

Nagpur, India

Partner city

Status of the project: Ongoing technical assistance



Basic Information

Urban area: 217 km²

Population: 2,893,000 | Growth rate: 1.5%

Region capital city

GDP per capita: USD 3,000

Modal Share:

Formal public transport: 9.8%1

Informal public transport: 26% (autorickshaw, minibus, school bus, chartered bus etc.)

Walking: 9.5%

Cycling: 6%

Private motorbikes or 2-wheelers: 42.6%

Private cars: 5.7%

National GHG emissions per capita: 2.41 (tCO₂eq)

Exposure to climate change: HIGH

Context

Nagpur is known as the Orange city of India, the third largest city in the state of Maharashtra and second capital of the state. Nagpur lies precisely at the centre of the country with Zero Mile Stone indicating the geographical centre of India. It is a major commercial and political centre of the Vidarbha region of Maharashtra. With nearly 3 million people, Nagpur accounts for 6.5% of the total urban population of the state. The total population including the surrounding towns of Kamptee, Kalmeshwar, and Hingna was 3.6 million in 2021.

Nagpur has been the main centre of commerce in the state and is an important trading location. The city is also home to various food manufacturing units. The city is undertaking the Multi-Model International Passenger and Cargo Hub Airport at Nagpur' (MIHAN) project, which is the biggest economic development project currently underway in India in terms of investments.

Nagpur is one amongst the Indian cities having a Metro Rail System. Majority of commuters currently commute by buses as the metro project is still undergoing. Phase I of Nagpur metro was sanctioned in 2015 and its construction began in December 2020. Nagpur metro started commercial operations at 16 of its stations, and received approval for Phase 2. Nagpur metro has undertaken initiatives to integrate the metro system with other modes such as station and area design for physical integration and a digital app and card for fare integration.

Apart from the metro, the city bus service is a crucial mode of transport run by Nagpur Municipal Corporation (NMC). The bus service provides connectivity within the city and with suburban areas such as Butibori, Katol, Kalamna etc. NMC recently procured electric buses to run under the “Tejaswini” scheme, a bus service exclusively reserved for women. The Smart City Corporation of Nagpur (Nagpur Smart and Sustainable City Development Corporation Ltd) is also working to improve transport conditions in the city with various proposals such as PBS, Smart Parking, MLCPs etc. and is working with AFD on the preparation of a transition plan to electric buses.

A proposal was also sent to Maharashtra Government for establishing a Unified Metropolitan Transport Authority (UMTA) in Nagpur. The proposal is under consideration.

As other municipal corporations in India, Nagpur Municipal Corporation, has the mandate and responsibility to finance bus transport infrastructure, whereby it can possibly borrow from international finance sources too. The performance of bus services is monitored and evaluated periodically by municipal corporations.

Whereas the ongoing development of a new phase of the metro will provide a new leap in public transport to counterbalance the negative impact of the increase in private vehicle traffic and provide more sustainable mobility solutions for the future, the city still faces significant challenges, such as the financial sustainability of the public transport system and its very low walkability due to the lack of pedestrian infrastructure. Beyond investment and technology, a transformation of mindset and system is required to move beyond the current reliance on individual mobility, for which increased public awareness on the benefits of a more sustainable mobility system will be critical.

Considering that the last comprehensive mobility plan (CMP) was prepared in 2013 and since CMPs are revised in 10 years, a new version may be taken up in the upcoming years. Further mobility needs, patterns and challenges have evolved with the introduction of the metro in the city and warrant an updated planning framework. In addition, the old CMP did not focus on e-mobility aspects which have gained traction in last few years.

AFD is supporting the Nagpur Municipal Corporation in the improvement of the existing CMP, the development of an e-bus transition plan and the creation of a mobility observatory.

Support from the Partnership

Technical assistance: mobility plan update, mobility observatory and complementary study

Funded by: European Union through the EU Asia Investment facility

Funding amount: EUR 350,000

Implemented by: AFD through the MobiliseYourCity India Programme

Local counterpart: Nagpur Municipal Corporation via Nagpur Smart and Sustainable City Development Corporation Ltd.

