

# Potential for low transport energy use in developing Asian cities through compact urban development

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## Overview

The urban population in the APEC region is growing rapidly. By 2050 the urban population in the APEC region is expected to increase by 50% or by approximately 800 million people<sup>[1]</sup>. The majority of urban population growth is from developing Asian cities. For developing Asian cities the combination of growing urban population combined with growing wealth will lead to rapid growth in vehicle ownership and urban transport energy use. The consequences include growing oil security and oil price risks, traffic congestion, air pollution and greenhouse gas emissions. Research conducted at the Asia Pacific Energy Research Centre (APEREC) suggests for a business-as-usual (BAU) scenario road transport energy demand in developing Asian economies<sup>[2]</sup> will increase 260% by 2035.

The scale of urban development in the next 40 years within emerging Asian cities will be unprecedented in history. The investment into housing and infrastructure to meet population growth strongly influence the patterns of urban transport and transport energy use. Substantial savings in urban transportation energy use exist through compact urban development. However once urban cities are developed the patterns of urban transport and urban transport energy use are difficult to alter.

Compactness of the urban built environment is an important indicator for the expected per capita energy use in urban cities. A study of 120 global cities over a 10 year period recognized that the urban city compactness has been declining on average 1.7% per year<sup>[3]</sup>. This paper will assess the impact of city compactness on urban transport energy use in selected Asian developing cities in 2050.

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<sup>[1]</sup> United Nations, Department of Economic and Social Affairs, Population Division, *World Urbanization Prospects: The 2009 Revision*

<sup>[2]</sup> Developing APEC economies include China, Vietnam, Philippines, Indonesia, Malaysia and Thailand

<sup>[3]</sup> Angel S., Sheppard S.C. and Civco D. *The Dynamics of Global Urban Expansion*. The World Bank Transportation and Urban Development Department. Washington, DC, USA, 2005; p. 205.

## **Methodology**

Urban city statistical indicators published in the Millennium cities database (MCD) are used in formulating our analysis. The MCD was compiled from 1995 census data for 100 global cities which include 38 APEC cities.

Our aim is to roughly assess the potential contribution of urban design to energy savings in urban transport energy use. For simplicity, we focus on city compactness as an indicator to low transport energy use. Future urban transport energy use is estimated by modeling the change in private vehicle ownership and vehicle usage to the change in city compactness and income. The level of transport energy use in wealthy cities across a compactness index defines the expected energy use trend of developing cities. As developing cities become wealthy in the future, the level private transport energy use per capita is expected to approach that of current wealthy economies with a similar urban compactness index.

Finally, the improvement in vehicle efficiency, switching to lower carbon fuels and growth of alternative vehicles is modeled using a consumer choice logit model and from published research. Without expected technological improvements, the outlook growth in transport energy demand would be considerably higher.

## **Expected Results**

The demand for transport in developing Asian cities from growing urban population and increasing wealth is expected to continue the trend of growing demand for transport. The expected savings in urban transport energy use range from 30-50% by 2050 when maintaining the existing level of urban city compactness in developing Asian cities.