

## **The metabolic impact assessment of planning interventions in two European cities: Oporto and Vienna**

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### **Abstract**

The paper is based on the research of the project Sustainable Urban Metabolism for Europe (SUME), funded by the Seventh Framework Programme, involving nine research centres from eight different European countries. The main focus of the project is the study of how future urban systems can be designed in a way which is consistently less damaging to the environment than the current status. Our main contribution to the project, already presented in last year conference, was the development of an impact assessment methodology through a metabolic perspective – Metabolic Impact Analysis (MIA). This methodology provides an operational tool to evaluate planning interventions in a city or metropolitan area. This year's presentation focus on its applicability to real cases, allowing for conclusions on the viability of this innovative methodology in the field of impact assessment methodologies. The spatial dimension comprised in MIA, not always included in other urban metabolism models, is essential to the evaluation of urban planning proposals. MIA has proven to be a valuable instrument to be considered as an ex-ante evaluation, both in the search for better solutions at the project phase and in the approval of planning proposals at the licensing process, and as ex-post evaluation in the assessment of the impact of real interventions in the city.

Thus, the paper explores how the concept of urban metabolism can give a new perspective in evaluating new proposals in our contemporary cities. The two case studies – cities of Oporto and Vienna – allow for a comparative analysis of the urban metabolism components. In particular, aspects of urban form are analysed. Also, the assessment will provide a deeper understanding of the nature of different and contrasting development processes, in particular when it comes to their contribution to the existing stocks and flows of energy, land and materials. The fact that both cities have very distinct metabolic profiles led to very interesting comparisons between not only these two cities but also and most importantly to the respective planning proposals under analysis.

The application of MIA followed closely the stages of the methodology, incorporating in throughout the procedure the main components of urban metabolism (energy, water, materials and land use). However, it should be noticed that the assessed components were not equally developed. Data constraints are a limitation factor in this kind of exercises where data is rarely available to scales of analysis lower than the city scale; nevertheless this methodology can work well even if not applied to all four urban metabolism components usually considered.

From the case studies it is possible to conclude on how European cities and their urban forms influence the way resources are managed. Some preferred models offering better metabolic performances can be outlined, enabling the definition of urban policies leading to more metabolically efficient cities.

The main conclusion points out that MIA can contribute to the final shaping of a given planning proposal (an urban project or plan) by providing clear indications and suggestions of changes, adaptations or add-ons to the initial proposal to improve the metabolic performance of the project (or plan) and, at the same time, the overall performance of the city where that project (or plan) will be implemented. We intend to further explore the potentials of the urban metabolism concept: the characterization of a more sustainable urban environment through improvements in urban form, reaching an optimal urban form.

**Keywords:** urban metabolism, sustainability, impact assessment, urban development, urban systems