

A Meta-Analysis of Investment in Green Transport

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Abstract

The increasing population and their increasing societal needs are a massive challenge for the Indian economy. Nowadays, it is very important to maintain coordination between artificial and nature-provided resources, despite the benefits of the emerging techniques of science. The prime focus of our research is to bring an analytical overview of investment into green transport and shed light on investment policies (including foreign investment) and regulation in both a deductive and inductive manner in green transport. We have analyzed the cost-effectiveness and impact of green buses on reducing emissions, improving air quality, and enhancing public health. Road transport has been a preferred mode of transport for every category of passenger and for goods movement in India. Due to the popularity of green buses, the government and private players are enthusiastic about investment in green transport to promote sustainable mobility and reduce dependency on fossil fuels. Our research presents a comparative overview of investment interest for both domestic and foreign players in green transport.

Objective

The objective of our study is to analyze green investments for the transport sector in urban areas of India. The purpose of this study is to investigate the role of investment policies in green transport adopted for achieving sustainable Development Goals (SDGs).

Methodology

We have adopted descriptive analysis of data which are based on regulatory and financing investment reports, websites etc. We have adopted a case analysis in urban areas of two states- Delhi and Bihar (Patna). We used secondary sources of data for current situations, participation of its users, investment options, funding mechanisms, and infrastructure policies. We have applied the thematic approach (charts and graph) for Meta-analysis.

Findings

We observed That India is far from meeting the growing needs in terms of coverage, capacity as well and service quality. Moreover, we have observed that green buses have some positive impact on the growth of the upcoming shared economy. We designed some frameworks about green buses and their positive impact on the upcoming shared economy. We have used a pragmatic approach to establish the comparative analysis by consolidating the data from the year 2018 to the present.

Practical implications

This research work will help all individuals to understand the comparative overview of the Indian transport sector and will motivate them to promote green buses. It will help organizations, concerns, authorities, and various departments make policies and set a benchmark to develop the transport sector, considering environment protection and the effective use of green transport.

Keywords

Green Transport, Meta-Analysis, India's Zero Emission Plan (ZEP), India's Green Economy

Introduction

It has been observed that transport infrastructure ensures the operational progression and mobility of commodities, people, and information, whereas the process of development of infrastructure is critical to the overall growth of the economy (Mohmand et al., 2021). The importance of transport can be realized in mobilization of resources and productivity augmentation (Pradhan & Bagchi, 2013), generating employment (Sreenu, 2021), reducing poverty (Deng, 2013), and making labor efficient and productive (P et al., 2022). The automotive sector has witnessed a significant growth in recent years with the adoption of sustainable technology (Yashpal et al., 2018). Green transport is one of such important additions to the sustainable effort in transport. Green transport is an emerging and convincing solution for promoting more efficient, healthier, and cleaner mobility systems. It is the movement of people and goods in the right way, keeping in mind the environment, social and natural resources. Today, the climate is changing rapidly due to increasing population, cumulative demand, and pollution everywhere in the world. It has been observed that urbanization is increasing exponentially, indicating migration from rural to urban areas due to improved facilities and connectivity. The need for the basic amenities is increasing day by day and due to this the transportation network is intensifying in commercial and socio-economical manner. Green transport is the best solution for sustainable mobility to meet the needs amidst growing glitches in the environment. It gives priority to environmental protection, energy efficiency, and a better quality of life while meeting essential needs too. A wide range of innovations, technologies, and practices are involved that seeks to reduce the carbon footprint and ecological impact of transportation. India is one of the world's fastest-growing economy and home to more than approximately 1.4 billion people, with an average economic growth rate of 7% in the last 21 years (Chakraborty, 2021). The transport segment act as an important catalyst in the economic growth of the nation (NITI Aayog, RMI, 2021). An efficient public transport system is a fundamental enabler in the development of every nation by making it convenient and affordable for the public. In urban life, public buses are the most cost-effective and widely accepted solution for commuting. According to a World Bank report, 84% of women prefer public transport. In non-metropolitan cities like Agra, Patna, Bhopal, Lucknow, Kochi, etc., more than 60% of the people give importance to public transport in their daily work.