Supported activities:

1. Update of the existing Comprehensive Mobility Plan (CMP)
2. Development of Transition Plan of Municipal buses to Electric Buses
3. Creation of a mobility observatory

Status of implementation

Project start: October 2018

Expected project completion: December 2022

Completed outputs:

- MoU signed - August 2018
- Local Steering Committee meetings were held during November 2019, December 2019, December 2020 and Technical task force committee settled in March 2019
- 8 Trainings and capacity building workshops - July 2019, December 2019 and February 2020
- Online webinars were conducted during the period of June 2020 – Jan 2021
- Elaboration of a Transition Plan for Municipal Bus Network In Nagpur – Final report "[Pre-feasibility study for electric buses deployment](#)"

Next expected outputs:

- CMP improvement
- Mobility Observatory
- Government approval of the e-buses deployment plan

Core impact indicators baselines

| Indicator | Baseline – N/A |
|--|------------------------------------|
| Total annual transport related GHG emissions (Mt CO ₂ eq) | 507,300 Mt CO ₂ eq |
| Annual transport related GHG emissions per capita (kg CO ₂ eq) | 197 kg CO ₂ eq / capita |
| Air pollution Mean urban air pollution of particulate matter (in µg PM2.5) at road-based monitoring stations | 49.2 µg/m ³ of PM2.5 |
| Road safety Annual traffic fatalities in the urban area, per 100,000 inhabitants | 10 fatalities / 100,000 hab |
| Affordability of public transport Percentage of disposable household income spent on public transport for the second quintile household income group | 12% |

Highlights in the past year

With the support from AFD, the Nagpur Municipality has developed a transition plan that aims at progressively replacing existing internal combustion buses with e-buses

The transition plan to electric buses builds on Nagpur's Comprehensive Mobility plan, which envisaged a progressive increase of the bus fleet size by almost 90% in 2018 and up to 4.5 times its current size by 2041, for a total of 2,418 buses.

The transition plan not only addresses the electrification requirements of a significant share of the bus fleet, but also includes recommendations on route rationalisation for a better integration with the recently introduced metro and adaptations to the contractual framework to guarantee operational and financial viability of the new system.

The pre-feasibility study focused on the electrification impacts and operational requirements of the bus fleet that shall be replaced by 2022, as foreseen in the existing contracts. In total, 237 standard diesel buses shall be replaced with 202 newer vehicles. For this purpose, three scenarios were assessed:

- **Reference scenario:** Replacement with new standard diesel buses
- **Scenario 1:** Replacement with new electric buses of 350 kWh battery capacity
- **Scenario 2:** Replacement with new electric buses of 400 kWh battery capacity

The pre-feasibility study showed that all modernisation scenarios required higher OPEX and CAPEX. The e-bus scenarios require significantly higher resources than the reference scenario. This difference is caused by a significantly higher CAPEX of e-buses relative to diesel buses compared to a lower OPEX for the former.

To close this funding and financing gap, both the study and the transition plan recommend three potential solutions:

1. **Increased cost efficiency through improved contractual frameworks:** Such adaptations could include extending the contract duration from 5 to 10 years, providing additional incentives to increase operational efficiency and renegotiating existing contracts or launching new competitive tenders for the new electric buses.
2. **Investment subsidies:** Different sources could be leveraged by the Nagpur Municipality to cover the increasing costs, such as advertisement revenue, land-value taxes, as well as international support in the form of soft loans and grants for capital expenditures from diverse sources, such as the Green Climate Fund or the Clean Technology Fund. The study however did not include any of these sources in its financial analysis, hence their potential remains unclear.
3. **Increased fare box revenue:** Currently, Nagpur's tariff levels are relatively low compared to agglomerations sharing similar characteristics, as the city has given priority to service affordability, by relying on public subsidies to close the ensuing gap. According to the study, the current conditions provide some flexibility to potential fare increases, assuming that these are progressive and their impact on ridership levels remains limited.

The necessary investments to electrify the bus fleet can be justified by non-quantified positive externalities, such as improved health and air quality and reduced GHG emissions. Even with high emission factors stemming from the electricity grid, battery electric buses have the potential to reduce CO₂ emissions by 30% compared to diesel buses and could save approximately 100 ktCO₂e over a period of 15 years.

Nagpur's transition plan and the pre-feasibility study can be accessed in the MobiliseYourCity Knowledge Platform using this [link](#).

Due to the limited availability of new or aggregated data, the factsheet has only marginally been updated in 2023.