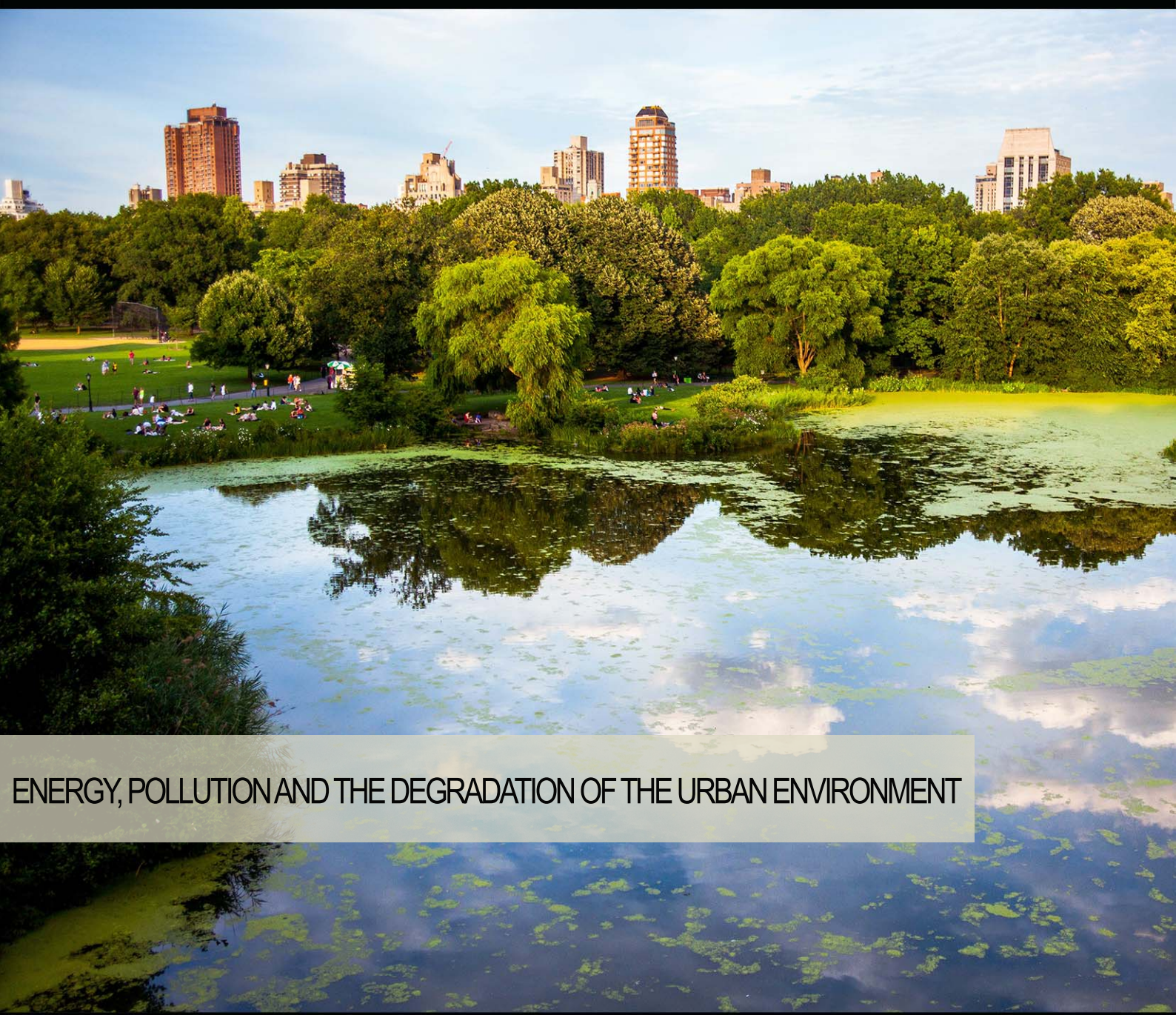


# TeMA

Journal of  
Land Use, Mobility and Environment

There are a number of different future-city visions being developed around the world at the moment: one of them is Smart Cities: ICT and big data availability may contribute to better understand and plan the city, improving efficiency, equity and quality of life. But these visions of utopia need an urgent reality check: this is one of the future challenges that Smart Cities have to face.

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ENERGY, POLLUTION AND THE DEGRADATION OF THE URBAN ENVIRONMENT

## ENERGY, POLLUTION AND THE DEGRADATION OF THE URBAN ENVIRONMENT

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## EDITORIAL PREFACE:

### ENERGY, POLLUTION AND THE DEGRADATION OF THE URBAN ENVIRONMENT

MATTHEOS SANTAMOURIS

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Cities are facing important environmental, social and economic problems. Local climate change and the urban heat island phenomenon rise the temperature in the urban environment, and increase the energy consumption for cooling, deteriorate the levels of indoor and outdoor thermal comfort and increase the concentration of harmful pollutants like the tropospheric ozone. In parallel, atmospheric pollution and chemical and biological contamination in the urban environment threatens the human health and worsen the quality of life of urban citizens (Santamouris, 2015).