Green transport encompasses a widespread collection of environmental friendly and sustainable conveyance opportunities intended to minimize the environmental impact. In terms of public transportation, it includes buses, trams, subways, and commuter trains, bus rapid transit (BRT), light rail transit (LRT), carpooling and ride-sharing, car-sharing services, and many more that provide efficient and sustainable options for moving large numbers of people. The transportation holds a substantial share of total energy demand in India. This sector itself accounts for more than 50% of the oil demand in the country (IEA, 2021). Hence, numerous means of green transport aim to diminish carbon emissions, improve air quality, alleviate traffic congestion, and promote sustainability in the conveyance segment. Green transport is such an environment-friendly system that emphasizes nature

conservation. It is making a significant contribution towards ensuring sustainable development. Therefore, for the development and balancing the environment and climate there is need of sustainable policies in India (India Transport Energy Outlook, 2022). India is embracing green transportation as a solution to its growing population and rapid demand for energy efficiency and environmental protection. The Indian government and private institutions are actively working to reduce CO2 emissions, coordinate energy sources, and address necessary needs. They are also running financial schemes and raising awareness about the benefits of green transportation.

Literature Review

Number of studies emphasize on sustainable transport and its promotion and development. The green transport is an enhanced system of mobility and an emerging outcome in this technological era (Rajesh, 2020). Researchers have also addressed the relationship between environmental and financial performances (García-Sánchez et al., 2014). Moreover, we carried out a methodical review of studies about investments in green transport. The major findings from the literature have been presented in the following table:

Table 1.1: Key findings from the literature in investment in green transport and related sectors.

Authors	Key findings
Ahamuefula Ephraim Ogbonna & Olusanya Olubusoye (2022)	The paper includes study of green returns significantly respond to own-market, oil-market, and COVID-19 uncertainty.
M. Absar Alam (2015)	The study examines the transport planning and practices, focusing on public transport integration and proposing guidelines and standards for operators.
Arnab Adhikari, Sumanta, Indrani, Ashim and Parth Pratim Sengupta (2018)	Researchers focuses on efficiency of Kolkata's bus routes using Shannon entropy-based DEA model, introduced emission metrics for environmental performance assessment, and recommending route design based on trade-off analysis.
Hadiqa Ahmad, Muhammad Yaqub & Seung Hwan Lee (2023)	Here, the researcher has given the disclosure of religion-based businesses and explained sustainability, performance, innovation, and the diversification of ESG investments during COVID-19.
Peter Kayula (2021)	It explains how green transport is useful and supports the Green Revolution; regional markets, agriculture production and trade.
Yashpal Malik, Nirupama Prakash and Ajay Kapoor (2018)	It explains the Government subsidies and promotional events can increase market share in acceptance of green vehicles for sustainability.
Megha Kumar, Zhenying Shao, Caleb Braun & Anup Bandivadekar (2022)	The study evaluates the baseline and mitigation scenarios. It compares and examine the use of energy with impact of COVID-19.
Sudipa Ghosh, Madhab Chandra & Amitava Ray (2020)	This paper presents framework for the green supply chain management and identifying a benchmarked industry, with Supplier and support sustainable development.

Akshay Mani, Madhav Pai, Rishi Aggarwal (2012)	This paper suggests sustainable policies examine transport strategies for the auto-rickshaw division and its role in the growth of sustainable transportation.
Snovia Naseem, Umair Kashif, Yasir Rasool & Md. Akhtar (2023)	The paper has addressed the role of the Indian government in promotion of green financial innovation and sustainable energy to reduce transport-based CO2 emissions, with effects of GDP.

Source: Self-compiled as per review of literature related to investment, its policies in transport sector.

