# Carbon Footprinting of ADB's Transport Projects

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# Introduction

**Rationale for Measuring Carbon Emissions:**

- **ADB's Safeguards Policy Statement requires quantification of emissions linked to development and operations of its projects**
- **Need to develop a mechanism to monitor carbon emissions at project, portfolio, and corporate levels**
- **Developing member countries to identify their nationally appropriate mitigation actions (NAMAs)**

**Development of Tools - Independent Evaluation Department's ongoing study on "Reducing Carbon Emissions from Transport Projects"**

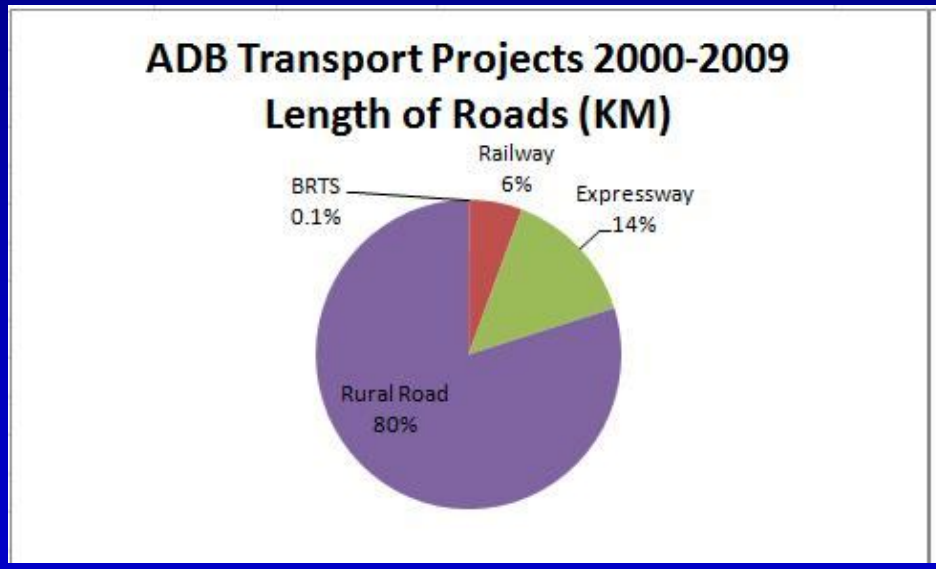
**Consultant Team – Institute for Transportation & Development Policy; Clean Air Initiative for Asian Cities**

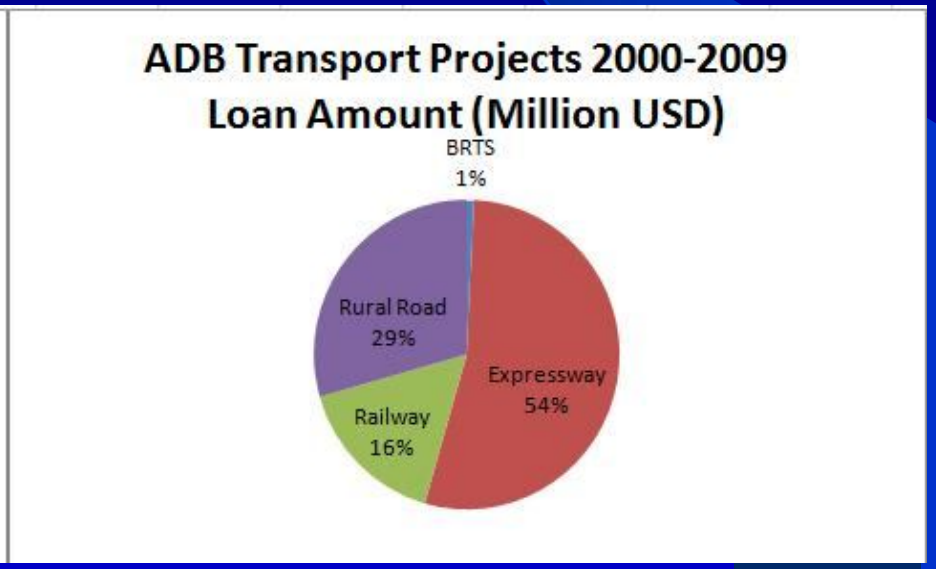
**Draft models available on ADB portal –**

