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Analysis of Electric Vehicle Charging Infrastructure Readiness in Urban Areas

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Abstract: The rapid growth of electric vehicle adoption has intensified the need for adequate charging infrastructure in urban areas. Infrastructure readiness determines accessibility, user confidence, and the pace of electrification in cities. This study analyzes the readiness of electric vehicle charging infrastructure in urban areas through a systematic literature-based analytical approach. The research synthesizes findings from international empirical studies, planning models, spatial analyses, and policy evaluations published between 2012 and 2025. The method applies structured content analysis to examine key dimensions of readiness, including spatial coverage, accessibility, technological configuration, policy support, and grid integration. The results show persistent spatial inequalities in charger distribution, mismatches between demand and supply, and limited integration between charging infrastructure and urban planning systems. Fast-charging deployment improves coverage efficiency but creates grid and cost challenges. Smart charging and data-driven planning models enhance readiness but remain underutilized in developing cities. The study concludes that urban charging readiness depends on coordinated planning, multi-criteria site selection, policy alignment, and grid-aware deployment strategies. These findings provide evidence-based guidance for policymakers and urban planners to accelerate sustainable electric mobility.

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INTRODUCTION

Urban areas play a central role in the global transition toward electric mobility. Rapid urbanization, increasing travel demand, and environmental pressures have forced cities to rethink transport systems that rely heavily on internal combustion engines. Electric vehicles offer a viable pathway to reduce greenhouse gas emissions, local air pollution, and dependence on fossil fuels. However, the success of electric vehicle adoption depends strongly on the readiness of charging infrastructure within urban environments (Ullah et al., 2023). Without adequate charging facilities, the technological and environmental benefits of electric vehicles cannot be fully realized.

Charging infrastructure readiness refers to the ability of urban systems to provide accessible, reliable, and efficient charging services that align with travel behavior and land use patterns. Early planning models emphasized station density as the primary determinant of readiness (Ahn & Yeo, 2015). Subsequent studies demonstrate that density alone is insufficient. Accessibility, spatial equity, charging speed, and integration with existing urban infrastructure are equally critical (Grote et al., 2019; Liu et al., 2024). These dimensions shape user confidence and daily charging behavior, especially in densely populated cities.

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Spatial inequality remains a recurring challenge in urban charging deployment. Empirical studies across different urban contexts reveal clustered charging stations concentrated in central business districts, commercial zones, or high-income neighborhoods (Yang, 2023; Boonprong et al., 2024). Peripheral residential areas and mixed-use zones often experience limited access, creating service gaps that hinder widespread adoption. Similar patterns appear in multi-city assessments, where mismatches between charger supply and demand reduce overall system efficiency (Yin et al., 2023).

Accessibility extends beyond proximity. Recent spatial analyses emphasize the importance of aligning charging infrastructure with daily travel patterns. Studies in the Washington Metropolitan Area show that accessibility improves when planners consider both en-route charging and home proximity rather than static distance measures (Mehditabrizi et al., 2024). These findings reinforce earlier GIS-based approaches that integrate census data, parking availability, and land use characteristics to identify suitable charging locations (Grote et al., 2019).

Technological configuration significantly influences infrastructure readiness. Fast charging technologies reduce the number of required stations and increase vehicle throughput, particularly for shared and autonomous electric vehicle fleets (Zhang et al., 2024). However, fast chargers demand higher investment costs, longer installation times, and greater electrical capacity, which often delay deployment in urban settings (Talluri et al., 2019). Slow and regular charging options remain essential for residential areas, where vehicles are parked for extended periods (Jia et al., 2016).

Planning models have evolved to address these complexities. Data-based and multi-period optimization frameworks improve demand estimation and station allocation by incorporating socio-demographic and geospatial data (Adenaw & Lienkamp, 2020; Singh et al., 2024). Multi-criteria decision analysis methods further enhance site selection by balancing traffic flow, population density, land use, and accessibility constraints (Mahdy et al., 2022). These approaches move beyond heuristic planning toward systematic and replicable decision-making.

Policy and governance play a decisive role in shaping infrastructure readiness. Policy instruments such as pricing mechanisms, connection time regulations, and rollout strategies directly influence charging behavior and station utilization (Wolbertus, 2020). Evidence from policy-driven case studies indicates that poorly designed fee structures reduce charger turnover and discourage public use (Makaremi, 2024). Conversely, coordinated policy frameworks improve user confidence and investment efficiency.