From the table 1.1 it is seen that the different authors have given various opinion based on their studies related to green transport. Green returns during Covid-19 related to oil market (Ogbonna & Olubusoye, 2022), planning and sustainable policies related to transport sector (Alam, 2015 &) and models which assess the performance of green buses (Adhikari et al., 2017) etc., are highlighted in most of the studies. Moreover, the Supply chain framework and adoption of the role of green mobility has also been addressed (Ghosh et al., 2021).

Objective

India is experiencing rapid urbanization, with the population projected to grow from 340 million in 2008 to 590 million by 2030, necessitating improvements in urban transport to ensure standard worth of life. This includes fast, reliable commutes, improved air quality, public health, safe transport, and equitable mobility options for all societal sections (McKinsey & Company 2010). India is emphasizing on playing an active role towards the decarbonization of transport and the adoption of sustainable mobility. Shared mobility is being promoted by bringing states, domestic and worldwide financial institutions, creators (manufacturing units), and different operators on the same length. Moreover, leveraging private sector investment to unlock financing for e-buses are the core of public transport (NITI Aayog & World Resource Institute workshop, February, 2022). The transport sector in India accounts for more than 12% of carbon dioxide emissions, and it is expected that it will double in the upcoming year by 2050 (IEA, 2023). It is observed that transport is a growing sector compared to other sectors. India has the largest consumer ratio and has huge demands; hence, to meet such demands, transport services play a vital role in overall growth.

After a thorough insight into the study area and the increasing use of green transport, it is decided to carry out a study to assess the green investment for the transport urban sector. It is observed from the aforesaid paragraph that green investment in transport has been studied from different perspectives. However, it is not possible to include all of them. Therefore, we have decided to emphasize on present scenario of green investment, policies, and participation of users.

Methodology

The present study aims at analyzing the green investment for the transport sector in urban areas of India.

We have adopted a case analysis in urban areas of two states, i.e., Delhi and Bihar (Patna). Bihar is an important landlocked state of India, both factually and geographically. Hence, the development of this state needs priority, but the development profile is very slow. The transport sector, which is related to

roadways, is retrograde, specifically green buses, which is less acknowledged and lopsided. Delhi is the capital city of India and the central place of the country where people gather here across all the states. The present scenario of surrounding in the capital of the state is critical due to such large gatherings and huge growing needs. Efforts to promote green transport amid increasing congestion in the capital are very slow.

We have used secondary data to achieve the study objective. Green Investment in transportation involves allocating funds for conserving nature and for the advancement, improvement, and maintenance of transportation infrastructure and services, including roads, railways, airports, seaports, and public transportation systems. This includes funding for network construction, vehicle acquisition, and technology implementation for safety and sustainability. To analyze the green investments in the transport sector, we focused mainly on the investment in green buses. This includes different Electric Vehicles (EVs), Battery Electric Vehicles (BEVs), Plug-in Hybrid type Electric Vehicles (PHEVs), Hydrogen-based fuel cell vehicles, bicycles, e-bikes, and electric-assist bicycles (e-bikes), which are green and sustainable modes of transportation that reduce the need for fossil fuel-powered vehicles.

Another important aspect of our study is the participation rate of the stakeholders in green investment. The role of government in the form of different policies is also considered to understand India's present position in green transport.

Findings and Discussion

We analyzed the information collected from various journals and government websites to understand the investment in green transport. We have analyzed the current scenario of two states namely Bihar and Delhi in our study. The findings are presented in three sections as (A) Current situation of the green transport, (B) Participation of users and option of investments and (C) Infrastructure policies.

