Semarang City Green Corridor Development

February 2025

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Executive Summary

Green corridors are a transport planning concept that integrates a range of policies to prioritize low-emission mobility at the corridor scale. Therefore, they are often referred to as low-emission corridors. The implementation of this concept is based on a mass public transport system, where policy interventions include push and pull strategies to encourage a shift to public transport and maximize the mode's benefits

SEMARANG AS BEST PRACTICE

Urban areas in Indonesia, including cities and districts in the Greater Jakarta area, generally face similar urban mobility challenges. Congestion and air pollution are often the result of high levels of private motor vehicle use. To address these issues, Jakarta has adopted various sustainable transportation initiatives. Pull policies, such as the provision of mass public transportation services (bus rapid transit/BRT, light rail transit/LRT, and mass rapid transit/MRT) and good pedestrian and cycling facilities, and push policies, such as odd-even schemes, are implemented to control the use of private motor vehicles. In contrast to Jakarta, other cities in the Bodetabek region have not placed sustainable transportation development as one of their top priorities. Initiatives undertaken in Jakarta are often considered difficult to replicate by other cities, given Jakarta's greater financial capacity.

However, apart from Jakarta, Semarang also has good low-carbon transportation initiatives. One such initiative is the launch of the Trans Semarang public transportation service system in 2009. The service has grown to include 8 main corridors, 4 feeder routes, 1 night service, and plans to build a dedicated BRT lane to improve capacity and service quality. The Trans Semarang BRT feasibility study also identified the potential for electric buses in the BRT system.

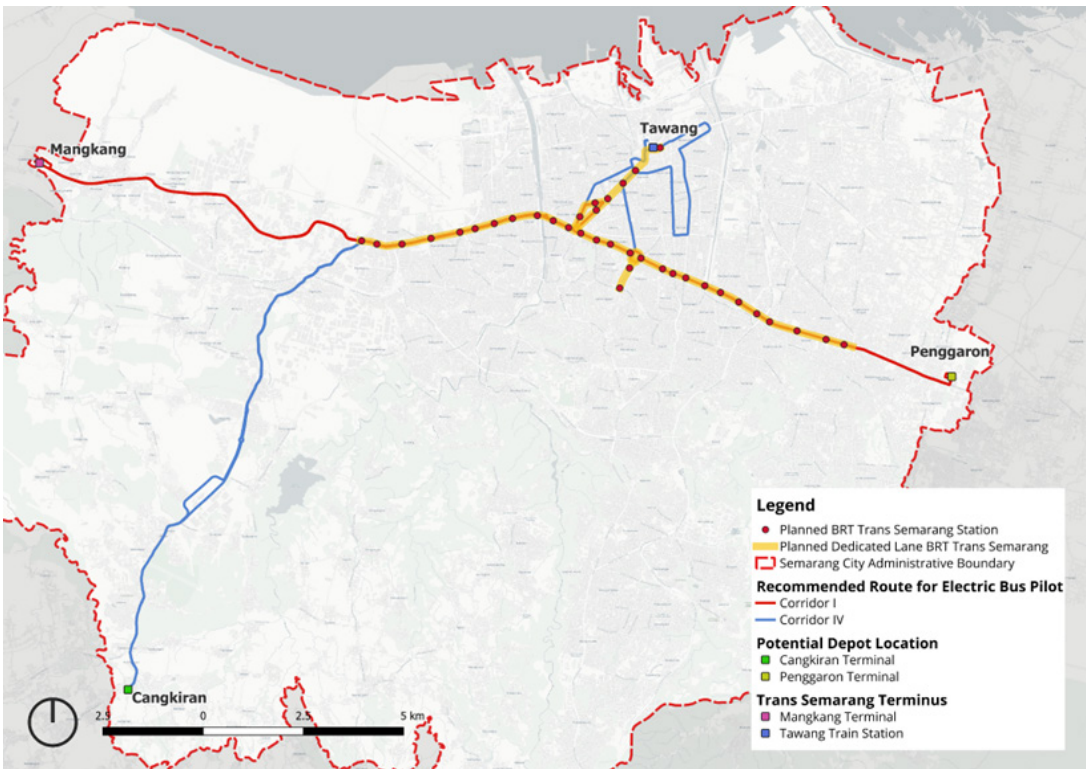
Semarang's limited fiscal capacity, with a 2024 APBD of Rp5.7 trillion, makes it a relevant pilot city for implementing sustainable transportation interventions in urban areas. It proves that cities with limited resources can still develop effective and sustainable transportation systems. With similar characteristics and challenges, Semarang's experience can serve as a best practice model for cities across Indonesia, including cities and regencies in the Greater Jakarta area.