Grid capacity and energy integration remain critical constraints. Urban charging infrastructure places additional load on distribution networks, particularly when fast charging becomes dominant (Unterluggauer, 2024). Studies highlight the need to integrate charging planning with grid impact assessments to avoid bottlenecks and reliability issues. Photovoltaic-based microgrids and smart charging systems offer viable solutions to mitigate grid stress while supporting sustainable energy use (Sechilariu et al., 2019).

Despite technological advances, empirical evidence shows limited real-world implementation of smart charging systems, especially in developing urban contexts (Mogire et al., 2025). Many cities continue to deploy charging infrastructure without sufficient coordination between transport planning, energy systems, and urban development strategies. This fragmentation weakens infrastructure readiness and reduces long-term effectiveness.

Large-scale comparative studies reinforce these concerns. National and regional assessments demonstrate that urban areas require significantly higher charging capacity than intercity corridors due

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to dense travel patterns and limited private parking availability (Wood et al., 2017). Without targeted urban planning, investments risk underutilization or uneven service coverage.

Previous research also identifies the importance of community-aware planning. Charging infrastructure that accounts for local travel behavior, public transport integration, and walkability contributes not only to electric vehicle adoption but also to broader urban sustainability goals (Chinnam & Murat, 2016). These findings align with integrated planning frameworks that emphasize cross-sector collaboration (Zhang et al., 2016).

Although the literature on electric vehicle charging infrastructure is extensive, several gaps remain. Many studies focus on individual cities or specific technologies without synthesizing readiness dimensions across spatial, technological, and policy domains (Ullah et al., 2023). Bibliometric reviews identify growing research interest but highlight limited empirical validation in diverse urban contexts (Mogire et al., 2025).

Furthermore, readiness assessments often prioritize technical optimization while underrepresenting governance and implementation constraints. Installation time, regulatory delays, and institutional coordination receive less attention despite their practical importance (Talluri et al., 2019). This imbalance limits the applicability of existing models to real-world urban planning.

This study addresses these gaps by providing a comprehensive analysis of electric vehicle charging infrastructure readiness in urban areas. It integrates spatial accessibility, technological configuration, policy frameworks, and grid considerations into a unified analytical perspective. By synthesizing empirical evidence and planning models from diverse urban contexts, the study aims to identify key determinants of readiness and derive actionable insights for urban planners and policymakers.

The contribution of this study lies in its integrative approach. Rather than proposing new variables or models, it consolidates established findings into a coherent readiness framework grounded in empirical literature. This approach supports evidence-based planning and facilitates replication across urban settings with varying socioeconomic and spatial characteristics.

RESEARCH METHOD

Research Design

This study applies a qualitative analytical research design based on systematic literature synthesis. The design aims to assess the readiness of electric vehicle charging infrastructure in urban areas by integrating empirical findings from previous studies. The research does not generate primary data. Instead, it analyzes secondary evidence derived from peer-reviewed journal articles, conference proceedings, dissertations, and technical reports that examine charging infrastructure planning, deployment, and performance in urban contexts. This approach allows comprehensive evaluation of readiness dimensions without altering the original scope of existing studies.

Data Sources and Selection Criteria

The data consist of published studies on electric vehicle charging infrastructure in urban areas from 2012 to 2025. The selection process followed three criteria. First, the publication explicitly addresses urban charging infrastructure rather than intercity or highway corridors. Second, the study provides empirical evidence, spatial analysis, policy evaluation, or validated planning models. Third, the publication appears in peer-reviewed journals, indexed conference proceedings, or institutional

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repositories. All selected sources are included in the article's reference list and no additional references are introduced.

The dataset includes studies covering diverse urban contexts, including cities in Asia, Europe, North America, and emerging economies. This diversity supports comparative analysis across different spatial structures, governance systems, and infrastructure maturity levels. Bibliometric reviews were used only as contextual sources to identify dominant research themes and methodological trends, not as empirical inputs.