A. Current situations

A.1. Current situation of Bihar

Bihar an agrarian state has growing population and increasing urbanization. The state is facing the challenges related to environment degradation, air pollution and traffic congestion in urban areas. The UNEP and Bihar's government are collaborating to revise the State Action Plans on Climate Change (SAPCC) to bring into line with national goals and effectively tackle local climate change impacts They have partnered to develop a climate-resilient and low-carbon extension pathway in the state. The partnership will involve advocacy, climate analyses, and capacity building for climate-related issues. Bihar has knowledgeable higher growth than the Indian economy but is vulnerable to climate change, making a shift towards sustainable development necessary for economic growth. UNEP will assist Bihar in preparation of the greenhouse gas inventory, conducting carbon footprint evaluation and developing climate impact vulnerability assessments (Government of Bihar to chart low carbon development pathway with UNEP Support, n.d.). The Bihar State Road Development Corporation (BSRDC) is encouraging green transportation in Bihar, focusing on green buses vehicles as public transport. Initiatives like the Bihar Electric Vehicle Policy 2021, Bihar Cycle Lane Project, and Bihar Solar Energy Policy 2017 aim to increase electric vehicle adoption and cycling. A report issued by the institution Centre for Science and Environment (CSE) directs high participation in green transportation in Bihar. Currently State owns more than 1500 buses whereas green buses are in very less numbers. There are 145 green buses out of which 120 buses are CNG buses and only 25 buses are e-buses (BSRTC). The Bihar state road transport corporation manages these buses where it has been recorded that around 80,000 passengers travel daily to the transit. Following are the type of transit of these buses (*BSRTC*,

n.d.).

- Intercity or Intrastate bus service (within state from one city to another).
- Interstate bus services (from Bihar to other state as Delhi, Uttar Pradesh, Jharkhand).
- International bus services (Bihar to Nepal).
- Local bus services in selected cities only.

The e-buses are delightful solution of the problem of increasing environment degradation and air pollution. Green buses ensure the saving of fuel cost and carbon emission and it is accepted widely in the country and abroad. The different types of e-buses have their own capacity of fuel saving and CO2 emission saving presented in table A.1 (a).

Table: A.1 (a) Effectiveness of electric bus.

	KMs covered	CO2 emission saved	Fuel (Diesel) saved
12M Electric Bus	1,716,912 kms	1,416 Tons	536,535 Liters
9M Electric Bus	1,600,422 kms	1,056 Tons	400,106 Liters
Total	3,317,334 kms	2,473 Tons	936.641 Liters

Source: As per Bihar State Road Transport Corporation webpage.

We have observed that 936.641 liters of fuel (diesel) have saved and 2,473 tons of CO2 have been saved by using electric buses by covering 3,317,334 kms. This is the remarkable achievement in the transport sector.

