



MESTNA OBČINA MARIBOR

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CENTRAL EUROPE



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Ready4Heat

## Summary of the Strategy and measures of Heat Action Plan for the Municipality of Maribor

The **main objective** of the Strategy and Heat Action Plan for the mitigation and prevention of the negative effects of heat waves in the Municipality of Maribor (MOM) is to ensure the health and well-being of the inhabitants and visitors of Maribor and to provide suitable living and working conditions, which will enable the sustainable development of the municipality in the years to come. This will be achieved by implementing short, medium and long-term measures which, in addition to information and education, include greening the municipality and designing adequately cooled and ventilated public spaces. The measures pay particular attention to vulnerable groups such as the elderly, children, pregnant woman, people with pre-existing medical conditions, the disabled and outdoor workers.

The coordination of the implementation and verification of the impact of the measures and the monitoring of the plan will be carried out by the Municipal heat action plan steering group, which will actively cooperate with all the stakeholders already involved in the preparation of the Action Plan. The implementation of the actions will be regularly reported to the Municipal Administration and the City Council of the Municipality of Maribor.

The aim of the Strategy and Heat Action Plan of the Municipality of Maribor is to increase the municipality's resilience to heat waves and to protect people's health and provide them with suitable living and working conditions. The strategy focuses on identifying and protecting the most vulnerable groups, such as the elderly, children, pregnant women, infants and outdoor workers, as well as people with pre-existing medical conditions, and on implementing measures that can be implemented in the given circumstances.

### The objectives of the strategy are:

1. protect people, especially vulnerable groups, by raising awareness of the dangers of heat waves and implementing measures to reduce the impacts of heat.
2. adapting infrastructure and the urban environment by promoting urban solutions that contribute to reducing the heat effect, including the expansion of green spaces, the use of appropriate materials and access to cool public spaces.

3. providing information and education through appropriate and rapid dissemination of information on weather conditions, to vulnerable groups, the organisation of educational workshops and other activities to raise awareness of the risks associated with heat waves and best practices for self-protection.

The strategy is based on cooperation between different stakeholders, including health services, educational institutions and other organisations. The development of the strategy was prepared in the framework of Ready4Heat project, which includes vulnerability analysis and data on past, present and future climate conditions in Maribor. The aim of the strategy is not only to respond to the immediate consequences of heat waves, but also to reduce risks in the long term and improve the quality of living and working in the municipality, with a focus on sustainable development and improving conditions for residents and visitors to the municipality.

Heatwaves pose a serious threat to public health, increasing mortality and health problems, especially among older people and those with chronic conditions such as cardiovascular disease, respiratory diseases, mental illness, diabetes and obesity. In recent years, a number of studies have confirmed the link between heat waves and increased mortality and morbidity. Research has shown that extreme heat waves can cause a significant increase in deaths, especially among vulnerable populations.

Heat stress can lead to a variety of health problems such as heat exhaustion, heat stroke and exacerbation of pre-existing chronic diseases. Summer heat waves can lead to increased hospitalisations for cardiovascular and respiratory problems. Vulnerable groups include the elderly, the chronically ill and those who work outdoors

#### Basic climatic characteristics of the area

Maribor is in a temperate warm zone and has a temperate continental climate of eastern Slovenia, also known as a sub-pannonian climate. It is characterised by a more pronounced continental rainfall regime. The average air temperature in 2023 was 11.6 °C. The lowest average air temperature in 2023 was 6.9 °C and the highest was 17.2 °C. Winters are rather cold, springs are early, summers are hot and autumns are warm. Maribor's climate is characterised by sunny days. Fog is not very common in Maribor; it occurs in November and December as humidity and cloudiness increase. Data for Maribor show that the heat stress will increase in the future. By mid-century, significant climate change will be observed. The number of hot days will almost double and tropical nights, which are currently rare, will become more frequent. The increasing number of consecutive hot days portends longer heat waves, increasing the risk of heat stress, especially for vulnerable groups. More summer days indicate shorter seasons and faster transitions from winter to summer, which may bring additional challenges for the environment and the population.