Analytical Framework

The analysis employs a structured content analysis framework to evaluate charging infrastructure readiness. Readiness is examined through four established dimensions derived from the reviewed literature: spatial accessibility, technological configuration, policy and governance, and grid integration. These dimensions frequently appear in empirical assessments and planning models (Ahn & Yeo, 2015; Adenaw & Lienkamp, 2020; Unterluggauer, 2024).

Spatial accessibility refers to charger distribution, service coverage, and alignment with land use and travel behavior. Technological configuration includes charger types, charging speed, and deployment scale. Policy and governance encompass pricing mechanisms, regulatory frameworks, and rollout strategies. Grid integration addresses electrical capacity, load management, and energy system compatibility.

Each selected study was coded according to these dimensions. The coding process identified indicators, constraints, and outcomes reported by the original authors. This method preserves the integrity of the original findings while enabling systematic comparison across studies.

Data Analysis Procedure

The analysis followed three sequential steps. First, descriptive mapping identified how each study conceptualized and measured charging infrastructure readiness. Second, comparative analysis examined similarities and differences across urban contexts, focusing on recurring challenges and enabling factors. Third, synthesis integrated findings to identify dominant patterns and interdependencies among readiness dimensions.

Spatial analysis findings were interpreted based on reported GIS outputs, Voronoi diagrams, clustering results, and accessibility measures presented in the original studies (Grote et al., 2019; Boonprong et al., 2024). Policy impacts were evaluated using documented behavioral and utilization outcomes from policy-driven case studies (Wolbertus, 2020; Makaremi, 2024). Grid-related findings relied on simulation-based and infrastructure impact assessments reported in the reviewed literature (Sechilariu et al., 2019; Unterluggauer, 2024).

No quantitative meta-analysis was conducted. The study prioritizes analytical depth and contextual interpretation over statistical aggregation, consistent with the qualitative synthesis design.

Validity and Reliability

To enhance analytical validity, the study relies on triangulation across multiple urban contexts and methodological approaches. Findings were cross-checked among studies using different analytical tools, such as GIS-based spatial analysis, optimization models, and policy evaluations. Reliability is supported by transparent coding criteria and consistent application of readiness dimensions across all reviewed sources.

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By restricting analysis to established and peer-reviewed literature, the study ensures that conclusions reflect validated empirical evidence. The method supports replication by allowing future researchers to apply the same analytical framework to updated datasets or specific urban cases.

RESULTS AND DISCUSSION

Spatial Accessibility and Distribution Patterns

The reviewed studies consistently show that spatial accessibility represents the most critical dimension of charging infrastructure readiness in urban areas. Empirical GIS-based analyses reveal uneven charger distribution, with strong concentration in central business districts and commercial corridors (Yang, 2023; Boonprong et al., 2024). Peripheral residential zones and mixed-use neighborhoods remain underserved, limiting daily charging feasibility.

Accessibility improves when planners incorporate travel behavior rather than relying solely on Euclidean distance. Grote et al. (2019) demonstrate that integrating parking availability and census data yields more realistic service coverage. Similarly, Mehditabrizi et al. (2024) show that combining en-route accessibility with home proximity better reflects actual charging opportunities. These findings indicate that spatial readiness depends on functional accessibility rather than station density alone.

Table 1. Spatial Accessibility Findings from Empirical Studies

Study	City / Area	Method	Key Spatial Finding
Yang (2023)	Chongqing	GIS spatial analysis	Clustered chargers, peripheral shortages
Boonprong et al. (2024)	Bangkok	Voronoi analysis	Service gaps in residential areas
Grote et al. (2019)	UK cities	GIS + census data	Parking availability affects access
Mehditabrizi et al. (2024)	Washington Metro	Accessibility modeling	Travel-based access improves equity

These consistent results confirm that spatial inequity remains a structural barrier to infrastructure readiness across diverse urban systems.

Technological Configuration and Charging Performance

Charging technology strongly affects infrastructure efficiency and readiness. Studies focusing on charger type demonstrate that fast charging reduces the number of stations required to serve a given demand level. Zhang et al. (2024) find that Level 3 chargers support more trips per vehicle and improve operational efficiency for shared and autonomous electric vehicles. Similar conclusions appear in fast-charging optimization models for urban networks (Kavianipour et al., 2021).