SEMARANG CITY GREEN CORRIDOR

In response to the potential use of electric buses in the Trans Semarang BRT system, ITDP Indonesia's 2023 study, "Electric Bus Pilot Route Recommendation for Trans Semarang", recommended corridor I and corridor IV of the Trans Semarang service as pilot routes for electric buses. The study identified significant environmental benefits from electrifying both routes through a 42.9% reduction in greenhouse gas (GHG) emissions, equivalent to a decrease of 5,238 tons of CO_2e per year compared to the business-as-usual (BaU) scenario.

Complementing the potential use of low-emission modes, other interventions can also be implemented through push-pull strategies to increase the shift from private motor vehicle use to public transportation. One of them is **the development of green corridors in Semarang City, focusing on corridor I and corridor IV routes in the Trans Semarang service.**

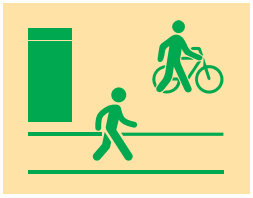
Figure 1 Recommendation of the Pilot Route of the Trans Semarang Electric Bus as A Priority Route for Developing the Green Corridor Concept in ITDP Indonesia's 2023 Study



The "Semarang City Green Corridor Development" study discusses push and pull strategies focusing on components that can be implemented in the early stages of green corridor development. These components include as follows:

Public transportation services ensure that public transportation is a reliable and convenient option that competes with private motor vehicles. This includes:

a. Quality of public transportation services; and
b. Provision of inclusive bus stops.



Provision of first- and last-mile infrastructure and public transportation facilities, ensuring that public transportation can be easily accessed from the area around its stops. This includes:

a. Walking infrastructure;
b. Cycling infrastructure;
c. Wayfinding system; and
d. Bikeshare service.

Restrictions on private motorized vehicles ensure that public transportation becomes the first choice for mobility in Semarang City. This study's restriction strategy focuses on implementing parking management, which is considered more practical than other strategies, such as electronic road pricing (ERP) or low emission zone (LEZ). Although it does not directly restrict motor vehicle traffic, parking management can influence people's decision to use private vehicles, thus gradually supporting the increase of public transportation modes.

The formulation of conceptual recommendations for the green corridor component of studies conducted by ITDP Indonesia in the Greater Jakarta area through the UK Partnering for Accelerated Climate Transition (UK PACT) program. These conceptual recommendations also refer to the results of ITDP studies conducted under other programs, including specific studies in Semarang City. The discussion's components and key references are presented in the following table.

Table 1 Study Scope Limitations and Key References

No.	Component	Sub-Component	Key References
1	Public Transportation Services	Improved quality of public transportation services	Another study by ITDP: • *"Menuju Mobilitas Semarang yang Tangguh dan Berkelanjutan"* ("Towards Semarang's Resilient and Sustainable Mobility") (2018) Accessible at: https://bit.ly/mobilitassemarang2018 • "The BRT Standard: 2024 Edition" (2024) Accessible at: https://bit.ly/brtstandard2024
2		Inclusive bus stops	ITDP study in the UK PACT program: • *"Rekomendasi Menuju Halte Inklusif Transjakarta"* ("Recommendations Towards Transjakarta Inclusive Shelters") (2022) Accessible at: https://bit.ly/transjakartahalteinklusif2022 Another study by ITDP: • *"Rekomendasi Mobilitas Inklusif Kota Semarang"* ("Semarang City Inclusive Mobility Recommendations") (2022) Accessible at: https://bit.ly/mobilitasinklusifsemarang2022
3	First and Last-Mile Infrastructure and Facilities	Pedestrian infrastructure	ITDP study in the UK PACT program: • *"Studi Integrasi Transportasi Publik Jabodetabek"* ("Jabodetabek Public Transportation Integration Study") (2024) Accessible at: https://bit.ly/integrasijabodetabek2024 Another study by ITDP: • *"Pengembangan Infrastruktur Pejalan Kaki dan Pesepeda DKI Jakarta 2023-2027"* ("DKI Jakarta Pedestrian and Cyclist Infrastructure Development 2023—2027") (2023) Accessible at: https://bit.ly/PetajalanNMT2023
4		Bicycle infrastructure	
5		Wayfinding system	