The demographic structure of Maribor reflects the diversity that characterises Slovenia's second largest city. According to the data, majority of city population is the middle-aged generation, while the number of older inhabitants is gradually increasing. This increase has important implications for the planning of urban services and infrastructure, especially considering increased vulnerability of this group during heat waves.

In the framework of the Strategy and Heat Action Plan for the Municipality of Maribor, an annex "List of Maribor tree species" has been prepared about urban tree species for Maribor that,

according to different criteria, can thrive well in different urban locations such as: parks, other public green spaces, roadside areas, car parks and other areas in Maribor. The material also contains requirements for tree seedlings, main guidelines for execution of planting and maintenance of young urban trees.

## **Heat protection measures for the Municipality of Maribor**

HEAT WARNING SYSTEM

PUBLICLY ACCESSIBLE PLACES TO COOL DOWN DURING HEAT WAVES

TEMPORARY SHADE AND COOLING FOR OUTDOOR PUBLIC AREAS

DRINKING WATER IN PUBLIC SPACES

GUIDELINES FOR THE PROTECTION OF VULNERABLE GROUPS DURING HEAT WAVES

RAISING AWARENESS AMONG THE POPULATION

EDUCATION AND TRAINING

URBAN PLANNING

IMPROVING INSULATION OF BUILDINGS

INDOOR COOLING

PLANTING NEW TREES TO INCREASE GREENING

URBAN GREENING PLAN AND REDUCTION OF CONCRETE SURFACES AND SHADING

WATER SAVING

ROOFTOP SOLAR POWER AND ENERGY STORAGE

MONITORING THE INCREASE IN MORBIDITY AND MORTALITY DURING HEAT WAVES

### **K1 SHORT-TERM OR URGENT ACTION: WARNINGS AND COMMUNICATION**

#### **HEAT WARNING SYSTEM**

The Environment Agency of the Republic of Slovenia (ARSO) issues warnings about upcoming heat waves or high temperatures. These warnings include information on the expected temperatures, the duration of the heat wave and recommendations for protection. The aim of the measure is to inform the local population in a timely and effective manner about the approaching heat wave and to ensure the safety of vulnerable groups in particular.

The public can be informed about the coming heat wave (and how to protect themselves and others) through various information channels:

- Website,
- social media channels (Facebook, Twitter, Instagram),
- displaying warnings on screens in the city (e.g. at train/bus stations),

- targeted alert and advice mailings.

Financial assessment: 5.000 EUR annually

## **K2 SHORT-TERM OR EMERGENCY MEASURE: SHADE AND COOLING**

### **PUBLICLY ACCESSIBLE SPACES FOR COOLING DURING HEAT WAVES**

An inventory of public spaces in the MOM will be used to select suitable spaces for cooling. Opening public spaces for cooling during heat waves, such as community halls located in the city districts or other suitable spaces, will allow residents to cool down.

Financial assessment: 50.000 EUR per year gradually implementing

## **K3 SHORT-TERM OR EMERGENCY MEASURE: SHADE AND COOLING**

### **TEMPORARY SHADING AND COOLING FOR OUTDOOR PUBLIC AREAS**

The MOM will carry out a survey and inventory of outdoor public areas where large numbers of people congregate and are exposed to direct sunlight and have no means of retreating into the shade. Based on this inventory, locations with the greatest need for shading will be identified, where canopies, pavilions, temporary mobile green islands, water sprinklers, drinking fountains, etc. can be installed.

Financial assessment for the gradually implementation: 500.000 EUR for infrastructure and then 100.000 EUR for maintenance and equipment

## **K4 SHORT-TERM OR EMERGENCY MEASURE: SHADE AND COOLING**

### **DRINKING WATER IN PUBLIC SPACES**

During heat waves, drinking fountains can be installed in public places or drinking water can be organised.