A.2. Current situation of Delhi

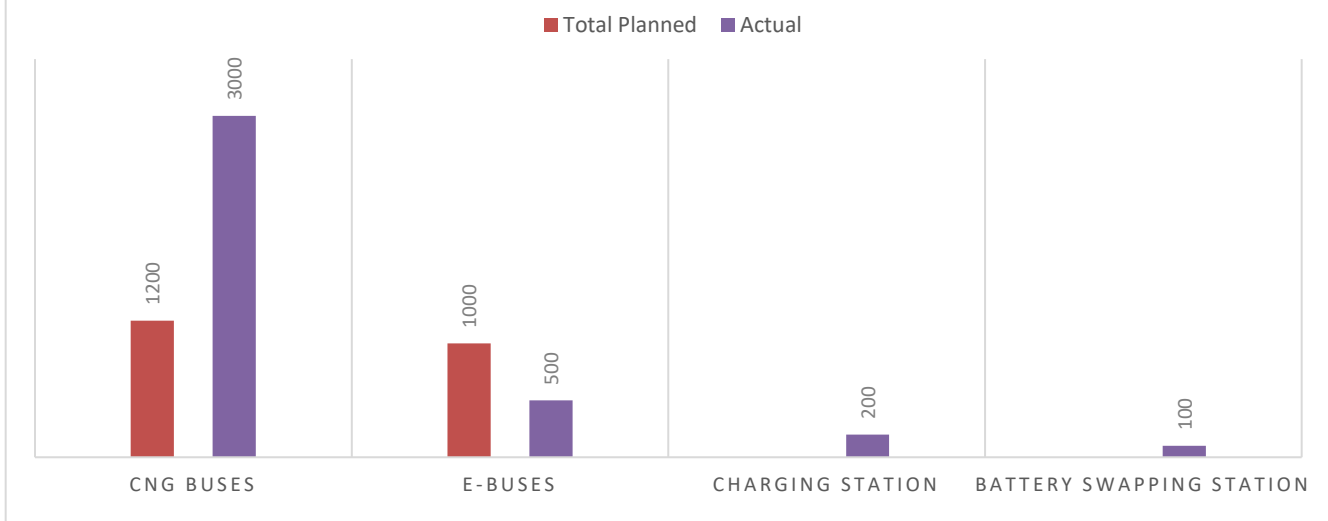
As per report of Delhi Transport Corporation, it has been observed that around 70 % of people use public transport in the state. The large population is wholly depended on public transport specially they like to travel through buses. The green buses are managed by DTC (Delhi Transport Corporation). In recent times, increasing economic activities demands fine mobility system and Delhi is the hub of mobility as comparison of others. The bitter truth is that the state is facing serious air pollution and related problems therefore fixing such issues related to air pollution the Delhi government has taken some healthy steps and prepared various strategies to reduce carbon emission. The government has aimed following in its green budget: (*green budget of Delhi 2021 for transport sector*)

- It aims to convert 25% registered vehicles in the state into electric ones by 2025 and plans to roll out 1300 electric buses in the state.
- The state government of Delhi has launched a scheme called ‘landscaping of PWD roads’ for improving qualities of air.
- The government is committed to innovative steps via Public Private Partnership Models and launched cluster schemes where they enable private players to finance and manage around 20,000 buses.
- The government is providing free travelling facilities to women commuters to motivate public interest in public transportation.

As per the EVs policy, 2020 data we found that Delhi government is implementing the green buses in the state whereas the rate of acceptance is still low as in comparison of requirement.

Figure A.2 (i): The budgeted and actual acquisition of green buses

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Source: Author's compilation based on data of Delhi EV policy 2020 & (Accelerating Electric Mobility in Delhi – RMI India Foundation, 2022).

In the figure A.2 (i) the availability of green buses and the charging stations have been presented. The number green buses, charging station etc., are not as per requirements. The report issued by United Nations Population Division estimated the population of the urban city in the state is larger (approximately 32.2 million) which is 21,000 people per square (highest in the world). There are only 1300 CNG buses and 500 electric buses available in the state whereas 200 charging stations and 100 battery swapping station are only available.

B. Participation of users and Investment options.

The emerging E-buses attract various stakeholders for the investment. The government of India is procuring and managing such investment activities for developing and promoting green transport. Ministry of Heavy Industries (MHI) consulted with many participants these are World Bank, Asian Development Bank, Ministry of Road Transport and Highway (MoRTH), NITI Aayog, E-bus operators, Department of Economic Affairs, Financial Institutions, Banks, Non-Banking Financial Services Companies (NBFCs), Reserve Bank of India (RBI), Ministry of Housing and Urban Affairs (MoHUA), and the US Government (*Decarbonization of Transport Sector Essential to Reduce GHG Emissions, Achieve Net-zero Emissions by 2070: Union Environment Minister Shri Bhupender Yadav, n.d.*). It emphasizes the importance of arranging electric buses as the sustainable aiming for net zero emissions through the following means:

- India is making the investment of \$1 billion for replacing old buses and planning for 5,450 e-buses in the behalf. The government has targeted 50,000 e-buses where 12,000 buses already in the process of acquisition.
- The United State and India is working together to invest \$10 billion and planned to buy 38,000 e-buses in India.
- Ninety Public Transport Authorities in India lost Rs. 19,726 Crore during operating of 1.5 lakh buses. As per report of Public Transport Authorities during 2019-20.

