



ASIAN INFRASTRUCTURE
INVESTMENT BANK

The Role of Mass Transit Systems in Urban Air Quality

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PHOTO: SEMBCORP

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Overview

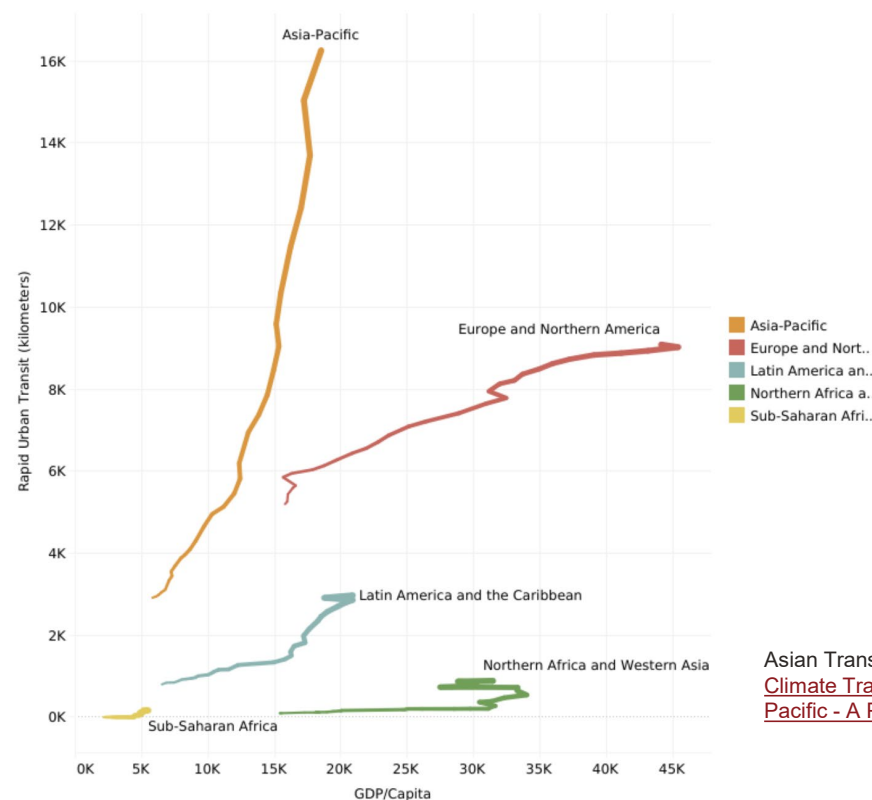
Role of Mass Transit Systems in urban air quality

- **Non-GHG pollutants (SO₂, NO_x, PM_{2.5}, PM₁₀, HC, VOC, etc.) are referred sometime as silent killers.** They also create several issues, but the most prominent one is the threat for human health.
- **Pollution is to be tackled where the population is: urban nucleolus.**
- **There are several ways of tackling pollution in urban areas;** e.g. reforming of the urban heating systems, natural barriers for dust, relocation of industries, and transformation of the urban transport systems, etc.
- In context of urban transport systems, **modal shifts** from a high polluting transport mode (normally car and bike transportation) to a less polluting one (railway, BRT and other public bus options) has been proven to be a **very effective way** to reduce pollution in highly populated areas.



Urban Transport Infrastructure Gap in Asia-Pacific

- Although Asia-Pacific had a swift growth in urban rapid transit systems from 2000 to 2021, the availability of rapid transit per million urban residents in Asia still lags behind that of the developed world. **This leave approximately 1.4 billion urban residents without efficient options.**



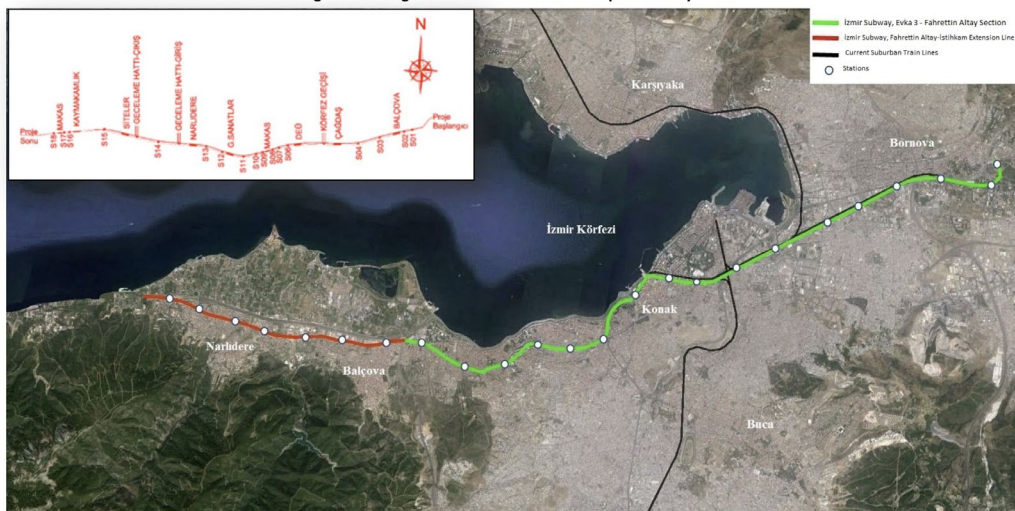
Asian Transport Outlook (ATO). 2024
[Climate Tracker for Transport in Asia & Pacific - A Primer for COP29](#). Oct 2024

