

## ***Urban heat islands - Do we have enough water to mitigate urban heat waves?***

*Summary of the workshop of 26 May 2022*

On 26 May, the REKK Foundation and the REKK Water Economy Group organised a workshop with researchers, NGOs, professional organisations and representatives of the water utility sector on the urban heat island phenomenon. The REKK researchers addressed the question of how much water might be needed for interventions to reduce the urban heat load.

In his presentation, Gábor Ungvári, Senior Research Associate of the REKK's Water Economy Group, said that the necessary scale of measures to mitigate heat island phenomena should be interpreted by considering the magnitude of the heat load in an urban area. Given the scale of the energy flows that occur in the process on a summer day, the only way to have a meaningful impact on the heat load is to exploit the energy absorption capacity of evaporation. The REKK researchers have used maps of the built-up areas of cities in the county to investigate the extent to which the vegetation activity of currently unbuilt areas can influence the heat load on urban areas and the amount of water required. Based on an average evapotranspiration rate of 3.5 litres/day/m<sup>2</sup> (3.5 mm/day), a daily water need of cc 880,000 m<sup>3</sup> was calculated for Budapest, which could displace one third of the daily heat load depending on the degree of built-up area (for Budapest districts, this value ranges from 9 to 42%). It is not surprising that this attenuation effect is smaller in the inner districts of Budapest with high density, and in the larger cities of Eger, Győr, Kecskemét and Debrecen. The calculation results show that the current vegetation alone will not be sufficient to attenuate the heat load by the desired level, and therefore, in addition to extending green areas, technical solutions allowing evaporation at critical times should be applied. Even if the water resources of the water supply system are sufficient in some places, it is not possible to avoid the collection and use of excess water (rain retention) due to the size and location of the affected areas.

László Báder, PhD student at the Budapest University of Technology and Economics, reviewed the factors shaping the urban heat balance. He illustrated the impact of evaporation on the energy balance using the example of the Budapest heatwave day of 7 July 2021, when a mid-day shower significantly dampened the daily maximum temperature, resulting in a 5°C lower peak temperature of the day.

András Kis András Kis, Senior Research Associate of the Water Economics Group of REKK, used international examples and literature to support the amount of water used for irrigation and evaporation to alleviate the heat in summer. He asked whether in Hungary, in the most affected urban areas, there is sufficient water and infrastructure to meet the evaporation volumes described above. Finally, he also looked at who the cost bearers and beneficiaries of new systems could be.

Dr. Szilvia Szalóki, Vice President of the Hungarian Energy and Public Utility Regulatory Authority, pointed out in her speech that most of the water utility systems operate with high capacity utilisation, especially in the case of the settlements of the Budapest agglomeration or the rural cities, such as Győr. This also means that there is little scope for piped irrigation. The use of rainwater

would be necessary to cool urban spaces, but neither the legal nor the economic background for this has been developed.

Enikő Kácsor, Senior Research Associate at REKK, presented trends in electricity generation and use in Hungary. With the rise in summer temperatures, the demand for electricity for cooling is increasing, and although the rapid expansion of solar panels in the summer months is already a significant surplus supply in Hungary, it is still important to mitigate the urban heat island phenomenon in order to reduce the burden on the electricity system.

Participants in the workshop agreed that urban heat islands are a local problem, but that it would be necessary to develop appropriate regulatory frameworks and incentives at national and municipal level, e.g. in building regulations, licensing procedures, water and wastewater treatment pricing. The use of large quantities of drinking water for cooling purposes is not desirable, although in many respects it would be the obvious solution that can be quickly deployed. Instead, the retention and use of rainwater, treated wastewater and greywater should be encouraged, for which the technology is available. The Radó Dezső plan developed by the capital lists a number of instruments that are important for reducing the thermal insulation effect, and several projects have been launched to develop a climate-friendly green and blue infrastructure city.

Given the scale of water demand presented at the workshop, effective public policy making requires clearer relationships in terms of the spatial and areal extent of evaporation and evapotranspiration measures required to mitigate the heat island effect in the urban environment. In parallel, the potential source of the required amount of water and the appropriate way to implement heat island mitigation measures in practice should be identified on a site-specific basis.

The presentations given at the event are available on our [website](#).