No.	Component	Sub-Component	Key References
6		Bikeshare service	Another study by ITDP: • "The Bikeshare Planning Guide" (2018) Accessible at: https://bit.ly/panduansepedasewa2018 • "*Panduan Teknis Perencanaan Pengembangan Layanan Sepeda Sewa di Kota Semarang*" ("Technical Guideline for Planning the Development of Bicycle Rental Services in Semarang City") (2023) Accessible at: https://bit.ly/sepedasewasemarang2023
7	Transport Demand Management	Parking management	ITDP study in the UK PACT program: • "*Pedoman Reformasi Parkir Jakarta*" ("Jakarta Parking Reform Guide" (2024) Accessible at: https://bit.ly/reformasiparkirjakarta2024

Other elements, such as low-emission vehicles, ERP, and LEZ, are not discussed for reasons outlined below.

Table 2 Rationale for Discussion Components that are Not Included in the Scope of the Study

No	Component	Reason for Excluding from Scope of Study
1	ERP	High sensitivity to community support, requiring deeper technical studies and communication strategies
2	Evaluation of Public Transportation Electrification	An advanced stage after the electrification of public transportation is carried out
3	LEZ	Regional in scale and an advanced stage of green corridor development

GREEN CORRIDOR PRIORITY AREA

The implementation of green corridor components is expected to be thoroughly applied on corridor I and corridor IV routes. These interventions can start from priority road sections that are feasible to implement in the short term before being gradually expanded. The identification of these priority road sections is as follows:

- **East-West Segment:** Simpang Lima Street – Pandanaran Street - Mgr. Sugiyopranoto Street – Sudirman Street
- **South-North Segment:** Pemuda Street - Imam Bonjol Street – Tendean Street - Kota Lama

The determination of these priority road sections is based on the following considerations:

- **Corridor I & Corridor IV Route Intersection:** The intersection of these two routes is generally located in the city center, which is also crossed by various other corridor routes on the same road sections. Therefore, early interventions in this segment can accommodate transfers between key city areas, enhancing corridor connectivity.
- **Existence of BRT Trans Semarang Dedicated Lane Plan:** Implementing interventions in this area at an early stage can support public transportation services' operation, thereby encouraging a shift towards more optimal public transportation services. Overall, priority road segments account for about 60% of the planned length of the Trans Semarang BRT dedicated lanes.
- **Consisting of Diverse Land Use and Dense Concentration of Points of Interest (POI):** As the city center with the center of attraction of community activities, implementing interventions at an early stage can improve accessibility to support urban mobility.

