



Methodological challenges in modelling and evaluating urban sustainability

N. Filchakova and D. Robinson

Solar Energy and Building Physics Laboratory, Station 18, Ecole Polytechnique Fédérale de Lausanne (EPFL), CH-1015 Switzerland.

In analogy to natural ecosystems, the uptake, transport and storage of substances in urban sites, as well as their transformation, can be considered as equivalent to urban metabolism. With more than half the world population now urbanised this urban metabolism is responsible for consuming the majority of global resources and the impact that this has on the global biochemical cycles. The study of urban metabolism is thus central to the sustainability of cities.

This paper discusses several methodological and practical issues that relate to the modelling and evaluation of urban systems' metabolism and their sustainability.

In this, we consider the issues of scope and reference state as cornerstones for urban studies. With regard to the modelling, we discuss the challenges that arise from the theoretical thermodynamic, as well as practical perspective on the 'city' as open - and often extremely open - system.

For the evaluation of urban sustainability, and particularly, the attempted by the authors thermodynamically-based evaluation, the definition of a reference state of a city - or city's future - appears crucial. To this end we analyse various applications of thermodynamic concepts for assessment of ecosystems' sustainability. We conclude by suggesting some potential pathways in applying them to the evaluation of urban metabolism and discuss the challenges ahead.