**http://www.adb.org/evaluation/reports/ekb-carbon-emissions-transport.asp**

# ADB Transport Portfolio 2000-2009 Approvals

- ADB loans aggregate $19 billion approximately



# Methodology

- Development of 7 carbon emissions analysis models (rural roads/highways, expressways, urban roads, MRT, BRTS, nonmotorized transport [bike] projects, railways) that include air pollutants
- Analysis of carbon footprint and intensity of savings (based on a business-as-usual [BAU] scenario[a])
- Intermodal analysis and comparison
- Suggestions for future work

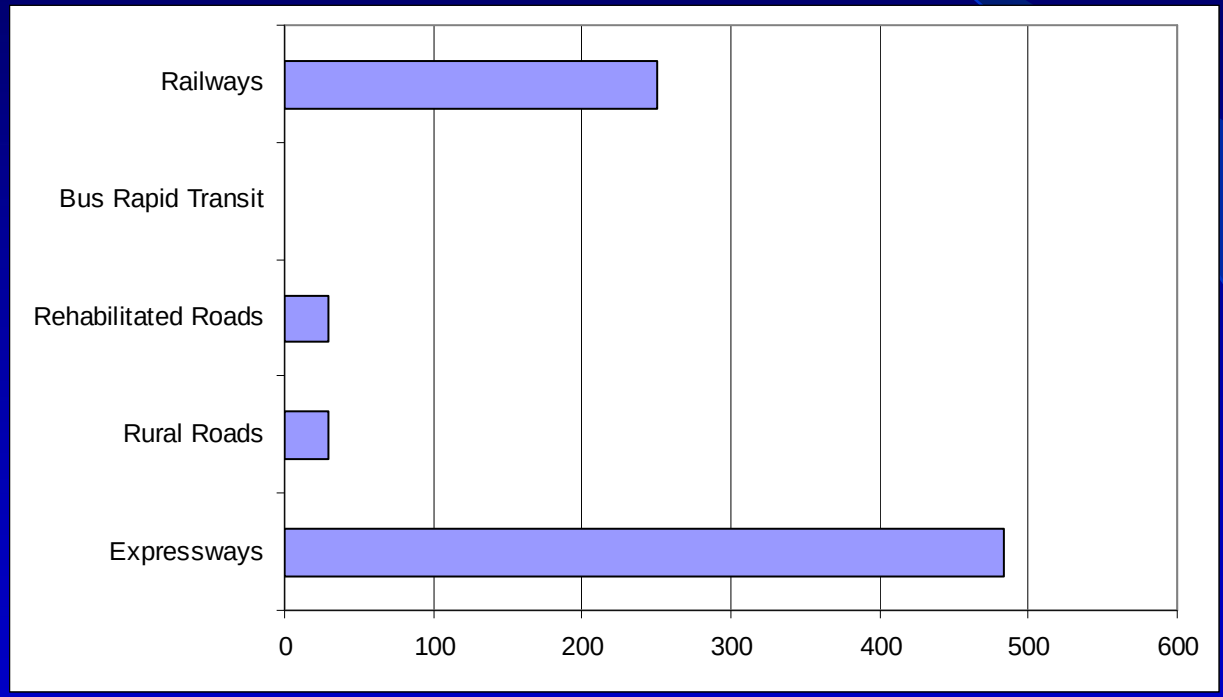
[a] BAU scenario refers to the no build/without-project situation.