Important social and economic problems in our cities like poverty and in particular energy poverty and social deprivation oblige a large part of urban citizens to live under unacceptable conditions that threaten their lives (Kolokotsa, Santamouris, 2015).

UHI and Global Climate Change in combination with the expected increase of the earth's population may increase the cooling energy demand of the building sector up to 2500 % by 2050. An extremely high number of new power plants will be required to satisfy the huge peak power load and the whole demand. Tremendous investments are required to satisfy the demand while if conventional fuels are used, the related environmental and economic problems will be aggravated. Mitigation and Adaptation Technologies should contribute highly to counterbalance the additional energy needs

High ambient temperatures increase the mortality rate and the corresponding hospital admissions. The threshold temperature over which mortality increases rapidly varies as a function of the adaptation of the local population. In Med region is close to 31 C, in Northern Europe, is 23 C. Use of mitigation and adaptation techniques to improve the built environment have a very positive impact on health.

During the last years, important research has been carried out aiming to mitigate the local and global climate change in cities, decrease the energy consumption of the urban buildings and eradicate the problem of energy poverty (Santamouris, 2016). In particular, the development of advanced mitigation technologies, involving the use of reflective materials, advanced chromic surfaces, and green facades and roofs, have offered very significant technical tools for urban scientists (Akbari et al., 2015). Demonstration projects of large scale have shown that it is quite feasible to reduce the temperature of our neighbourhoods by 1,5 to 2 K, with a very reasonable budget (Santamouris, 2014). Continued research efforts aim to develop more efficient urban techniques and technologies, presenting a much higher potential for climate change mitigation.

The development of advanced know how on urban mitigation technologies paves the way for global and holistic retrofitting plans for cities aiming to improve the urban climate and fight urban overheating. Studies in Europe shown that the cost of global mitigation plans is affordable and may range between 200 to 4000 Euros per citizen depending on the characteristics of the city, with an average cost close to 2000 Euros per person. The scientific community together with the local authorities have to prepare and implement global mitigation plans. Eradication of the energy poverty in the urban environment is one of the main challenges we face actually in the developing but also in the developed world. The tremendous increase of the urban population expected up to 2050 in Asia and Africa will put in stress the urban systems and will require the adoption of effective and smart policies to face the problem. The whole problem has serious social, economic and technological dimensions and should be faced in an integrated and holistic way. Failure to consider all issues in an integrated and holistic way may inevitably result in higher energy consumption, more urban problems and social discrepancies.

Research on Climatic Mitigation technologies should explore interrelationships and links with advanced ICT technologies like Smart City Information Networks, Intelligent Urban Management, and also with Efficient Green Supply Networks, Zero Energy Settlements, Alternative Labor and Education Technologies, etc., in order to uncover new information about how our cities work and develop and provide integrated urban solutions that will improve the quality of citizen life by providing direct and personal services.

Climatic Change Research should become smarter and have access to the exploding amount of urban data. Digital data is expected to double every two years from now until 2020. How researchers and technology providers leverage and share this data will be a competitive differentiator.

Research on climatic mitigation technologies should not be seen in an isolated way. It should be part of a global research aiming to face the global challenges in the urban environment and in particular the economic turmoil, the climatic change, the increased urbanisation and the urban sprawl, the increasing age of the population and the problem of poverty.

Minimization of the energy consumption, eradication of the energy poverty and mitigation of the urban heat island is an unequivocal choice that will create substantial opportunities for future growth and will alleviate the population from the consequences of the specific problems and will create benefits and opportunities.

## REFERENCES

Kolokotsa, D., Santamouris, M. (2015). Review of the indoor environmental quality and energy consumption studies for low income households in Europe. *Science of the Total Environment* 536, 316–330. doi: <http://dx.doi.org/10.1016/j.scitotenv.2015.07.073>.

Akbari, H., Cartalis, C., Kolokotsa, D., Muscio, A., Pisello, A. L., Rossi, F., Santamouris, M., Synnefa, A., Wong, N.H., Zinzi, M. (2015). Local Climate Change and Urban Heat Island Mitigation Techniques – The State of the Art. *Journal of Civil Engineering and Management*, 22 (1), pp. 1-16. doi: <http://dx.doi.org/10.3846/13923730.2015.1111934>.

Santamouris, M. (2014). Cooling the Cities – A Review of Reflective and Green Roof Mitigation Technologies to Fight Heat Island and Improve Comfort in Urban Environments. *Solar Energy*, 103 (2014) 682–703. doi: <http://dx.doi.org/10.1016/j.solener.2012.07.003>.

Santamouris, M. (2015). Regulating the damaged thermostat of the Cities – Status, Impacts and Mitigation Strategies, *Energy and Buildings*, 91 (2015) 43–56. doi: <http://dx.doi.org/10.1016/j.enbuild.2015.01.027>.

Santamouris, M. (2016). Innovating to zero the building sector in Europe: Minimising the energy consumption, eradication of the energy poverty and mitigating the local climate change. *Solar Energy*, 128 (2016), 61–94. doi: <http://dx.doi.org/10.1016/j.solener.2016.01.021>.