. This transformation not only enhances the aesthetic appeal of the playgrounds but also promotes biodiversity, provides students with a closer connection to nature, and contributes to improved environmental quality in urban areas. By integrating green spaces into school environments, the programme seeks to create healthier and more engaging settings for students, fostering both educational and ecological benefits[25].

» **Providing affordable energy for all** – 35 to 72 million people across the EU are facing energy poverty, with strong social implications today. Energy poverty also displays significant disparities across EU countries, as it is influenced by very heterogeneous national realities, including geography, natural resources, climate, infrastructure, national public policies, etc. Furthermore, cultural aspects can explain differences in self-reporting energy deprivation conditions. For instance, in Greece and Bulgaria, nearly 30% of the population is energy poor by at least two indicators, while in Western and Northern EU countries, this figure drops below 5%[26]. However, in the context of geopolitical tensions and war on the European continent, the most cost-efficient manner to reduce the energy bill is to rapidly phase out fossil fuels and develop fossil-free energy systems. Renewable power is increasingly cost-competitive with fossil fuels – 81% of renewable capacity additions in 2023 produced cheaper electricity than fossil fuel alternatives – and the accelerated deployment of renewable power continues to trigger technology advancements in a virtuous cycle of production efficiency and cost reduction[27]. Cities moving to decarbonise their cooling energy systems will contribute to lower energy bills and secure affordable, renewable and local energy.

CITY OF MUNICH (GERMANY)

The City of Munich (Germany) started developing its own cooling network in 2014, consisting of eight groundwater plants of 16 MW, and operated by Stadtwerke München (SWM), the municipal energy utility. The main source is the Isar River with remaining underground streams. It supplies both heating and cooling, built in the same system. Two ways of generating cold are used: direct cooling via a heat exchanger between the groundwater and the cooling networks or via heat pumps. According to Patrick Krystallas from SWM, the district cooling network allows the city to save energy, between 50-70%, compared to decentralised cooling supplies[28].

25 This project is part of "COOLSCHOOLS". Coolschools is an applied-research project aiming to analyse the multiple co-benefits of implementing nature-based solutions (NbS) for climate adaptation in school environments. We will explore how these nature-based climate school shelters can act as drivers of transformation at larger urban scales through an inter- and transdisciplinary approach that puts the focus on the needs and views of children and youth. https://coolschools.eu/
26 Who's energy poor in the EU? It's more complex than it seems, Join Research Center, September 2024. https://joint-research-centre.ec.europa.eu/jrc-news-and-updates/whos-energy-poor-eu-its-more-complex-it-seems-2024-09-25_en
27 IRENA (2024), Renewable power generation costs in 2023, International Renewable Energy Agency, Abu Dhabi.
28 The advantages of district cooling – the case of Munich, Decarb City Pipes 2050, Julien Joubert (ENC), June 2024.

5. KEY RECOMMENDATIONS FOR COOLER CITIES

FOR CITIES

1. **Heating and cooling planning (a mandatory requirement for municipalities above 45.000 inhabitants) provides an excellent opportunity to assess a city's cooling needs and potential. Cities should use this opportunity to address both heating and cooling. In short term, cooling demand will be a challenge in most EU cities. *Check out the EU Tracker* of Energy Cities to identify both the legal and technical support available in your country.**

2. **Citizens should be at the core of any strategy. Cities are best positioned to involve citizens in cooling planning. Participatory processes and stakeholder engagement should not be overlooked. Since cooling needs arise from various contexts (e.g., elderly individuals, children, workers, and vulnerable households), it is essential to integrate these challenges into the planning process.**

3. **Fossil-free cooling solutions already exist (e.g. district cooling), but additional solutions may come from nature-based approaches or integrated urban planning. Cities should maximise these opportunities to enhance energy efficiency, improve air quality, and benefit the natural environment.**

FOR NATIONAL AND EU AUTHORITIES

1. **National or/and regional authorities should develop guidelines and provide support for cities addressing their cooling needs. This should include regulations for integrating passive cooling solutions, technical assistance, and policies to decarbonise cooling-related energy demand. These measures must be part of national actions supporting cities in their local heating cooling planning.**

2. **Monitoring and gathering data to map the heat island effect or the lack of cool areas should be at the centre of any cooling strategy. Therefore, cities should be given the proper technical and financial support to collect and access these data.**

3. **Nature restoration measures should be mobilised to provide nature-based solutions for cooling. National authorities should design such policies in consultation with local authorities while integrating them into urban policies.**

4. **The EU Heating and Cooling Strategy (first semester of 2026) should include guidance on cooling planning and cooling solutions. The strategy must inform on the technical and financial support available for cities, ensuring that EU and national legal frameworks are fit for the deployment of sustainable cooling solutions. More recommendations on *Energy Cities website*.**

ENERGYCITIES

www.energy-cities.eu

in energy cities

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Energy Cities' mission is to empower cities and citizens to shape and transition to future-proof cities. We showcase concrete alternatives deployed by cities, we advocate changing policy and economic governance at all levels and we foster wide cultural change leading to a future-proof society. Energy Cities community is composed by local leaders of thousands of cities in 30 European countries.