Financial assessment for the gradually implementation according to yearly municipal budget: 100.000 EUR annually

## **K5 SHORT-TERM OR URGENT ACTION: GUIDELINES**

### **GUIDELINES FOR THE PROTECTION OF VULNERABLE GROUPS DURING HEAT WAVES**

The municipality of Maribor, in cooperation with stakeholders, will develop guidelines for the protection of different vulnerable groups from the effects of heat waves, including recommendations for adjusting working hours, daily routines and living conditions. The guidelines will be aimed at businesses, schools, kindergartens, sports organisations and health care facilities and will include measures to ensure the supply of drinking water, the arrangement of cool and shaded areas and the adaptation of activities to the weather conditions.

Example: For pregnant women and infants, the guidelines will offer advice on monitoring indoor temperatures, preventing dehydration and ensuring access to air-conditioned rooms. For children, the guidelines will include recommendations on informing parents and children about heat protection, adjusting school and kindergarten timetables, and improving shading and ventilation of rooms. For outdoor workers, it will recommend measures to adjust working hours, use protective clothing and arrange cool break areas. For athletes, the guidelines will include the creation of cooled sports facilities, the greening of playing fields and the organisation of educational workshops on heat protection. These measures will improve conditions for different vulnerable groups and reduce the risks to their health during heat waves.

Financial assessment: 5.000 EUR

## **S1 Medium-term actions: AWARENESS, CAPACITY BUILDING AND RESILIENCE BUILDING**

### **RAISING AWARENESS AMONG THE POPULATION**

Raising awareness among the population about the risks of heat waves and appropriate protective measures using educational materials. It is important that residents understand the risks of heat waves and are aware of preventive measures. Awareness raising may include information on symptoms of heat stroke, recognition of signs of dehydration and tips for hydration.

Here are some examples:

- Poster and billboard activities: Putting up information posters and billboards in public places such as bus stops, train stations, health centres and parks.
- Press releases at the beginning of summer: Press release campaigns informing people about the coming heatwaves and how to protect themselves.
- Social media activities: Use social media platforms to share information, tips and videos on heat protection.
- Public events/information stands: Organising public events and setting up information stands at events where residents can get information and advice.
- Information material for vulnerable groups: Distribution of leaflets, brochures and other information material to vulnerable groups such as the elderly, mothers with young children and the homeless.

Financial assessment: 5.000 EUR annually

## **S2 Medium-term actions: AWARENESS, CAPACITY BUILDING AND RESILIENCE BUILDING**

### **EDUCATION AND TRAINING**

The Municipality of Maribor will organise workshops and other awareness raising and knowledge building activities in cooperation with health facilities, schools and social services. The aim is to equip these groups with knowledge on the impact of heat on health and protection against heat waves so that they can effectively support vulnerable groups during extreme temperatures.

Possible activities:

Organisation of workshops: Workshops will be held throughout the year, with more intensive activities before the summer. These include the preparation and distribution of information materials through health facilities, schools and social services.

First aid courses: First aid courses will include topics on heat waves, how to recognise the symptoms of heatstroke and appropriate action.

3. Counselling: Specific counselling programmes for vulnerable groups will include information on how to protect themselves from heat and prevent dehydration.

4. Dissemination of information and advice via the internet and social networks.

Financial assessment: 25.000 EUR annually

## **D1 Long-term measures: buildings**

### **URBAN PLANNING**

The objectives of the Climate Change Adaptation Strategy will be integrated into spatial planning documents, covering the development of green spaces, cooling islands and the reduction of urban heat islands.

This may include:

Green spaces: Planning and development of parks, green belts and other green spaces that will contribute to cooling the city. So-called 'cold islands' will be created by planting trees and shrubs and installing water features such as fountains and sprinklers.

2. Green roofs and facades: Encourage the construction of green roofs and facades on public and private buildings. Green roofs and facades will improve the energy efficiency of buildings, reduce the heat island effect and contribute to cooling the surroundings.

3. Irrigation systems and water retention basins: Construction of irrigation systems and water retention basins to allow efficient use of rainwater for watering green areas and plants. The detention basins will help to reduce the pressure on water resources during dry periods and improve the maintenance of urban vegetation.

