Abstract

Several Nations have long recognized that a sound transportation system is critical to the well-being of their societies and economies. The complexity, interconnectivity, and high cost of the transportation infrastructure construction, operation and maintenance necessitate long lead times for the sustainable transformation of current transportation systems. Also, the recent advancement of the transportation and information technology, and renewable energies adds a new dimension to the challenge facing the process of transportation policy formulation, particularly in developing countries. Although the transportation sector accounts for a large share of global greenhouse gas (GHG) emissions, this share is expected to continue to grow over the coming decades. Some developing countries are registering an annual growth in per-capita vehicle ownership of 15 to 20 percent. And despite the transport sector’s importance to global GHG emissions, the focus of GHG mitigation efforts by the multilateral and bilateral actors, and the international carbon market, have generally been outside the transport sector. At present, there is a lack of adequate data on potential GHG savings as well as on the costs of various urban transport operations. Most of the available data/information in developing countries is anecdotal or reliant on data from more developed economies with urban characteristics that are fundamentally different from those in developing countries. The scarcity of high quality transportation related data/information, particularly in developing countries, requires the undertaking of a sound assessment of the existing transportation indicators and data/information infrastructure. Of concern from a climate change perspective is that GHG emissions are increasing most rapidly from private road vehicle use. There is a sound justification for supporting actions to improve the quality of data and information on renewable energy and related GHG emissions from urban transportation systems in developing countries, including the introduction of alternative fuels and alternative fuel vehicles. A transportation system becomes sustainable only when all links in its chains and their related impacts are firstly identified and fully understood. This will facilitate the successful deployment of prototypes and effectively putting in place and operating the required infrastructure at a wide scale. This paper will review and highlight deficiencies and prospects of transportation data/information issues as related to renewable energy and GHG, and will present policy recommendations, with specific focus on developing countries.

Keywords: Sustainable Transportation, Transportation Data, ATF Data, AFV Data

Background

“Transportation leaders have established little guidance regarding what data to collect, in what detail, precision, and frequency, or even for what reason. The most important aspects of transportation are time and cost. Yet little or nothing is known about these two factors.”

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A transportation system becomes sustainable only when all links in its chains and their related socio-economic, environmental and health impacts are adequately identified and properly understood. This will facilitate the successful deployment of prototype schemes and effectively putting in place and operating sustainably the required infrastructure.

The international instruments evolved out of the 1992 Rio Earth Summit (United Nations Conference on Environment and Development (UNCED)),2 City Summit (United Nations

(1) Martha J. Tate-Glass, Rob Bostrum and Greg Witt, Data, Data, Data-Where’s the Data?, Committee on Statewide Transportation Data and Information Systems, Transportation Research Board, Washington D.C., USA.

Habitat II Conference), Millennium Development Summit, and Johannesburg World Summit on Sustainable Development (WSSD) as well as the outcomes of the 9th and 14th Sessions of the United Nations Commission on Sustainable Development and the Conferences of the Parties (COPs) of the UNFCCC have recognized the need for improving the information infrastructure needed to achieve the objectives of sustainable development at the national and local levels. The evolution of Kyoto Protocol and its Clean Development Mechanism (CDM) and the Joint Implementation (JI) projects pose a real challenge to governments and nations alike to rethink the way data and information issues have been and should be perceived. Unlike other sectors, transportation and environment are the least advanced in terms of data and information systems, particularly in developing countries.

The United Nations Department for Economic and Social Affairs (DESA) in cooperation with the World Bank launched the Global Initiative on Transportation Emissions (GITE) in Cairo in 1999 and Johannesburg in 2002. One of the components of the GITE was data collection. It is understood that the GITE did not progress well.

On the other hand, most of available transportation data/information in developing countries is anecdotal or reliant on data from more developed economies with characteristics that are fundamentally different from those in developing countries. There is ample evidence that transportation data infrastructure and exchange networks in developing countries are inadequate to fulfill the objectives and evolving requirements of sustainable development strategies. This inadequacy include the lack of data on several transportation impacts, including CO₂ emission for various modes, vehicles and fuels (at various time of the day, various loading, various vehicle ages), as well as the poor quality of a large part of the available and collected data. The scarcity of high quality transportation related data/information, particularly in developing countries, requires the undertaking of a sound assessment of the existing transportation data/information, indicators and infrastructure, and their related sources.

