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THE ROLE of LAND-USE PLANNING in REDUCING
ENERGY USE and “GREENHOUSE GAS” EMISSIONS from
URBAN TRANSPORT.

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Abstract:

Urban transport has been one of the key environmental concerns of the last decades of the twentieth century. Private car use has become a particular focus for the contribution it makes to several key problems, including fossil fuel depletion, climatic change via the “greenhouse effect”, air pollution and at more localised levels, severe traffic congestion.

Land use planning has an important role to play in ameliorating the worst impacts of private car use, as different forms of urban development display quite different levels of transport needs. Twentieth century urbanisation patterns have made car ownership necessary in many cities, particularly where post-war development has resulted in the physical separation of various urban activities. Large areas of newly developed land were devoted to single land uses in many cities during the 1950s and '60s, and the private car became integral to moving between the dispersed locations of home, work and other activities. Many planners have identified reintegrating land-uses as a means of reducing this need for extensive intraurban travel.

This thesis examined some of the assertions regarding urban land use by identifying several key factors which help to determine the energy performance of different areas of the city. The study was based on data from the an extensive travel survey conducted in and around Wellington, New Zealand, late in 1988. Some 3000 households participated in the survey, with about 9000 people providing details of their daily travel for one weekday. This data was used to calculate transport energy performance and the levels of greenhouse gas emissions which resulted for 64 residential zones throughout the region. Mean daily household emissions were found to range from 3.3 to 19.6 kilograms carbon dioxide equivalent. (This includes the radiative warming potential of small quantities of other “greenhouse” gases). The “best performing areas” were mainly close to Wellington’s CBD but also included zones around other centres in the region. Performance was then analysed further against urban form, transport use and socio-economic factors derived both from the survey data and other sources.

Mean distance of the journey to work, car ownership levels and the proportion of all travel undertaken by walking emerged as the strongest influences on energy and emissions performance. Modal split for bus use, population and dwelling densities, and the distance to central Wellington were identified as moderate influences on these areas of interest, whereas modal split for rail and cycling had little influence on the relative performance of the different areas surveyed. It was concluded that strongly pedestrian oriented forms of development clustered in close proximity to existing public transport services, perhaps with some additional “fine coverage” minibus services, offered the best land-use pattern in terms of minimising energy use and greenhouse gas emissions.

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