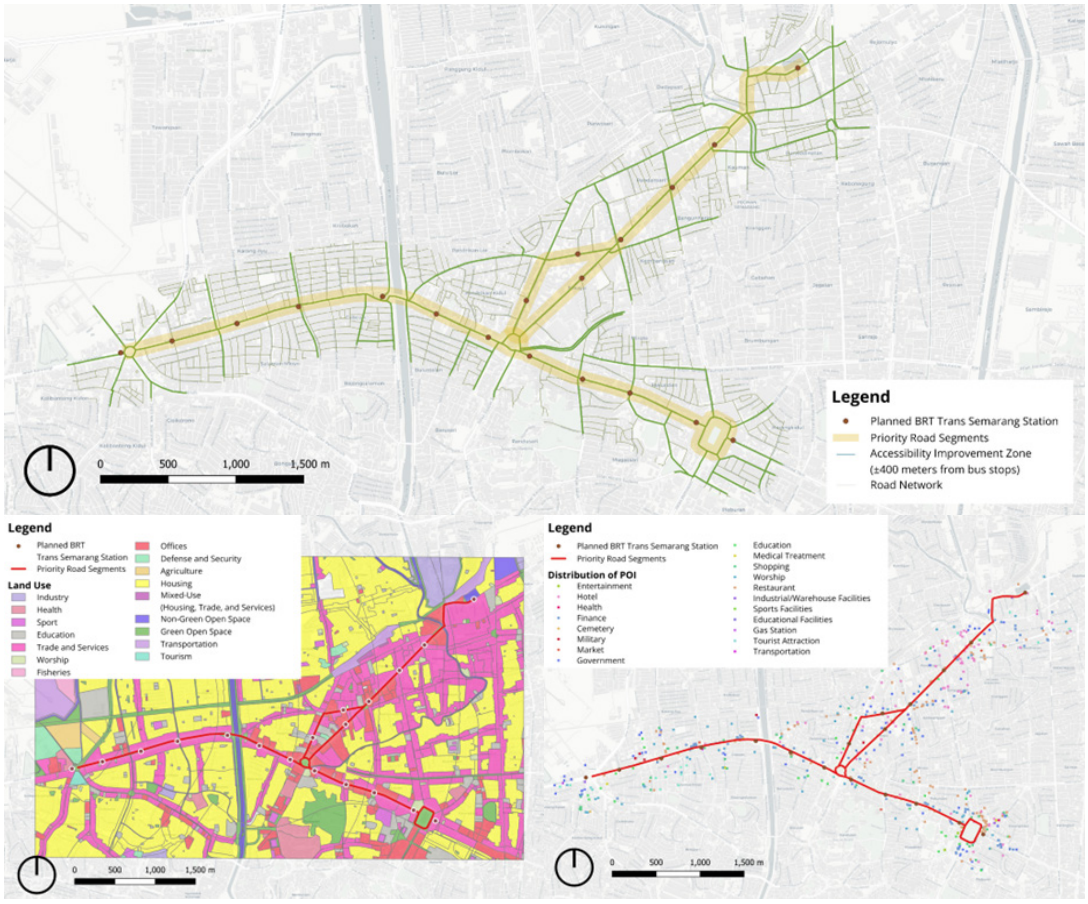


Figure 2 From Above: (a) Recommended Priority Road Sections, (b) Land Use Conditions, and (c) Distribution of POI around Priority Road Sections

IDENTIFICATION OF POTENTIAL ISSUES AND RECOMMENDATIONS FOR GREEN CORRIDOR DEVELOPMENT

Comparing the ideal principles of each green corridor component with its application in Semarang City, both in terms of policy and on-the-ground implementation, several issues were identified that could potentially hinder its development and affect the achievement of targets in Semarang City's Urban Mobility Plan. Based on this identification, recommended action plans for each green corridor component were formulated. Implementation of physical interventions is recommended to start with priority sections in the short term before being gradually expanded. The recommendations are based on ITDP's study in Jabodetabek and Semarang City, which used a corridor-based approach. A summary of potential issues and recommended action plans for each component is presented in the table below.

Table 3 Summary of Identification and Action Plan Recommendations for Green Corridor Development in Semarang City

Issues Encountered	Action Plan Recommendations
Component: Public Transportation Services	
Sub-component: Quality of public transportation services	
The issues identified within the Trans Semarang service, including those operating on the Green Corridor route, are as follows: 1. Certain aspects of service delivery by Trans Semarang personnel were found to be not fully responsive to users; 2. There are still driving patterns among drivers that may compromise safety and comfort; 3. Several buses do not yet provide optimal comfort, with the following indicators: • Air conditioning systems that do not always function properly; • On board facilities showing signs of inadequate maintenance; and • Bus cleanliness that is not consistently well-maintained. 4. Irregular bus headway times are still observed; 5. Some bus fleets show signs of aging that affect operational reliability; and 6. Limited information systems available on board.	1. Standard operating procedure (SOP) evaluation and periodic training for Trans Semarang officers and drivers; 2. Evaluation of minimum service standards (MSS) and control of fleet maintenance by bus operators. Collaboration with third parties to monitor MSS compliance and maintenance processes may be an option; 3. Improved service reliability through dedicated lanes, reallocation of buses between routes, and/or fleet size/ number adjustments; 4. Fleet rejuvenation with minimum Euro IV specifications or electric buses; 5. Provision of audio and visual information systems throughout the fleet; 6. In relation to financial issues, the recommendation options are as follows: • Exploration of non-regional revenue and expenditure budget (*anggaran pendapatan dan belanja daerah*/APBD) funding, such as non-farebox revenue; • Cost efficiency through exploration of service contract models or modification of Trans Semarang operational patterns; and • Improvement of the status of public transportation management institutions from regional technical implementation unit public service agency (*badan layanan umum unit pelaksana teknis daerah*/BLU UPTD)