The problem

Chapter 40 of Agenda 21 has made clear that sustainable development can not be achieved without a sound and comprehensive information infrastructure. Therefore, to contribute to sustainable development, a transportation system should be safe, efficient, environmentally sound, affordable, comfortable, and accessible by all sectors of society on an equitable basis. In order to achieve these characteristics, accurate, reliable and consistent transportation related data and information have to be available, exchangeable and accessible to all relevant stakeholders. The case for many countries, particularly those in the developing world is not so.

Several Nations have long recognized that a sound transportation system is critical to the well-being of their societies and economies. For example, decision-makers in the OECD countries are becoming more aware of the need to promote sustainable transportation. However, to date, no comprehensive tool has been developed to monitor the progress of transportation systems towards (or away from) sustainability. Limited efforts to develop sustainable transportation performance indicators have been exerted in Canada and elsewhere. Linking indicators to the definition of sustainable transportation was an approach adopted by the Centre for Sustainable Transportation (CST) in Canada that has defined a sustainable transportation system as one that:

- Allows the basic access needs of individuals and society to be met safely and in a manner consistent with human and ecosystem health, and within equity within and between generations.
- Is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy.
- Limits emissions and waste within the planet’s ability to absorb them, minimizes consumption of non-renewable resources, reuses and recycles its components, and minimizes the use of land and the production of noise.

In a compelling study undertaken by the Committee on Statewide Transportation Data and Information Systems of the US Transportation Research Board, it was concluded that the:

"...future of data in transportation decision making lies along one of two divergent paths. One perpetuates a greater reliance on good, high quality, statistically relevant, timely, and useful data for decision making. This comes at a high cost that often outweighs the near term benefits. The other path, and the one often followed for budget reasons, leads to a "data-free analysis zone" in which decisions are made without the benefit of sound data. The customer deserves the best. Data professionals must lead the transportation industry along the right path."

Along these lines, California and several other states, have undertaken an effort to develop transportation system performance measures that should provide a systematic approach to planning and decision making.

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(3) UN Habitat Agenda: http://www.unhabitat.org/unch/english/hagenda/
(4) http://www.un.org/millenniumgoals/
(6) http://unfccc.int/essential_background/kyoto_protocol/items/1678.php
(7) http://cdm.unfccc.int/
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Available road statistical publications, including those of the OECD and International Road Federation (IRF) reveal a disproportionate number of developing countries showing incomplete and sometimes no statistics. Usually, in these countries, transportation data has minimal or no annual budget allocations. Government statistical organizations in the majority of developing countries have, intentionally or unintentionally, suffered for many decades from the incompleteness and scarcity of high quality transportation data. The governance system of transportation data in many developing countries is unable to deal with the emerging socio-economic and environmental problems.

Further, several developing countries are registering relatively high annual growth in per-capita vehicle ownership, and despite the transport sector’s increasing share of the global GHG emissions, the focus of mitigation efforts by the multilateral and bilateral agencies, and the international carbon market have generally been outside the transport sector. But, funding agencies and governments are required to intensify the encouragement and promotion of transportation related programs/projects that use alternative fuels. The key to the success of these programs is to have a sound data infrastructure on alternative fuel use and impacts, including those related to CO₂ emission.

While transportation’s demand, requirements, impacts and technologies are changing throughout the world, patterns and magnitudes of these changes differ significantly between developed and developing countries. Also, the quality and effectiveness of the transportation governance system in these countries play a major role in the quantification of socio-economic, health and environmental impacts. Contrary to their poor quality in the majority of developing countries, transport data/information infrastructure and networks have advanced considerably in several countries of the developed world. Nevertheless, the two world summits on information society in 2004 (Geneva) and 2005 (Tunisia) that have dealt with the “Digital Divide (DD)” between developed and developing countries. It should be realized that the transportation’s demand, requirements, impacts and technologies are changing throughout the world, patterns and magnitudes of these changes differ significantly between developed and developing countries. Also, the quality and effectiveness of the transportation governance system in these countries play a major role in the quantification of socio-economic, health and environmental impacts. Contrary to their poor quality in the majority of developing countries, transport data/information infrastructure and networks have advanced considerably in several countries of the developed world. Nevertheless, the two world summits on information society in 2004 (Geneva) and 2005 (Tunisia) that have dealt with the “Digital Divide (DD)” between developed and developing countries.

