The Filigree City: environmental sustainability issues under conditions of retrenchment

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Abstract

In all regions of the world, response to changing economic circumstances is causing some urban areas to retrench whist other grow. This is by no means a new phenomenon, but must now be considered in a new context. Concern with issues of global warming is ever-growing, so policies to encourage energy efficiency - thus promoting carbon intensity - have received much recent attention. Does city retrenchment inevitably lead to a drop in carbon intensity, as population density declines?

This paper focuses on the two sectors: the role of energy use in buildings, and in transport.

Buildings
Buildings use energy for a variety of purposes: heating, lighting, cooling and mechanical ventilation. The climatic location of a building and its usage (whether for residential or commercial use, for instance) determine the relative importance of these energy-consuming activities. Within a given situation, however, differences in urban built form can have a considerable impact on energy use. Recent work in temperate conditions has shown that residential energy use is reduced in high-density settlements.

There is evidence however that this relationship between urban density and energy use for residential buildings however does not necessarily hold true for other building uses, or for other climatic zones. In commercial buildings, for example, energy use in temperate climates is typically dominated by lighting, cooling and ventilation - and thus by electrical consumption and the high carbon emissions that this entails. In these circumstances, a sustainable commercial building will be one in which satisfactory environmental conditions can be provided for most of the floor area while maximising the use of daylighting, natural ventilation and (when appropriate) solar heat gain.

Urban thinning may furthermore increase the potential for some building-integrated renewable energy technologies which require solar access or steady windflow, and reduce urban heat island effects – particularly important in warmer but well-vegetated climates. Against these should be set the likely disadvantages: increased heat demand in cooler climates for residential buildings; and lower potential applicability of some low-energy technologies such as district heating and CHP.

Transportation
The second aspect of carbon utilization in cities is energy use for transportation. There are several components to this issue: distance travelled, and how frequently; modal split; and energy usage by the differing modes. How might city shrinkage affect these?

This paper considers evidence that the relationship between settlement size and average travel distance over a typical year is not linear, in particular that large towns, in the range of 25-50,000 inhabitants, may be more efficient than small cities – perhaps because the town dwellers have access to most of the services they need within a comparatively small area. Thus a potential way forward for large cities, confronted with economic change which brings a decline in population, may be to reinvent themselves as clusters of smaller, smarter centres. In this way, it is possible to retain some environmental benefits of urban life – including reduced car dependence and consequent energy use – at lower overall densities. This direction is towards a “filigree city”, in which dense urban nodes, with a few tens of thousands of inhabitants, are interspersed with green spaces.

Within these urban nodes, a mix of uses – including commercial, retail and leisure alongside houses – could help to keep travel distances short and encourage pedestrian and cycle trips. This revalidation of the urban node to maintain and improve environmental performance will require substantial re-engineering of the building stock. This re-engineering must focus on replacing poor quality housing and workplaces with buildings that will provide a higher quality of life in the coming decades, and lower resource depletion rates.

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