The city government understands the urgency associated with refurbishing or providing a new fleet, but it finds it difficult due to the city's limited fiscal condition.	(*badan layanan umum daerah*/BLUD) or regional-owned enterprises (*badan usaha milik daerah*/BUMD) so that they have greater flexibility in decision-making.
Sub-Component: Inclusive bus stops	
1. There are no guidelines or uniform standards for bus stop design, especially for bus stops built by other than the Transportation Agency (Dinas Perhubungan/Dishub); 2. MSS does not specifically regulate the inclusivity component based on the type of bus stop typology; and 3. Most bus stops, including those on the Green Corridor route, still do not fully meet the inclusivity aspect.	1. Draft the regulations for inclusive Trans Semarang bus stop design standards, with the inclusion of vulnerable groups as experts; 2. Update on the Trans Semarang's MSS, especially in the section on bus stops that are adjusted based on bus stop typology; and 3. Revitalize Trans Semarang bus stops to meet inclusivity aspects.
Components: First and Last-Mile Infrastructure and Facilities	
Sub-Component: First and last-mile infrastructure, including pedestrian and bicycle infrastructure and wayfinding information systems	
The main issue in providing first-mile and last-mile infrastructure in Semarang City lies in the design of the road space, which has not been fully integrated between each component, including the green corridor. In more detail, each gap in the first and last-mile infrastructure component is as follows: **Pedestrian Infrastructure:** Some pedestrian infrastructure around the bus stops still has a relatively low walkability index. This is mainly due to the focus of pedestrian facility development being concentrated on major roads, while the streets in the surrounding or feeder areas remain underserved. **Bicycle Infrastructure:** 1. Bicycle infrastructure is only available in the city center and is not entirely conducive yet to providing optimal comfort for cyclists; and 2. Public bicycle parking facilities around Trans Semarang bus stops are still unavailable.	Synchronize the planning and design of bus stop revitalization with pedestrian infrastructure, bicycle lanes, and direction information systems based on the complete street concept to accommodate all road users. Therefore, the following can be done: 1. Preparation of a roadmap for the development of first and last-mile infrastructure, including the formulation of a typology of road space based on the characteristics of road sections that meet the concept of complete street design; 2. Formulation of regulations to standardize the design of the wayfinding system so that it has legal force; 3. Revitalization of first and last-mile infrastructure around bus stops according to road space typology; and 4. Provision of wayfinding systems at bus stops and around bus stops.