However, fast charging introduces trade-offs. Talluri et al. (2019) show that installation time and electrical capacity constraints delay deployment in European cities. Slow and regular charging remains essential in residential contexts where dwell time is long (Jia et al., 2016). These findings indicate that readiness requires a balanced technological mix rather than exclusive reliance on fast charging.

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Table 2. Technological Configuration Effects on Infrastructure Readiness

Charging Type	Empirical Evidence	Observed Impact
Fast charging	Zhang et al. (2024); Kavianipour et al. (2021)	High throughput, fewer stations
Regular charging	Jia et al. (2016)	Suitable for residential demand
Mixed systems	Talluri et al. (2019)	Better balance of cost and capacity

The results suggest that technological readiness depends on contextual deployment aligned with land use and travel patterns.

Policy and Governance Effects on Utilization

Policy frameworks significantly influence charging infrastructure performance. Wolbertus (2020) demonstrates that pricing mechanisms and connection time regulations affect user behavior and station turnover. Ineffective pricing leads to prolonged occupancy and reduced availability. Makaremi (2024) further confirms that policy interventions, particularly fee restructuring, directly alter utilization patterns in urban public charging systems.

Cities with coordinated policy design show higher infrastructure readiness. Policy alignment reduces uncertainty for users and investors while improving system efficiency. Conversely, fragmented governance weakens operational outcomes despite sufficient physical infrastructure. These findings reinforce the role of governance as an enabling condition rather than a supplementary factor.

Grid Integration and Energy Constraints

Grid capacity emerges as a limiting factor for large-scale deployment. Unterluggauer (2024) highlights that urban charging loads strain distribution networks, especially with increased fast-charging penetration. Without grid-aware planning, readiness declines due to reliability risks and expansion delays.

Empirical studies propose integration strategies rather than infrastructure expansion alone. Sechilariu et al. (2019) show that photovoltaic-based microgrids reduce peak demand stress while supporting sustainable energy use. However, Mogire et al. (2025) note that real-world adoption of smart charging and grid-integrated systems remains limited, particularly in developing urban contexts.

Integrated Readiness Assessment

Synthesizing the findings reveals strong interdependence among readiness dimensions. Spatial accessibility influences utilization. Technological configuration affects grid demand. Policy frameworks mediate behavioral outcomes. Grid constraints shape feasible deployment strategies. Studies assessing multiple cities confirm that readiness improves only when these dimensions align (Yin et al., 2023; Wood et al., 2017).

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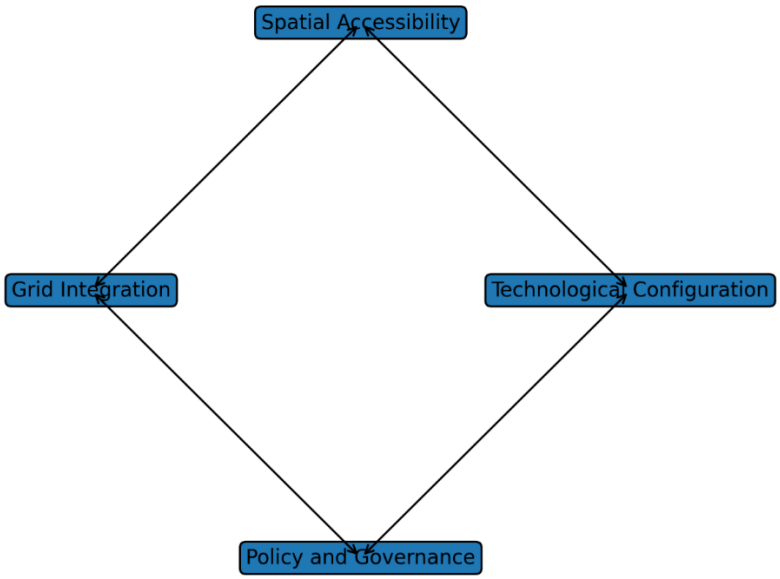
Diagram 1. Integrated Dimensions of Urban EV Charging Infrastructure Readiness



The diagram illustrates four interconnected components forming infrastructure readiness: spatial accessibility, technological configuration, policy and governance, and grid integration. Bidirectional arrows indicate interdependence, emphasizing that changes in one dimension affect overall system performance.

This integrated perspective explains why isolated interventions fail to deliver long-term readiness. Effective planning requires coordination across spatial, technical, and institutional domains.