4. Promotion of green building: Inclusion of measures to promote green building and energy efficiency in buildings. This includes the use of sustainable materials, improving building insulation, optimising ventilation and the use of renewable energy sources.

5. Education and awareness-raising: organising workshops and campaigns to raise awareness among residents and professionals about the importance of adapting to climate change. Information on the benefits of green spaces, green roofs and facades, and efficient watering systems.

Financial assessment: 10.000 EUR annually

## **D2 Long-term measures: buildings**

### **IMPROVING THE INSULATION OF BUILDINGS**

Improving the insulation of public and private buildings with energy efficient materials can reduce the need for air conditioning and ensure moderate indoor temperatures. This can be done by installing highly insulating materials on roofs, walls and foundations of buildings, passive cooling and installing multi-layer windows and doors with high insulation value.

Examples of activities:

- Roof insulation: installation of materials with high insulation value, such as roof panels with high thermal insulation.
- Wall insulation: use of insulating materials for facades, including contact facade insulation and ventilated facades.
- Foundation insulation: insulation of foundation walls and floor slabs to reduce heat loss.
- Passive cooling: use of natural ventilation systems and shading to reduce the need for artificial cooling.
- Multi-pane windows and doors: installation of windows and doors with high insulation value to reduce heat loss and increase energy efficiency.

Financial assessment: 200.000.000 EUR continuously

### **D3 Long-term measures: buildings**

#### **INDOOR COOLING**

Indoor cooling will be achieved by putting in place passive and/or active thermal protection measures that will help to reduce overheating in buildings, improve the living environment and reduce the need for active cooling, which is achieved by installing chillers.

Passive cooling measures:

1. External sun protection: installation of folding and sliding blinds, roller blinds, awnings, shutters and solar sails to prevent direct sunlight from entering the interior of buildings, thereby reducing space heating.
2. External shading with deciduous trees: Planting trees next to buildings to provide natural shade and reduce heat absorption through their canopies.
3. Interior sun protection: Use of interior blinds, vertical and horizontal slats and foil screens to further reduce sunlight penetration and space heating.
4. Ventilation concepts: Optimisation of ventilation systems for efficient night ventilation when outside temperatures are lower, allowing cooling of rooms without the use of mechanical air conditioning.
5. Colour design of buildings: Use of light colours on the external surfaces of buildings to exploit the albedo effect, which reflects sunlight and reduces surface heating.

Developing a plan for priority buildings: the municipality will develop a plan to put in place passive cooling measures in priority buildings such as kindergartens, primary schools, health centres, waiting rooms and public transport and stations.

This plan will include:

- Identification of priority buildings: Review and identification of buildings that have the highest need for cooling due to high load or sensitive users (children, patients).
- Implementation of measures: Planning and implementation of measures such as installation of external and internal sun protection, planting of trees for natural shading and optimisation of ventilation systems.
- Monitoring and maintenance: Setting up a system to regularly monitor the effects of passive measures and ensure that they are properly maintained to ensure that they work effectively in the long term.

Financial assessment: 1.000.000 EUR continuously

#### **D4 Long-term measures: greening of areas**

##### **PLANTING OF NEW TREES TO INCREASE GREENING**

The planting of new trees increases the greening and cooling of surfaces and spaces. A list of suitable tree species has been prepared to be planted in different areas and zones for Maribor. The trees are adapted to local climatic conditions and have a high cooling capacity (larger and denser canopy). The Recommendations for the selection of tree species and planting guidelines are taken into account in the planning of construction and landscaping. The guidelines shall also be taken into account in the maintenance and care of trees.

Financial assessment: 40.000 EUR continuously

#### **D5 Long-term measures: greening of areas**

##### **URBAN GREENING PLAN AND REDUCTION OF CONCRETE SURFACES AND SHADING**

An urban greening and concrete reduction plan will be prepared, including the development and integration of green spaces in the city and the reduction of built-up areas, such as asphalt and concrete, which contribute to the warming of the urban environment. Green spaces will serve the recreation of residents, cooling of neighbouring residential areas and improving the microclimate. Reducing sealed areas will help to lower night-time temperatures and reduce the urban heat island effect.