Türkiye: Izmir Metro Expansion Phase 4 Project

About Project

- **Project Objective:** To increase capacity, connectivity, and efficiency of Izmir Metro.
- **Project Description:** The Project involves the construction of a new 7.2-kilometer, 7-station metro line extension to meet the increasing demand for high-capacity public transport in the city of Izmir. AIIB is providing EUR 50 million non-sovereign backed financing to Izmir Metropolitan Municipality (IMM).

Figure 7 – Integration of new line with transportation system



Pollution Reduction

- **Traffic is the main cause of urban air pollution** in Türkiye, as most existing vehicles emit GHG and other pollutions.
- In 2019, the measurements near the Project area recorded **52 days of emissions** above the EU air quality limits.
- For 2022 - 2046 period, the Project is estimated to reduce the following pollution due to modal shift: (transport passengers equivalent to a fleet of 251 buses and 537 minibuses)
 - **CO₂ = 449,741 tons**
 - **Hydrocarbon (HC) = 140,116 tons**
 - **NO_x = 901,532 tons**
 - **PM = 15,876 tons**
- **The real reduction is expected to be higher**, since the estimate above ignores the modal shift from private cars to the metro system, which is a conservative assumption.

Egypt: Alexandria-Abou Qir Metro Line Project

About Project

- **Project Objective:** To increase access to efficient, safe, and low carbon public transport in Alexandria by upgrading and electrifying the existing Alexandria-Abou Qir rail line.
- **Project Description:** The project will provide EUR 250 million sovereign backed financing together with EBRD, EIB, and AFD to upgrade and electrify the existing Alexandria-Abou Qir rail line. Specifically, the project supports (i) rehabilitation and upgrade of the existing Alexandria-Abou Qir rail line to create the Alexandria Metro and (ii) purchase of new rolling stock.



Pollution Reduction

- Alexandria is Egypt's second largest city. But due to the rapid expansion of population and urbanization, it is facing significant urban challenges such as **lack of public transport infrastructure and worsening air quality**.
- The project is the first modern metro system in the city, which will generate substantial economic and environmental benefits from the modal shift.
- The feasibility report estimated that the project will generate average savings of 567,000 tons of CO₂ over the evaluation period from 2028 to 2055. In addition, the project will also reduce the following pollutions:
 - **SO₂ = 33,210 tons**
 - **NO_x = 8,370 tons**
 - **PM2.5 = 702 tons**

India: Kochi Metro Rail Project - Phase II

About Project

- **Project Objective:** To improve urban mobility on the Jawaharlal Nehru (JLN) Stadium – Infopark corridor via Kakkanad in Kochi.
- **Project Description:** The project will support the implementation of Phase II of Kochi Metro Rail that will include the construction of an elevated, electrified metro rail system of 11.2 km and 11 stations along the JLN Stadium – Smart City corridor. The estimated cost of the project is USD229.88 million, with a sovereign backed financing loan from AIIB of USD122.32 million



Pollution Reduction

- **India's urbanization is gaining pace** as a result of the country's improving economic situation. While urbanization has improved, living standards and employment prospects, it also led to challenges, such as traffic congestion and air pollution.
- **Development of the project will reduce the share of private vehicle on the roads** thereby reducing GHG and pollutions generation from vehicles. It is estimated that 657,192 and 1,042,098 vehicle km will be reduced by 2021 and 2031 respectively.
- The estimated GHG and pollution reductions in the 2021 - 2045 period from the project are as followed:
 - **CO₂ = 5,135,765 tons**
 - **Hydrocarbon (HC) = 3,675 tons**
 - **NO_x = 86,130 tons**
 - **PM = 6,000 tons**

CONCLUSIONS

- **Mass transit systems is one of the key solutions** for urban air pollutions, along with other co-benefits such as reduced congestion, fuel cost saving, reduction in accidents, etc. In our 3 case studies, the GHG and pollution reductions due to the project are estimated as follow (tons per daily passenger):

CO₂ 1.09~18.96	NO_x 0.02~8.2	HC 0.01~1.27	SO₂ ~0.06	PM 0.001~0.14
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- **Mass transit systems reduce the pollution mainly through modal shift (shifting from road transport).** Other measures that can reduce transport air pollutions in urban areas are electrification, emission regulations, managing transport demand, etc.
- While mass transit systems can significantly reduce urban pollution, **the infrastructure availability for modal shift is still limited in the Asia & and Pacific region.** Surface transport infrastructure investments have primarily focused on road infrastructure, but there's an increasing priority towards public transit. Private sector involvement and climate finance can contribute to this trend.¹

Thank you.

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