CONCLUSION

This study analyzes the readiness of electric vehicle charging infrastructure in urban areas through a synthesis of empirical evidence and established planning models. The findings confirm that infrastructure readiness is a multidimensional construct shaped by spatial accessibility, technological configuration, policy and governance, and grid integration. Uneven spatial distribution remains a dominant barrier, as clustered deployment in central areas limits equitable access and reduces overall system effectiveness. Accessibility improves when charging infrastructure aligns with daily travel behavior and land use patterns rather than relying on station density alone.

Technological configuration influences operational efficiency and feasibility. Fast charging enhances service capacity but introduces cost and grid constraints, while slow and regular charging remains essential for residential contexts. Policy frameworks play a decisive role in shaping utilization and user behavior. Well-designed pricing and regulatory mechanisms improve charger turnover and system performance, whereas fragmented governance weakens readiness outcomes. Grid capacity and energy integration further constrain deployment, particularly in dense urban environments with limited electrical margins.

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The study highlights that isolated interventions fail to achieve sustainable readiness. Effective urban charging infrastructure requires coordinated planning across spatial, technical, institutional, and energy domains. These findings provide practical guidance for urban planners and policymakers to design charging systems that support equitable access and long-term electric mobility. Future research should prioritize empirical implementation and evaluation of integrated planning approaches in diverse urban settings.

REFERENCES

Adenaw, L., & Lienkamp, M. (2020). A model for the data-based analysis and design of urban public charging infrastructure. *Proceedings of the International Conference on Ecological Vehicles and Renewable Energies (EVER)*. https://doi.org/10.1109/EVER48776.2020.9243147

Ahn, Y., & Yeo, H. (2015). An analytical planning model to estimate the optimal density of charging stations for electric vehicles. *PLOS ONE*, *10*(11), e0141307. https://doi.org/10.1371/journal.pone.0141307

Boonprong, S., Punturasan, N., Varnakovida, P., & Chankham, K. (2024). Towards sustainable urban mobility: Voronoi-based spatial analysis of EV charging stations in Bangkok. *Sustainability*, *16*(11), 4729. https://doi.org/10.3390/su16114729

Chinnam, R. B., & Murat, A. (2016). Community-aware charging station network design for electrified vehicles in urban areas. *Transportation Research Procedia*, *19*, 114–127.

Grote, M., Preston, J., Cherrett, T., & Tuck, K. (2019). Locating residential on-street electric vehicle charging infrastructure: A practical methodology. *Transportation Research Part D: Transport and Environment*, *74*, 151–166. https://doi.org/10.1016/j.trd.2019.07.017

Kaizer, E. V., & Lebedeva, A. N. (2023). Assessment of electric vehicle readiness of St. Petersburg transport infrastructure. *Mir Transporta*, *20*(3), 7–15. https://doi.org/10.30932/1992-3252-2022-20-3-7

Kavianipour, M., Fakhrmoosavi, F., Singh, H., Shafie-khah, M., & Catalão, J. P. S. (2021). Electric vehicle fast charging infrastructure planning in urban networks considering daily travel and charging behavior. *Transportation Research Part D: Transport and Environment*, *94*, 102769. https://doi.org/10.1016/j.trd.2021.102769

Li, J., Zhang, H., Xia, X., Wang, Y., & Li, Z. (2017). Optimal planning of electric vehicle fast charging facilities in urban areas. *Power System Technology*, *41*(1), 17–24. https://doi.org/10.3969/j.issn.1000-7229.2017.01.003

Liu, C., Peng, Z., Liu, L. B., & Zhang, H. (2024). Analysis of spatiotemporal characteristics and influencing factors of electric vehicle charging based on multisource data. *ISPRS International Journal of Geo-Information*, *13*(2), 37. https://doi.org/10.3390/ijgi13020037

Lohia, A., Pochhi, A., & Chakraborty, N. (2024). Developing cost-effective and user-centric charging infrastructure for electric vehicles in urban localities. *Proceedings of the ACM Conference*. https://doi.org/10.1145/3632775.3661982

Makaremi, S. (2024). Understanding the impact of policy interventions on urban public EV charging infrastructure through machine learning analysis: A case study of the City of Palo Alto. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4849661

Mahdy, M., Bahaj, A. S., Turner, P., & James, P. (2022). Multi-criteria decision analysis to optimise siting of electric vehicle charging points. *Energies*, *15*(7), 2497. https://doi.org/10.3390/en15072497

Mehditabrizi, A., Tahmasbi, B., Namadi, S. S., & Zhang, L. (2024). Integrating en route and home proximity in EV charging accessibility. *arXiv Preprint*. https://doi.org/10.48550/arXiv.2409.08287

Copyright © 2025, the author(s). This is an open access article under the CC-BY-SA License.