# Carbon Emissions of ADB's Transport Portfolio

- Analysis of ADB's transport portfolio of loans and grants approved during 2000–2009
- Analysis of project emissions over a 20-year life
- Gross carbon emissions from construction and operations of ADB-funded transport projects were estimated at 792 million tons
- Average of 39.6 million tons annually, which is in the range of the current land transport emissions between the Philippines and Thailand

# Carbon Footprint

**Cumulative $CO_2$ Construction and Operations Emissions (Million Tons) of ADB-Funded Transport Projects during 2000–2009**

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# Key Findings

**Construction Emissions**

- The size of the construction emissions varies between 1.2% and 24% of total (construction and operations) emissions
- MRT construction was found to emit about 20% of the total emissions

**Expressways**

- Expressways account for over 60% of ADB's transport projects-related emissions
- The high emissions contribution of expressway projects is attributed to effects on induced travel that overwhelm the short-term benefits of curbing low-efficiency congested traffic
- Induced traffic effects boost $CO_2$ emissions from added road capacity typically by one-fifth to one-half or more

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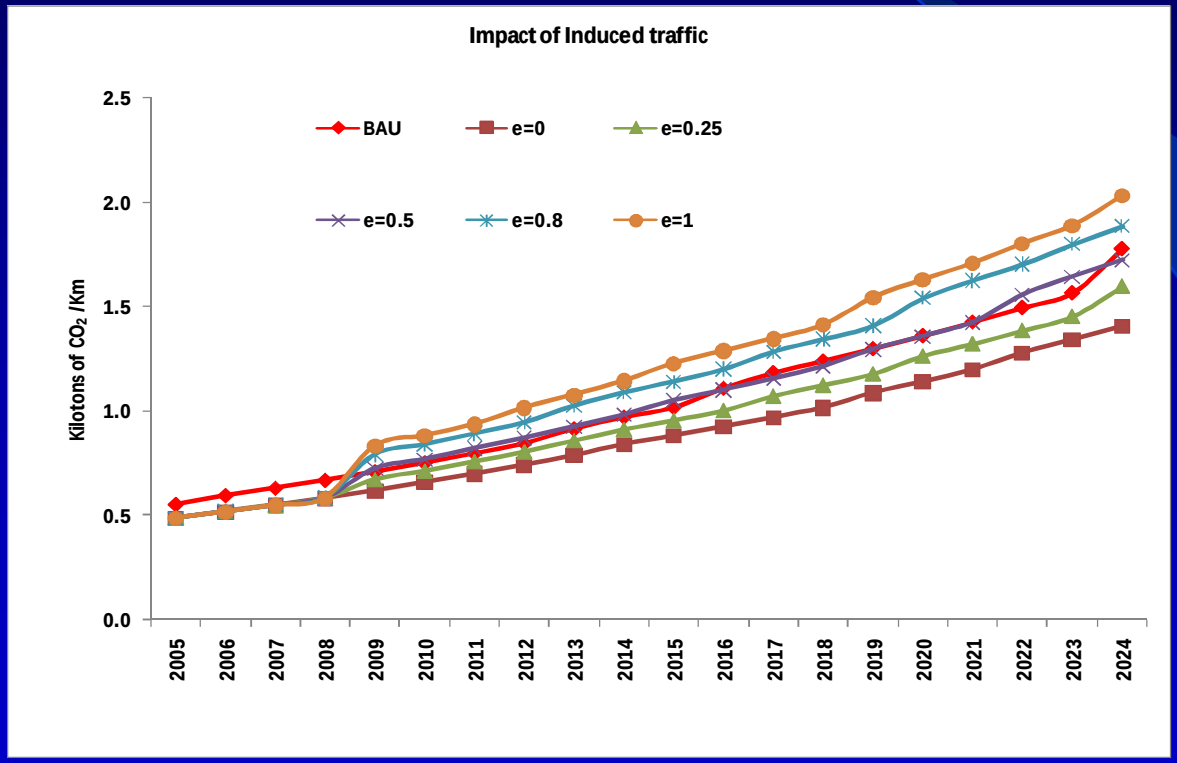
# Impact of Induced Traffic

**Impact on the $CO_2$ Emissions of a Road Rehabilitation Project**
(Case - Almaty–Bishkek Regional Road Rehabilitation Project)




BAU = business-as-usual, $CO_2$ = carbon dioxide, km = kilometer, e = elasticity of traffic with regard to road capacity.