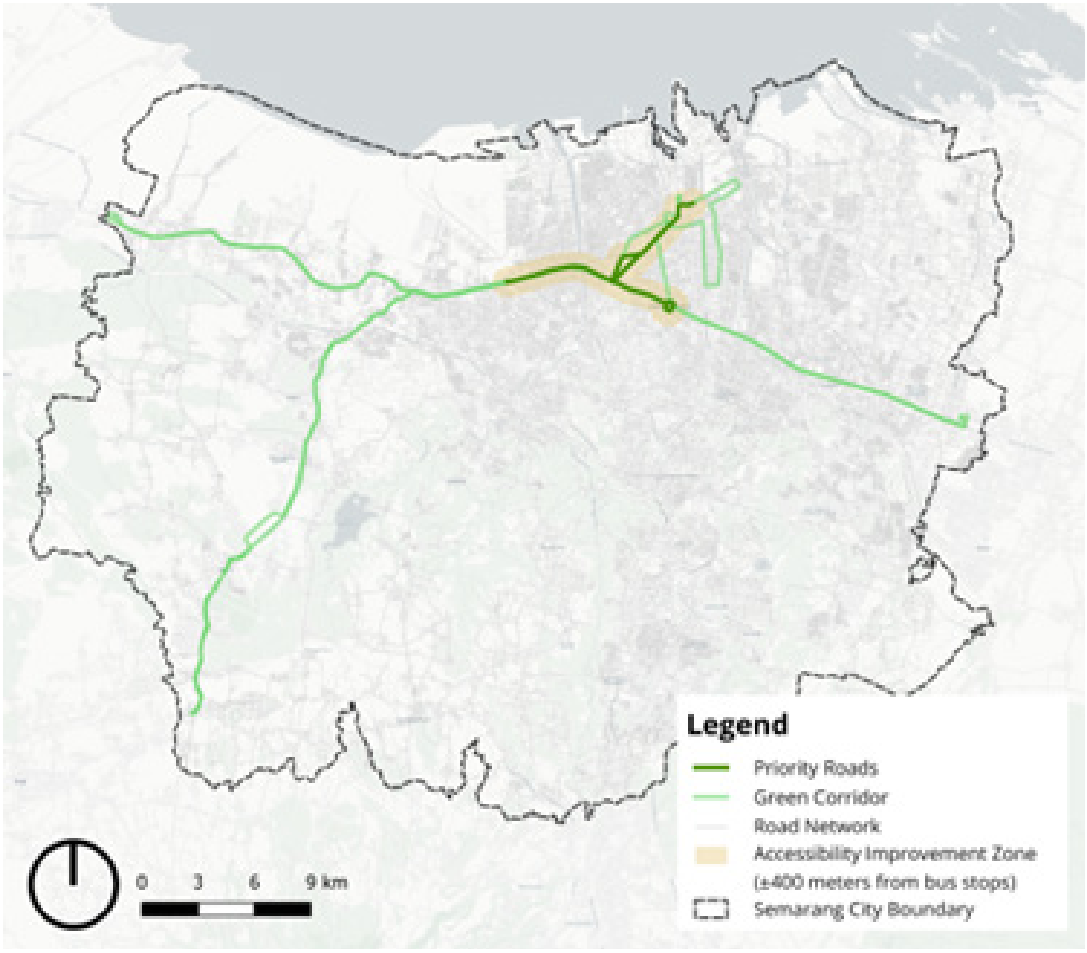
Wayfinding System: 1. Directional information is only fully available at large bus stops, while it is limited at other typologies; 2. Wayfinding system around bus stops is not available yet; users still rely on digital map applications to find bus stop locations and nearby destinations; and 3. There is no standardized wayfinding system in place, which may lead to inconsistencies in design across different stakeholders or transport operators.	
Sub-Component: Bikeshare service	
Bikeshare service as an alternative first and last-mile mode has not been made available again in Semarang City. This service was implemented in the past but did not last long for the following reasons: 1. There are no specific regulations governing the operation of bikeshare, which contributes to the emergence of order and security issues during operations; 2. Limited supporting infrastructure and facilities; and 3. The technical planning of services, including the placement of mooring points, is not optimal and is not easily accessible. Overall, the fact that private operators fully manage the service scheme without government support, together with the profit orientation of private operators and other issues, has led to declining usage and even discontinuation of the service.	Within the limitations of the bikeshare ecosystem and an unestablished market, the city government could initiate a publicly owned and operated service. This is in line with the Transportation Master Plan 2023—2043, which allows the service to be funded by the city budget, although other potential sources can be pursued. Alongside this, the following are required: 1. Formulation of regulations for implementing bikeshare services; and 2. The bikeshare service masterplan study includes a business roadmap initiated by the city government (public-owned and operated), funding plans, technical planning, bicycle infrastructure and facilities, and integration with public transportation and city information systems.