- A security plan for e-buses gives a 3-month safety net for payments if there are problems. The government of India has collaborated with united state to manage such financial issues of acquisition of 38,000 e-buses. covering up to 38,000 e-bus purchases
- Ministry of Heavy Industry has expected to buy 25,000 e-buses for Rs 2345 crores through public comments and state consent.

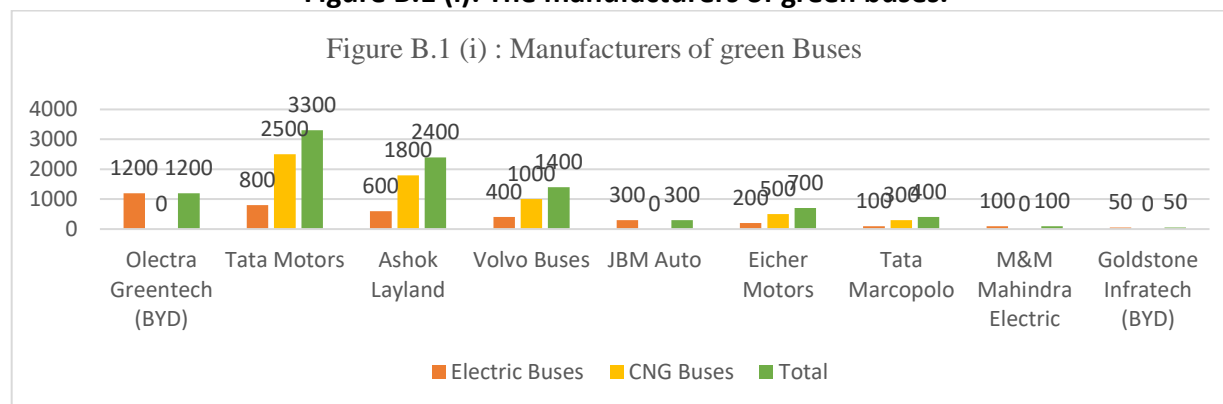
B.1 Manufacturers of green buses.

India is also one of the leading countries which has huge demand of green buses to achieving sustainable growth. Green transport is being adopted across the globe whereas to attain the goal sustainability India is also accepting it. The manufacturing and acquisition of these buses are under the supervision of make in India initiative of the government. There are various manufacturing companies who manufacture such green buses. India is implementing electric vehicles (EVs) as a sustainable transportation solution. The green buses are emerging solution which are revolutionizing urban mobility with reduced emissions and innovative technological advancements. The manufactures and investors are taking interest to develop the green buses in India through their collaborative actions. The companies who are manufacture green buses are as follows:

- Olectra Greentech (BYD) is an Indian company established in 2014. Its headquarters are in Hyderabad, Telangana. The company manufactures electric buses.
- Tata Motors is the oldest Indian company, established in 1945. Its headquarters are in Mumbai, Maharashtra. The company manufactures all types of green buses.
- Ashok Leyland: This Indian company was established in 1948. Its headquarters are in Chennai, Tamil Nadu. The company manufactures green buses.
- Volvo Buses is a foreign company established in 1927. Its headquarters are in Gothenburg, Sweden. The company manufactures electric buses.
- JBM Auto is an Indian company established in 1996. Its headquarters are in Faridabad, Haryana. The company manufactures electric buses.
- Eicher Motors is an Indian company established in 1948. Its headquarters are in Gurgaon, Haryana. The company manufactures green buses.
- Tata Marcopolo is an Indian company established in 2006. Its headquarters are in Dharwad, Karnataka. The company manufactures green buses.
- M&M Mahindra Electric is the oldest Indian company, established in 1945. Its headquarters are in Mumbai, Maharashtra. The company manufactures electric buses.
- Goldstone Infratech (BYD): an Indian company established in 2011. Its headquarters are in Hyderabad, Telangana. The company manufactures electric buses.