Transport- CO₂ emissions data

The transportation sector represents about 30 percent of the global emissions of carbon dioxide, the primary contaminant responsible for climate change. This share is expected to continue to grow over the coming decades. Available information shows changes in sectoral GHG emissions for the period from 1990 to 2003 in developed countries, the largest increase was observed for transportation (20.7 per cent); the largest decreases were for agriculture (15.7 per cent) and waste (15.3 per cent). Stephen et al, reported that there is a “need for better data and case-study information on the impact the various urban transport interventions on GHG emissions in developing countries.” The need to address the potential of land- use planning in reducing transport-related GHG emissions through research activities was also highlighted by the Global Environmental Facility (GEF). Moreover, some countries encountered technological and financial difficulties in collecting data in the transport sector for accurate estimates of vehicular emissions. At present, there is a lack of adequate data on potential GHG savings as well as on the costs of various urban transport operations and related impacts, particularly for developing countries.

The EU directive (2003/30/EG) anticipated a growth of 2% and 5.75% in 2005 and 2010 respectively in renewable fuels use in transportation. The Directive considered public transport as “as an important forerunner.” Since 2004, 100 percent of the electricity for rail traffic in Europe comes from wind and water power. It was also reported that 16% of the buses in Europe used renewable fuels in 2005. The Directive set a stepwise goals of 25%, 50%, 100% for 2006, 2015, 2030 respectively.

Until recently, there were questions regarding the environmental and health impacts of alternative fuels, including the biodiesel effects on pollutant mass emissions as well as chemical composition, and how they should be incorporated into emission inventories for use in air quality modeling. For policy makers and planners in developing countries, there should be viable ways to meet rapidly evolving local, national, regional and international needs for legislation, modeling, inventories, and performance measurement. Moreover, information shows changes in sectoral GHG emissions for the period from 1990 to 2003 in developed countries, the largest increase was observed for transportation (20.7 per cent); the largest decreases were for agriculture (15.7 per cent) and waste (15.3 per cent). Stephen et al, reported that there is a “need for better data and case-study information on the impact the various urban transport interventions on GHG emissions in developing countries.”

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(9) www.itu.int/wsis
the recent advancement in the transportation and information technology, and the gradual growth of alternative fuel usage in the transportation sector add a new dimension to the challenge facing transportation policy makers, particularly in developing countries. In order to deal with these newly evolving needs, accurate, reliable, and readily available data is prerequisite. This also requires that transportation and environmental agencies take these evolving issues into consideration in the updating of their data inventories.

**Promotion of AFVs and ATFs**

Several worldwide efforts to promote the usage of, and knowledge about, renewable energy in transportation systems have a history of more than one decade. Perhaps, the US Clean Cities Program of the Department of Energy is a pioneer initiative in promoting Alternative Fuel Vehicles at the City level. The 1990s Green Fleet program of the International Council for Local Environmental Initiatives (ICLEI) is, perhaps, one of the earlier attempts to promote AFV in urban areas. The publishing of the Green Fleet report by the Public Technology Inc (PTI)\(^{15}\) (now is called Public Technology Institute) was one of few global reports on AFV, worldwide.

The United Nations’ Global Environmental Facility (GEF) included sustainable transportation in its climate change operational program in the late 1990s. Operation Programme # 11 was then born. This program should be a valuable source for developing countries regarding project-specific transportation CO2 emission data.