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# Key Findings (cont'd)

- Rural roads and road rehabilitation projects were found to have a neutral or marginally reducing impact on emissions
- Road rehabilitation projects form 80% of the total km of transport facilities financed for construction or reconstruction by ADB during the past 9 years; but they made up less than 4% of the $CO_2$ footprint of ADB's transport portfolio
- Public transport investments and railway improvements, while generating new $CO_2$ of their own, more than offset those emissions when they divert passenger and freight movements from higher carbon modes and improve the efficiency of traffic flows
- Bikeways produce modest reductions in emissions by diverting some trips from more carbon intense modes

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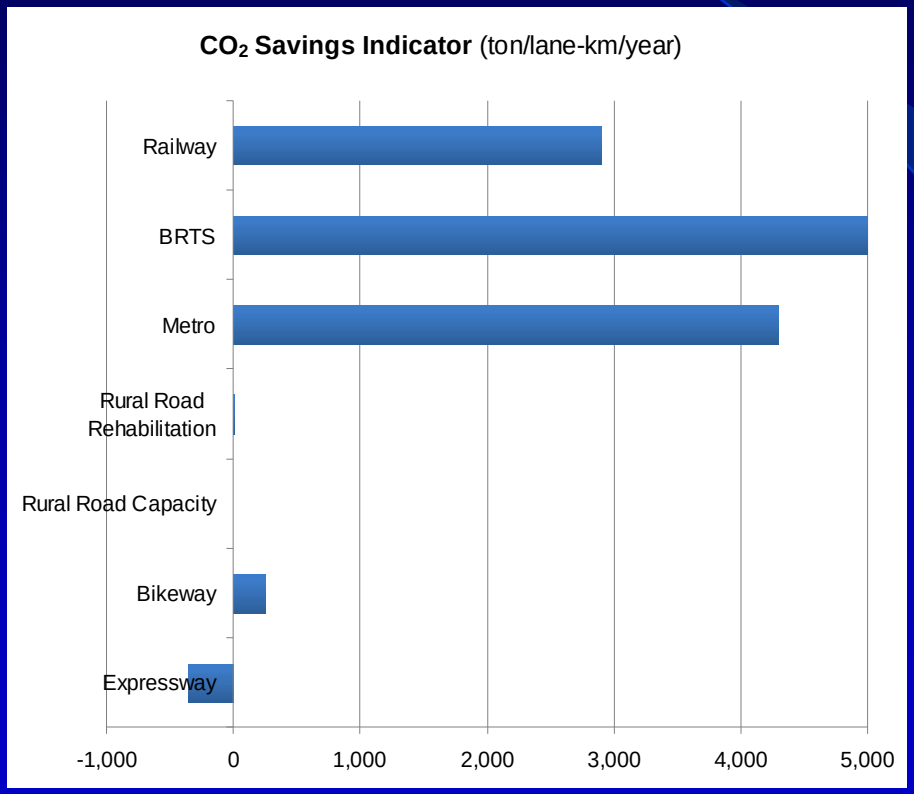
# Savings in the Intensity of $CO_2$ Emissions

**$CO_2$ Tons Saved per Kilometer per Lane per Year**

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# Indicators for Monitoring Carbon Emissions

- Output Indicator - $CO_2$ intensity per km of infrastructure constructed
- Mobility Indicators - $CO_2$ intensity per ton-km (freight) and per passenger-km
- Investment Indicator - $CO_2$ intensity per $ million spent on transport projects