The manufacturers of green buses and their yearly(2022-23) production are presented below:

Figure B.1 (i): The manufacturers of green buses.



Source: Author owns compilation on the report on different manufacturers & www.statista.com.

In figure B.1 (i), Tata Motors has manufactured 3300 green buses, Ashok Layland has produced 2400 green buses, which are the largest manufacturers, and Olectra Greentech has manufactured 1200 electric buses. Another company, Goldstone Infratech (BYD), has a very low number of green buses, which is only 50 electric buses.

C. Infrastructure policies

Green transport has been accepted as an enabler that helps to reduce air pollution, greenhouse gas emissions, fossil fuel consumption, and traffic congestion. The government is committed to developing the infrastructure to implement green transport through various supportive schemes, as presented below:

Table C.1: Policies / Scheme in Bihar related to Green Transport.

Particulars	Details
Scheme of conversion of Diesel Buses to CNG Buses.	Under this scheme, the government has budgeted Rs. 40 crores, where Rs. 11,41,50,000 is spent on direct procurement of CNG buses by BSRTC, apart from 28 diesel buses that are converted into CNG buses.
Bihar Clean Fuel Scheme.	The initiative for controlling vehicular pollution in Patna the scheme contains a provision of Rs. 2000 crore as a budget through which various subsidies are given to replace petrol- and diesel-powered vehicles.
CNG filling Stations.	Under this scheme, the government is fixing CNG stations. GAIL (India) Ltd. has set up five CNG stations at Patna in different places; further such stations in Begusarai have also started.
Electric Bus Transportation	Currently, there are 25 electric buses under BSRTC in the Patna urban area through the FAME-II project. The government has entered a partnership with M/s Ashok Leyland to operate said buses under the OPEX model with a total project cost of Rs. 104,58 crores for 7 years.
Green tax on 12+ years old vehicles.	The government is charging a green tax under the provisions of the Bihar Motor Vehicle Act, 1994. The tax amount is equivalent to 10% of the total tax paid by every owner of any 12-year-old vehicle.
Restriction on 15+ years old all vehicles.	The main reason for air pollution is gas and dust emissions from vehicles. Therefore, the government has restricted all 15+ years of vehicles, either private or government.
Mukhya Mantri Gram Parivahan Yojna	Under this scheme, the government is promoting pollution-free transport by providing subsidies to selected beneficiaries.
Vehicle Scrappage Policy	This scheme has been brought about to give relief in arrears and penalties to vehicles that are in scrap.

Source: Author own's creation based on green budget of Bihar 2022-23

The government has implemented various supporting schemes for meeting green transport goals and reducing vehicular pollution, including restrictions on the use of petrol and diesel-based vehicles. The Bihar Swachh Fuel Yojana promotes CNG and electric vehicles. It aims to promote technologies through sustainable practices. The budget allocations and disbursements are aimed at incentivizing eco-friendly transportation adoption. Bihar is the third-largest-populated state in India, but there are very few green buses available.

Now, The various schemes and policies implemented to promote green buses in Delhi are presented below:

Table C.2. Policies / Scheme in Delhi related to Green Transport.

