E-Newsletter/ 08

Energy Usage and Green Public Transportation in Future Smart Cities:

An Innovative Teaching Program for Students, Stakeholders and Entrepreneurs

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Detail info about Module 7

Module-7 *"Economics of Green Public Transportation Systems"*

In this module we focus on economic determinants of demand and supply of public transport, externalities, how fiscal policies and subsidies can be used to promote green technologies in the transportation system, and how new and alternative financing methods can be used to raise capital for investment in the new green technologies.

Externality is a benefit or cost that affects someone who is not directly involved in the production or consumption of a good or service which interferes with the economic efficiency of market equilibrium. Conventional transportation means causes many negative externalities, notably air pollution, greenhouse gases, water pollution and other impacts on ecosystems especially with the use of fossil fuels (Santos et al, 2010). Most prominent negative externalities caused by conventional transportation systems can be seen in Figure 1. Even though it looks like only fossil fuel usage, oil dependence, and road infrastructure damage are portrayed to be related with economy, issues about environment also has an impact and cost on economy.

Figure 1. Transport Externalities (Chatziioannou et al, 2020)

Fiscal policies are the changes in taxes and purchases that are intended to achieve macroeconomic policy objectives. Fiscal instruments are primarily price-based instruments that take advantage of market mechanisms and work through prices (Acutt and Dodgson, 1997). Some of these instruments can be listed as congestion charge or toll tax, emission and/or pollution tax or charge (e.g.,carbon tax, sulfur tax), fuel tax (e.g., any excise tax on fuel or a BTU tax), vehicle tax (e.g., ownership, licensing or registration fee) and subsidies (e.g., subsidies for clean fuels, efficient vehicles, and public transportation) (Timilsina and Dulal, 2008). Correct use of these instruments are expected to eliminate negative externalities by cutting travel demands, switching from private transportation to public transportation, encouraging use of clean fuels (e.g., ethanol, hydrogen, compressed natural gas).

A subsidy can be seen as government incentive to promote green transportation. It is a traditionally-used, and probably the most common fiscal instrument in the transport sector, particularly in developing countries. A subsidy can be provided to public transportation (e.g., bus, railway and water transportation), clean fuels (e.g., ethanol, biodiesel) and clean vehicles (e.g., fuel cell and hydrogen cars, CNG bus, etc.) (Timilsina and Dulal, 2008). A subsidy for public transportation is implemented mainly by lower fare prices. Lower fare prices enhance public transportation usage and in the long run will lead to reduced traffic congestion and emissions. Fiscal policy can also be used for supporting R&D activities of firms to share the cost of research activities for green transportation and speed up transformation to green alternatives.

Converting already established public transportation systems into a greener version requires adequate financial funding. Especially in developing countries, where financial resources are scarce it is necessary to come up with new ways of financing options to cover for the upfront investment needed for new transportation infrastructure. When deciding which financing source is relevant for a project, it is necessary to keep in mind that the amount of resources and type of financing instruments required are largely related with the level of development of the transport network. In developing countries, less developed transport networks would require large capital investments in the short term and recurrent funding sources in the long term. In developed countries, highly developed transport networks would have mainly recurrent operational and maintenance expenditures (Sakamoto and Belka, 2010).

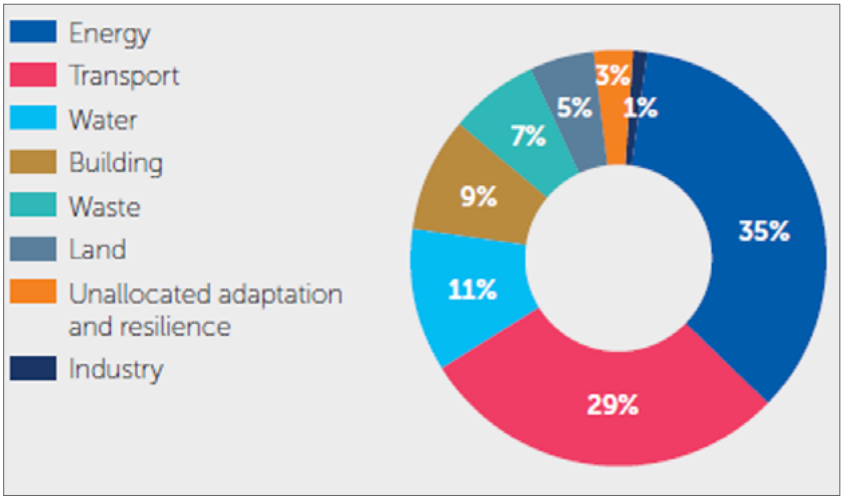

Figure 2. Project Based Allocations of Green Bonds (Amundi Asset Management & International Finance Corporation, 2021)

Throughout the module there are 4 lecture hours. First hour will be review of demand, utility and relative prices in green public transportation. Second hour will focus on review of supply, externalities and cost benefit analysis of green public transportation. Third hour will be about fiscal policies and subsidies to promote green public transportation. Fourth hour will be on new and alternative ways to finance green public transport technologies. Finally a business canvas model will be developed together with the participants.

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has a BSc degree on "Economics" from the Middle East Technical University, Turkey. He has received a master degree from the Birmingham University, UK on "Money, Banking and Finance". His PhD degree is on Macroeconomics. Specifically, he has worked on modelling oil demand and determination of oil price. He has publications at IMF Economic Review, Energy Economics, Economic Modelling, and Finance Research Letters. Dr. Unalmis has joined to the TED University in 2018 as an Associate Professor of Finance and Chair of Business Administration Department. Currently, he is Associate Dean of the Faculty of Economics and Administrative Sciences. His research interests are macroeconomic and finance and connection between these disciplines. He is interested in how existence of financial markets, especially speculative behavior in financial markets, affects macroeconomic outcomes. He is also interested in macroeconomic policies that can contribute to efforts to tackle global worming problem.

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