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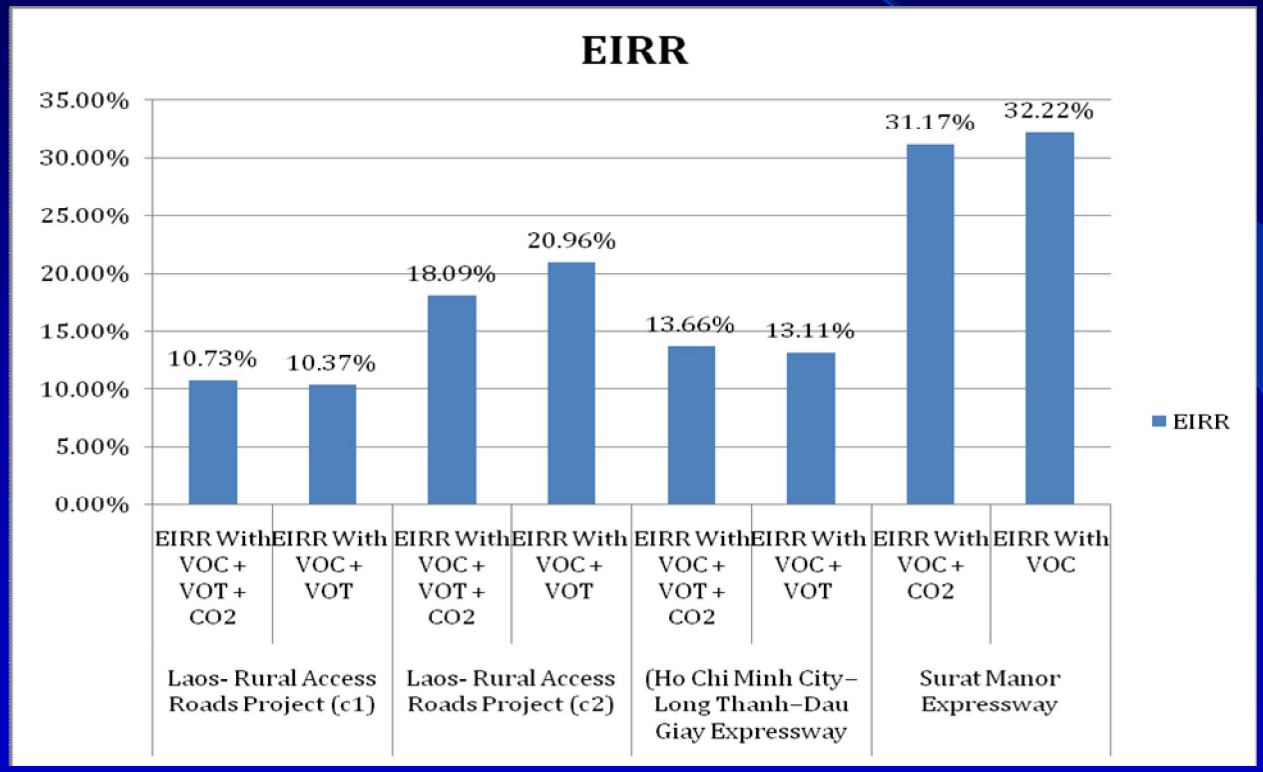
# Impact of $CO_2$ Emissions on EIRR




$CO_2$ = carbon dioxide, EIRR = economic internal rate of return, VOC = vehicle operating cost, VOT = value of time.

# Data Requirements for Measuring Carbon Emissions from Road Projects

- Basic project data

For Construction Emissions

- Construction materials used - cement, steel, and bitumen

For Operations Emissions

- Traffic data – baseline traffic volumes, trip lengths, traffic composition, occupancy, induced traffic elasticity, fuel split of vehicles
- $CO_2$ emission intensity factor in kilogram per liter for different modes depending on gasoline and diesel fuel split
- Volume to capacity (V/C) saturation limit on the project road
- Upstream emission factor to account for fuel manufacture

Measurement of Air Pollution

- Input emission factors for Particulate Matter (g/km) and NOx (g/km)

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# Recommendations for Controlling Future Carbon Emissions

- Shift investment and design to favor low carbon sustainable transport – public and nonmotorized transport, railways and intermodal connections, system management
- Encourage integrated transport supply and demand management
- Include smart traffic management to cut carbon emissions by up to 20%
- Foster efficient supply chains and logistics management to cut emissions from freight

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# Issues for Discussion

- Constraints on data availability
- Fine tuning of the models

  Draft models available on ADB portal – http://www.adb.org/evaluation/reports/ekb-carbon-emissions-transport.asp
- Use of carbon emissions in project appraisal – economic and environment assessments
- Country capacities to collect data and monitor emissions

# For feedback or more information contact:

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