Particulars	Details
PM E-buses Sewa Scheme: (Central government scheme in Delhi)	This scheme has been launched by the central government under the authority of the Ministry of Housing and Urban Affairs (MoHUA). The scheme aims to upgrade infrastructure in 181 different cities under the green mobility initiative. As per the guidelines of the scheme, 150 electric buses have been issued among the 20–40 lakh population in the city. Moreover, the government has allocated central assistance support per kilometer in three categories: Rs. 24/km for standard EVs, Rs. 22/km for midis, and Rs. 20/km for mini e-buses.
Mohalla bus services.	The initiative is under the Delhi Integrated Multi-Modal Transit System (DIMTS). The various CNG buses with air conditioning, GPS, and Wi-Fi facilities are being provided to the public. The green buses charge a nominal fare of Rs. 10 per trip. The green buses cover 20 different routes, mostly in the south and west zones of the state.
GCC Model	This scheme provides technical and financial support to the state for participating in the adoption of green buses as part of public transport. The scheme aims to reduce GHG emissions and air pollution and ensure quality of life and mobility among urban residents. Green buses are expected to save up to 50% of the cost of fuel and up to 80% of carbon emissions compared to conventional buses.
EVs Policy 2.0	This policy ensures a positive impact on the environment, economy, and society. It provides a performance-linked incentive to manufacturers of green buses in the state. It offers a cash incentive of Rs. 10,000 per kWh of battery capacity for the first 50,000 EVs manufactured in Delhi, subject to a maximum of Rs. 30,000 per vehicle.
Fame – 3 schemes	The third phase is a national initiative to promote faster adoption and manufacturing of electric vehicles. The scheme provides a direct subsidy to the buyers of EVs based on the type of vehicle purchased. The subsidy ranges from Rs. 10,000 to Rs. 1.5 lakh per vehicle.
Restriction on 15+ years old all vehicles.	The main reason for air pollution is gas and dust emissions from vehicles. Therefore, the government has restricted all 15+ years of vehicles, either private or government.
Vehicle Scrappage Policy	This scheme has been brought about to give relief in arrears and penalties to vehicles that are in scrap.

Source: Author compilation from the times of India, Delhi transport websites & www.morth.nic.in

The government has initiated several policies for increasing green buses and providing a roadmap to develop such buses easily. The policies aim to increase EV adoption and encourage the manufacturing of EVs and their components. The policies offer funds and incentives to develop a green ecosystem through green mobility.

C.3 Comparative analysis:

The Bihar state and Delhi state has their own target of sustainable mobility. The EVs penetration,

charging infrastructure, investments and available green buses are analyzed here through presented Table C.3 depicted below:

Table C.3. Budgeted and actual analysis related to green transport.

Parameters	Bihar		Delhi	
	Target/ Budgeted	Actual	Target / Budgeted	Actual
EVs Penetration (by 2024)	1,00,000 EVs	1,08,217 units	25 % of all new vehicle registration.	83,000 units of EVs
Charging Infrastructure	250 charging stations	20+ only	30,000 charging station	2900 only
Investment	Rs. 2,500 crores	NA	No such targets	NA
E-buses (In nos.)	1000	27	1000	423

Source: Author owns compilation based on analysis of state electric vehicle policies and their impact:

www.climatetrends.in.

In table C.3, we can see that the Bihar and Delhi have made progress in increasing electric vehicle penetration, but the actual numbers slightly exceeded initial targets. However, there are variations in the achievement of targets related to charging infrastructure and electric bus deployment, with some disparities between planned and actual figures. Investment data is not available for both states. The EVs penetration is higher than budgeted in Bihar which is 1,08,217 where as in Delhi it only 2.02% out of 25% new vehicles. The charging infrastructure is very less in Bihar as targeted 250 charging stations but there is only 20+ charging stations are there whereas Delhi has 2900 out of its target of 30,000 charging infrastructure.

Conclusion

We have examined the investment policies and infrastructure related to green transport, especially green buses. We found that there is very limited research in this area for the state of Bihar. Patna is the most populous and polluted district in Bihar. The targets and achievements towards sustainable mobility have a large variance in Patna. We have analyzed the policies of investment in green buses and their effectiveness. No doubt, green transport is very useful and helpful to sustainable mobility. It reduces fuel consumption. We found there is a slow rate of acceptance and implementation of green buses in both the states. The manufacturing and acquisitions are also slow, and the targets have yet not been attained. We have used only secondary data through the government website and reviewing research papers related to investment in green transport. This study can be used for further research on policy making and standard fixing related to green transport.

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