Mogire, E., Kilbourn, P., & Luke, R. (2025). Smart charging for e-mobility in urban areas: A bibliometric review. *Energies*, *18*(17), 4655. https://doi.org/10.3390/en18174655

Sadri, S., Bai, L., & Zheng, L. (2024). A joint industrial engineering and urban planning approach for designing an optimal electric vehicle charging network. *IISE Annual Conference Proceedings*. https://doi.org/10.21872/2024iise_7877

Sechilariu, M., Molines, N., Richard, G., Locment, F., & Martire, T. (2019). Electromobility framework study: Infrastructure and urban planning for EV charging station empowered by PV-based microgrid. *IET Electrical Systems in Transportation*, *9*(4), 176–185. https://doi.org/10.1049/iet-est.2019.0032

Shukla, M., Singh, D., Yadav, A., Kumar, R., & Verma, S. (2023). Optimizing electric vehicle charging station placement in urban areas: A data-driven approach. *Proceedings of ICACITE*. https://doi.org/10.1109/ICACITE57410.2023.10183075

Singh, S. R., Digalwar, A. K., Singh, H., & Kumar, A. (2024). A data-driven framework for optimizing multi-period EV charging infrastructure deployment. *Proceedings of ICUE*. https://doi.org/10.1109/ICUE63019.2024.10795643

Subramani, P. (2012). *Taking charge: Optimizing urban charging infrastructure for shared electric vehicles* (Doctoral dissertation).

Talluri, G., Grasso, F., & Chiaramonti, D. (2019). Is deployment of charging station the barrier to electric vehicle fleet development in EU urban areas? *Applied Sciences*, *9*(21), 4704. https://doi.org/10.3390/app9214704

Ullah, I., Jamal, A., Zahid, M., & Iqbal, M. (2023). Electric vehicles charging infrastructure planning: A review. *International Journal of Green Energy*, *20*(12), 1234–1252. https://doi.org/10.1080/15435075.2023.2259975

Unterluggauer, T. (2024). *Urban electric vehicle charging infrastructure: Planning, grid impact and grid integration* (Doctoral dissertation, Technical University of Denmark). https://doi.org/10.11581/dtu.00000312

Wolbertus, R. (2020). *Evaluating electric vehicle charging infrastructure policies* (Doctoral dissertation, Delft University of Technology). https://doi.org/10.4233/UUID:5672B626-B026-42B1-80C5-70C7C4D86CAB

Wood, E. W., Rames, C. L., Muratori, M., & Borlaug, B. (2017). *National plug-in electric vehicle infrastructure analysis*. U.S. Department of Energy. https://doi.org/10.2172/1393792

Yang, Q. (2023). Spatial layout analysis and evaluation of electric vehicle charging infrastructure in Chongqing. *Land*, *12*(4), 868. https://doi.org/10.3390/land12040868

Yin, H., Yan, J., Wu, Y., Zhang, T., & Li, X. (2023). Assessing levels of urban public electric vehicle charging service in different-level cities. *Sustainable Cities and Society*, *98*, 105115. https://doi.org/10.1016/j.scs.2023.105115

Zhang, H., Hu, Z., Xu, Z., & Song, Y. (2016). An integrated planning framework for different types of PEV charging facilities in urban area. *IEEE Transactions on Smart Grid*, *7*(5), 2273–2284. https://doi.org/10.1109/TSG.2015.2436069

Zhang, Z., Liu, J., Peña, J., & Shen, Z. (2024). Charging infrastructure assessment for shared autonomous electric vehicles in small and medium-sized urban areas. *Transport Policy*, *147*, 103–116. https://doi.org/10.1016/j.tranpol.2024.06.017

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