On 11 May 2006, the European Commission has released the results from the world’s largest trial of Hydrogen Fuel Cell Powered Buses at the Clean Urban Transport for Europe (CUTE) Conference in Hamburg, Germany. CUTE is considered to mark a milestone in the history of clean transport energy technology and to open the way to a new era of sustainable transport systems. The Commission has also announced the launch of a new hydrogen initiative. Since mid-2003, 27 public transport buses have covered more than 1 million km and carried more than 4 million people in 9 European cities\(^{1}\), producing zero emissions and causing no accident during their operation. The buses operated as part of the CUTE Project which has just come to a close. The new “Hydrogen for Transport” initiative, will involve the daily operation throughout Europe of around 200 hydrogen-powered vehicles and the corresponding hydrogen supply infrastructure.

Other programs include the building of ethanol driven buses, and the Mobility Program of the World Business Council on Sustainable Development (WBCSD).\(^{16}\) Also, the private sector in Yemen was a pioneer in converting private cars to hybrid vehicles in the mid 1990s. The same company extended its conversion program into other neighbor countries.

**Selected practices**

The US Annual Survey of Alternative Fueled Vehicle Suppliers and Users is undertaken using Form EIA-886, developed by the Energy Information Administration of the US Department of Energy. The Form collects information on the number, type, location of Alternative Fuel Vehicles (AFV), alternative transportation fuel (ATF) consumed and age of AFVs in use in the USA. This data is used to satisfy public requests for information on AFVs and ATFs and to provide Congress with a measure of the extent to which the objectives of the Energy Policy Act of 1992 (EPACT) are achieved. The data is collated by the Idaho National Engineering and Environmental Laboratory of the US Department of Energy. Data on AFVs and AFV is available at various public and private sources.

The USA first Regional Transportation Center (RTC), a $17.9 million, 60,000-square-foot state-of-the-art facility is designed to educate people about the benefits of AFVs, according to Steve Bimson, managing director of the San Diego Environmental Foundation.\(^{17}\) The Alternative Fuels Data Center (AFDC) maintains a database of more than 3,000 documents. This comprehensive collection of advanced transportation technology information includes program-specific publications from the US Department of Energy and other federal agencies, technical reports from both government and private sources, industry data, and citation information for copyrighted documents.\(^{18}\)

The global Transport Knowledge Partnership (gTKP), launched in Manila, Philippines in March 2005, is claimed to be the first international knowledge-sharing partnership dedicated to transport issues.\(^{19}\)

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\(^{15}\) [www.pti.org](http://www.pti.org)


\(^{17}\) [wwwrtc4afv.com](http://wwwrtc4afv.com)


\(^{19}\) Global Transport Knowledge Partnership (gTKP), Newsletter, June 2005, [www.gtkp.com](http://www.gtkp.com)
Conclusion

The poor state of transportation data in developing countries coupled with need to enhance the process of decision making, particularly in relation to transportation and climate change, necessitate an effective action. An appropriate global action is therefore needed to enhance transportation data systems in relation to identifying and predicting pollution emission, including CO2 emission. A Global Initiative on Clean Transportation Data (GICTD) is believed to be an appropriate step in the right direction. GICTD will be registered at the UN CSD as a Type II Partnership initiative. It will be in line with the UN Millennium Development Goals (MDG), Johannesburg Plan of Implementation (JPoI) of WSSD, Principle 10 of the Rio Declaration, Chapter 9 and 40 of Agenda 21, the conclusions of the 9th and 14th Sessions of the UN Commission on Sustainable Development, and others. Such an initiative will cover the geographical areas of the developing regions, establish a high quality baseline inventory, promote regular data updates, encourage easy and seamless access to, and exchange of, data by all stakeholders in all countries, and to attract all relevant stakeholders as partners. Such an initiative would contribute positively to any regional and national sustainable development process. It will include a Climate Change Data/Information Exchange Network. The Initiative will be instrumental for:

- Assessing Environmentally sound Transportation technologies,
- Evaluating Clean Development Mechanisms (CDM) and Joint Implementation (JI) projects, and
- Promoting and advancing Research in the transportation/Climate change areas, and
- Serving as a data source for the development of technological scenarios.

GICTD will provide all relevant stakeholders with the appropriate data needed for their various purposes.

References