Action details:

- Developing green spaces: Planning and implementation of new green spaces such as parks, gardens and green corridors that will link existing green spaces and create pleasant and cool recreational spaces.
- Reduction of concrete surfaces: Phasing out and replacing concrete and asphalt surfaces with green or permeable surfaces.
- Efficient watering systems: Introduce efficient plant watering systems such as drip irrigation and smart watering systems that reduce water consumption.



- Water retention and storage tanks: Design and installation of water retention and storage tanks to collect rainwater to serve as a source of water for irrigation during dry periods.
- Installation of shading screens: Installation of additional shading structures such as canopies, pavilions and solar sails in public places where large numbers of people are present, such as squares, bus stations and playgrounds.

Objectives of the action:

- Cooling urban areas: Reduce effective temperatures in urban areas by increasing green cover and reducing concrete surfaces.
- Improving the microclimate: Creating a more pleasant and healthy environment for inhabitants by increasing the presence of green spaces.
- Sustainable water management: Reduction of water consumption and better management of water resources through the use of retention basins and water storages.
- Increasing the quality of life: Improving the quality of life of residents by providing more green and shady areas for recreation and socialising.

Financial assessment: 40.000.000 EUR continuously

## **D6 Long-term measures: renewable energy and energy saving**

### **WATER SAVING**

Saving drinking water during the dry season is crucial to maintaining sufficient water supplies and ensuring sustainable use of water resources. This action includes various strategies and practices that help to reduce the consumption of drinking water and to maintain its quality.

Activities and practices:

1. Use of water-saving devices and equipment: Install water-saving taps, showers and flushers that reduce the flow of water without compromising their efficiency. Use of washing machines and dishwashers with high energy efficiency.

Rainwater harvesting and use: Installation of rainwater harvesting systems that can be used for watering gardens, washing cars and flushing toilets. This reduces the consumption of drinking water for tasks where high water quality is not required.

3. Adjusting watering patterns: water plants in the early morning or late evening when evaporation is lower. Use drip irrigation, which delivers water directly to the roots of the plants, thus reducing evaporation losses.

4. Water system maintenance: regular checking and repair of leaks in water systems and households. This prevents unnecessary water loss.

5. Education and awareness-raising: Organisation of workshops, campaigns and distribution of information materials to raise awareness of the importance of water conservation and practical tips to reduce water consumption in the home and garden.

6. Promote water reuse: use grey water (e.g. from showers and washing machines) for watering gardens and flushing toilets where possible and safe to do so.

Financial assessment: 1.000.000 EUR continuously

## **D7 Long-term measures: renewable energy and energy saving**

### **ROOFTOP SOLAR POWER PLANTS AND ENERGY STORAGE**

During heat waves, the need for electricity is greatly increased by cooling devices. Experience shows that the grid is not able to provide enough power and interruptions occur. This can put additional strain on people during heat waves.

It is therefore necessary to look for all possible ways to cool rooms without power and to consider installing solar power plants on the roofs of buildings and introducing energy storage. Full off-grid self-sufficiency in 2024 is still very challenging or almost impossible, but technologies are improving and soon it will be possible.

Financial assessment: 10.000.000 EUR continuously

## **D8 Long-term measures: IMPLEMENTATION**

### **MONITOR INCREASES IN MORBIDITY AND MORTALITY DURING HEAT WAVES.**

During the summer period, it is important to closely monitor and analyse the morbidity and mortality rates associated with heat waves. Such monitoring provides a comprehensive overview of the current situation and supports effective planning and implementation of preventive measures.

Implementation:

- Cooperation with the competent institutions in the acquisition and analysis of data.
- Recording cases of morbidity and mortality using codes, allowing systematic data collection and analysis.

Financial assessment: 5.000 EUR annually