The Kyoto Protocol and Sustainable Cities

Potential Use of Clean-Development Mechanism in Structuring Cities for Carbon-Efficient Transportation

Pedro Donoso, Francisco Martínez, and Christopher Zegras

This paper assesses the possibility for changing urban development patterns to reduce transportation greenhouse gas (GHG) emissions. The analysis was carried out as part of a larger project exploring the possibility of using the clean development mechanism (CDM) to reduce transportation GHG emissions in Santiago, Chile. The paper provides an overview of the analytical approach, which includes an integrated travel demand model with sensitivity to mesolevel land use variations, a method to generate optimal land use scenarios that relate to emission reductions, and a process to estimate the level of subsidies needed to produce those land use scenarios. Limitations to the approach and suggestions for future research are discussed. The paper concludes with an assessment of the results in the face of the fairly strict requirements for project development and implementation implied by the CDM.

Interest in modifying urban development patterns to influence transportation energy consumption dates back to at least the first global oil crisis of the 1970s (*1*). Today, energy security risks continue while the risk of global climate change adds further pressures to reduce transportation energy consumption. While the climate change mitigation burden clearly falls to the world's industrialized nations, which account for the overwhelming share of accumulated anthropogenic greenhouse gas (GHG) emissions, the rapidly industrializing countries constitute a large and growing share of global emissions [almost 50%, including the countries of Eastern Europe and the former Soviet Union (*2*)].

In February 2005, the Kyoto Protocol to the United Nations Framework Convention on Climate Change entered into force for signatory countries. The protocol contains several market-based mechanisms, including the clean development mechanism (CDM), which allows industrialized-country governments or private entities to invest in developing-country emission reductions. The industrialized-country project proponent earns emission reductions—known as certified emission reduction units (CERs)—toward domestic targets, while the developing country advances its development goals. Indeed, the Kyoto Protocol specifies that CDM projects must help host countries achieve "sustainable development," although it does not specify a definition of that concept. The market value of a CER varies in relation to the prevailing carbon price and can be influenced by factors such as country and project risk. In Europe, the price per tonne of carbon recently exceeded $20.

The majority of CDM projects to date have focused on renewable energy, energy efficiency, and landfill gas projects. As of early 2005, of roughly 1,200 CDM projects under development, just over 200 had reached the project design document (PDD) stage. The PDD represents the first step in the CDM process, formally defining the project, estimating emissions reductions, and describing the monitoring plan. Of those 200 projects, just four were transportation projects (*3*).

Transportation remains an important and challenging GHG emissions sector to address: it accounts for approximately 30% of anthropogenic GHG emissions, is growing rapidly, and has highly dispersed emissions sources (e.g., individual vehicles) with few readily available, less-carbon-intensive energy substitutes. More broadly, transportation clearly plays an important role in sustainable development. In the case of passenger transportation, for example, transportation provides access to jobs, education, social opportunities, and the like—all fundamental to human development. At the same time, however, transportation often imposes impacts, in the form of air pollution, accident risk, and the like that pose serious threats to sustainability.

While details of the numerous CDM project requirements extends beyond the scope of this paper and are provided elsewhere (*3*), three critical CDM-specific aspects bear mention here, due to their importance to this analysis:

1. The project baseline, which must represent a defensible vision of future emissions relative to business as usual;
2. Additionality, which refers to the requirement that emissions reductions be additional to what would have taken place in absence of the project; and
3. Monitoring and verification, which refers to the need for external monitoring and verification of emission reductions.

This paper presents results of an effort to assess the potential of the CDM to reduce GHG emissions from the transportation sector in Santiago, Chile. The paper analyzes a decidedly behaviorally based intervention: the possibilities for modifying urban development patterns to reduce GHGs via changes in passenger travel demand. Location Efficiency and Transit-Oriented Development (LABTUS) (*4*) presents a more detailed exposition of the theoretical and technical underpinnings of the analysis.

P. Donoso, Laboratorio de Modelamiento del Transporte y Uso de Suelo, Av. Blanco Encalada 1975, Piso 2, and F. Martínez, Departamento de Ingeniería Civil, División Ingeniería de Transporte, Av. Blanco Encalada 2002, Piso 5, University of Chile, Santiago, Chile. C. Zegras, Department of Urban Studies and Planning, Massachusetts Institute of Technology, Room 10-403, 77 Massachusetts Avenue, Cambridge, MA 02141.

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