Components: Transport Demand Management	
Sub-Component: Parking management	
1. Illegal on-street parking along the prioritized Green Corridor route is still prevalent. Several factors contributed to this situation: • The presence of informal parking attendants directing vehicles outside official parking areas to meet daily income targets; • Limited on-street parking capacity and insufficient setbacks, leading to the use of road space as additional parking pockets; • Off-street parking facilities are generally reserved for visitors of specific buildings; and • Road space being utilized by local communities for specific activities. 2. Parking fees remain relatively affordable and uniform across various areas, including the prioritized Green Corridor route. Factors influencing this condition: • The removal of the progressive tariff policy due to public resistance to fare increases; and • The absence of a zone-based pricing policy results in uniform rates across all areas. 3. There are still off-street parking facilities with low occupancy rates. This is due to the following reasons: • Higher parking fees at commercial off-street parking areas compared to on-street parking; and • There is an absence of a maximum parking space (*satuan ruang parkir*/SRP) requirement regulation for parking areas.	1. Strengthen monitoring and enforcement of illegal parking by doing the following: • Collaborate with the Semarang City Police Traffic Unit as law enforcement and utilize the electronic traffic law enforcement (ETLE) technology owned by the Indonesian National Police (*Kepolisian Negara Republik Indonesia*/Polri); • Supervise and enforce regulations for parking attendants so they do not deviate from their assignments, especially in directing vehicles to illegal locations; • Collaborate with the local community in parking management at locations that meet Dishub's official parking criteria; and • Implementation of shared parking in public buildings, such as government offices, shopping malls, and public transportation stations. 2. Implementation of corridor-based parking zones, followed by the development of area-based parking zones; 3. Implementation of high and progressive parking rates, along with parking technology upgrades; 4. Setting an upper limit on off-street parking rates so they are not more expensive than on-street parking; and 5. Implementation of the maximum SRP provision limit for off-street parking facilities organized by the public and private sectors can start from the Central Business District (CBD) area of Semarang City (following the area-based parking zone).

The action plan recommendations are organized into three phases: short-term (quick wins), medium-term, and long-term. The table below summarizes the action plan for each timeline, including its characteristics in accordance with the action plan recommendations above and an illustration of the development locations by timeline.

Short-Term:

Focus on the priority areas (intersection of Corridor I and Corridor IV of Trans Semarang)



- Preparation of masterplan/roadmap studies, such as improving the reliability and status of Trans Semarang institutions and standardizing bus stops, first and last-mile infrastructure, bicycle rental services, and parking management;
- Preparation of regulations, such as inclusive bus stop design standards, standardization and integration of wayfinding systems, bikeshare regulations, and parking rates and zones;
- Improvement of Trans Semarang service (fleet and service quality) on corridors I and IV routes;
- Pilot electric buses on corridors I and IV routes;
- Revitalization of bus stops with inclusive principles, improving accessibility with the complete street concept, and organizing bikeshare services in priority areas;
- Strengthen on-street parking regulations on priority roads; and
- Implementation of corridor-based on-street parking zones.

Medium-Term:

Focus on all corridor I and corridor IV of Trans Semarang

- Regulatory preparation, such as status improvement or the establishment of a new institution for Trans Semarang, the operation of electric buses, and the provision of minimum and maximum SRP for off-street parking;
- Implementation of full-scale electric bus operations in corridors I and IV, as well as improving fleet reliability and service quality in other corridors;
- Improvement of the quality of bus stops, accessibility with the concept of complete streets, and implementation of bikeshare services focused on corridors I and IV can also be expanded to other corridors or routes; and
- Implementation of area-based parking zones, high parking tariff policies, and minimum and maximum SRP requirements.

Long-Term:

Targeting all Trans Semarang corridors/routes

- All Trans Semarang service routes of reliable quality and meet good inclusivity standards (fleet & stops);
- Accessibility to/from bus stops is of good quality with the application of the complete street concept;
- Implementation of urban-scale rental bicycles; and
- Parking management by removing on-street parking in strict intervention zones and converting excess SRP in zones with maximum SRP requirements to more productive functions.

RECOMMENDED ACTION PLAN FOR WIDER SCALE

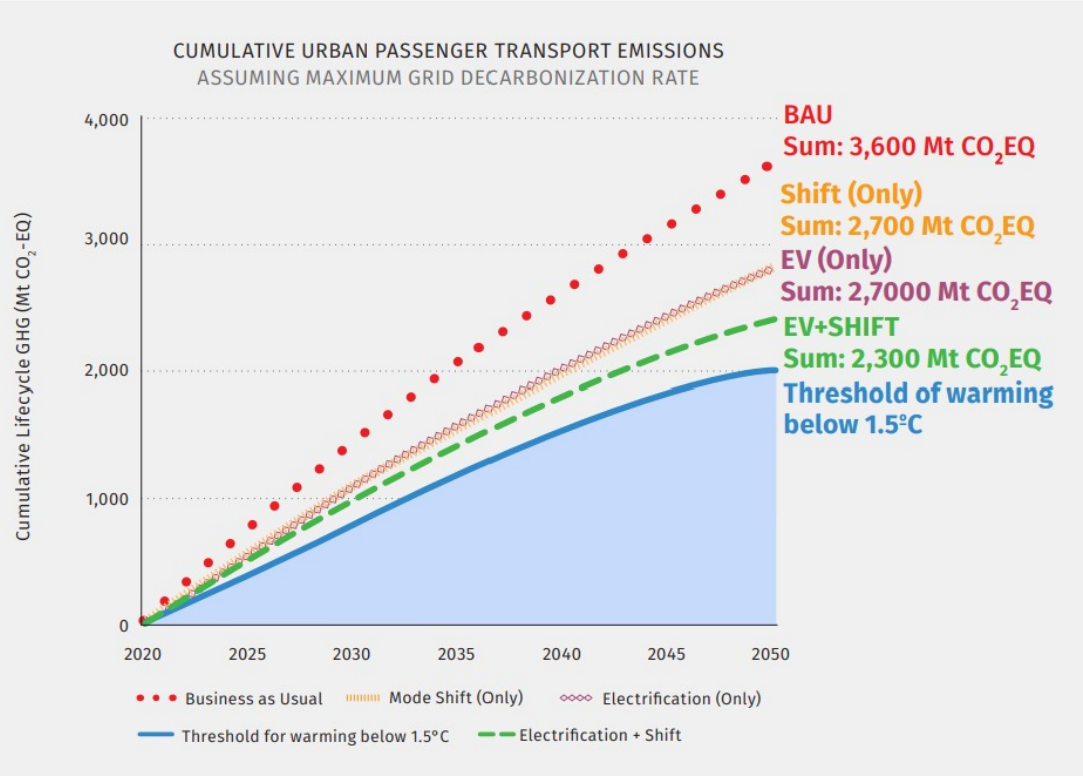
Once the concept of developing green corridors focusing on priority corridors is operational and shows significant impact data, this strategy can be expanded and scaled up for broader impact. Other proposed strategies are based on case studies and lessons learned from the development of transportation systems in DKI Jakarta Province, including the Jabodetabek agglomeration area, to provide real-world experience-based guidance for the development of better public transportation systems.

Table 4 Advanced Strategies That Can Be Implemented in The Long Term

Key References	Overview of Each Strategy
"*Studi Integrasi Transportasi Publik Jabodetabek*" ("Jabodetabek Public Transportation Integration Study"), Year 2024 Accessible at: https://bit.ly/integrasijabodetabek2024	**Institutional and Tariff Integration** Institutional and fare integration is crucial in creating an efficient, affordable, and inclusive public transportation system. Collaboration between regulators and operators must be synergistic to ensure clarity of roles. Meanwhile, the integrated fare system is designed to be simple, fair, efficient, stable, sustainable, and inclusive so that all levels of society can access it.
"*Panduan Evaluasi Pilot Bus Listrik di Indonesia*" ("Evaluation Guide for Electric Bus Pilots in Indonesia"), Year 2023 Accessible at: https://bit.ly/panduanbuslistrik	**Evaluation of Public Transportation Electrification** In line with the potential for electric bus trials in Semarang City, monitoring and evaluating electric bus trials is an important element in assessing the readiness of this technology for a broader scale. The evaluation covers vehicle performance, operational efficiency, environmental impact, and social and gender aspects to ensure the sustainability of electric-based public transportation implementation in the future.
"Jakarta LEZ Roadmap", Year 2024 Accessible at: https://bit.ly/jktlezroadmap	**Electronic Road Pricing** ERP aims to reduce congestion and air pollution and encourage the use of public transportation. ERP effectively regulates traffic demand by charging vehicles to travel through a specific area. Implementing this strategy requires high-quality "pull" policy support and effective public communication to ensure public acceptance.
	Low Emission Zone LEZ restricts motor vehicle access based on emission levels to improve air quality. As an advanced stage of the green corridor concept, LEZ integrates various sustainable policy strategies on a larger scale, significantly reducing city pollution.

Figure 3 GHG Emission Modeling Results Based on Scenarios

(Source: Compact Cities Electrified: Indonesia [ITDP, 2024)]; accessible at https://bit.ly/compactcitieselectrified

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