GLOBAL NEW MOBILITY COALITION

WORLD ECONOMIC FORUM

Scaling Investment in EV Charging Infrastructure: A Policy Roadmap for Cities

WHITE PAPER

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Images: Getty Images

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Preface

Investment in EV charging infrastructure is essential to help city governments advance the electrification transition.

Vivian Brady-Phillips
Head, Strategic Initiatives,
Centre for Urban Transformation,
World Economic Forum

To support the global commitment to achieve net-zero emissions by 2050, transitioning to emissions-free transportation is crucial. Passenger vehicles, a major source of greenhouse gas emissions, are at the forefront of this transition, with Europe leading the charge with an ambitious 2035 deadline for new vehicles to be emissions-free.[1] As states set their own targets for the transition, city governments – as convenors of the city ecosystem – will play a pivotal role, facilitating a shift towards zero-emissions private and public transport, as well as urban freight and logistics. Electric vehicles (EVs) are crucial to the long-term transition roadmap. While many cities have made significant progress in developing comprehensive charging networks for EVs, others still face challenges providing accessible and affordable infrastructure. This lack of charging – both public and private – poses a significant barrier to widespread adoption of EVs.

The World Economic Forum's Global New Mobility Coalition (GNMC), in partnership with the Taskforce on Scaling Investment in Electrification Infrastructure, has developed this resource to help city governments advance the EV transition. Launched in 2023, the taskforce has brought together members from the public sector, civil society and the private sector to pool a broad range of expertise in areas such as charging and fleet operations, public transport, payments and finance.

Based on the taskforce's multi-sector and cross-industry insights, this resource seeks to catalyse public-private collaboration by offering city officials with practical strategies and guidance to drive investment in public and private charging networks. This includes charging for private cars, shared and public transport, and urban fleets. While recognizing the potential of on-road conductive charging and other upcoming technologies (e.g. battery-swapping in some regions), this resource focuses on plug-in charging for its broad applicability today.

Importantly, this resource does not imply that city governments are solely responsible for the EV transition in cities, but rather seeks to support city governments in capitalizing on their unique capacity to incentivize investment. By focusing on strategy development, standardization, data, and grid access and capacity – where it is within their power to do so – city governments can help create a conducive investment environment, sending a strong demand signal to the private sector and investors.

As cities globally navigate their own pathways to zero emissions, policy-makers and city officials are encouraged to use this resource as a complement to their independent research and decision-making processes. Given that each city and region has unique challenges and opportunities, this resource should be viewed as an aid to support the implementation of strategies and incentives best suited to specific local contexts.

Executive summary

Expanding electric vehicle infrastructure requires collaboration between city governments and the private sector. This roadmap outlines the key steps city governments can take to encourage private-sector investment and create a conducive ecosystem.

The successful adoption of electric vehicles (EVs) hinges on the ability of city governments to create a conducive environment for the development of EV infrastructure. While city governments are pivotal in enabling this transition, private-sector collaboration and investment is crucial.

Some cities have made strides in scaling charging infrastructure, yet many face significant challenges in creating expansive, cohesive charging networks. The lack of public and private charging options continues to be a major barrier to widespread EV adoption. To support the expansion of charging infrastructure and encourage investment, this report outlines key strategies and interventions that city governments can make.

Strategic planning

City governments should develop strategic plans for scaling EVs and charging infrastructure, supported by enabling policies and actions. Establishing clear goals and timelines for the rollout of EVs is vital, alongside engaging a diverse range of stakeholders in the strategic planning process. Key strategies for city governments may include identifying priority charging areas, making land available for charging infrastructure, addressing uncertainties in demand, and ensuring equity, accessibility and inclusion in the deployment of charging infrastructure.

Cities may also look to utilize competitive public procurement processes, and, where possible, financial incentives, to encourage private-sector investment. In doing this, city governments can instil confidence among charge-point operators and investors regarding future local conditions and demand for charging infrastructure.

Standardization and processes

Establishing regulations for charging infrastructure in both residential and commercial buildings is vital for future-proofing these facilities. City governments should aim to streamline planning processes to reduce lead times for installation requests, thereby increasing the attractiveness of the market for charge-point operators. Furthermore, any city-level grants or incentives should be accessible to a wide range of stakeholders, focusing on outcomes rather than limiting funding to traditional business models. Standardization of charging infrastructure is also critical to ensure reliability and accessibility for all vehicle models, enabling an inclusive charging experience for all EV users, residents and visitors alike.

Data

Data plays a crucial role in shaping how city governments and stakeholders understand current and future charging needs. Cities should leverage existing data on EV ownership, traffic demand forecasts and the infrastructure planned in order to guide investment decisions. Regular, standardized data from charge-point operators on charging usage can inform city policies and help build robust business cases for investment. Collaborative planning with distribution system operators can enhance data access, enabling cities to better understand local frameworks and facilitate connections that may lead to favourable access rates for charging infrastructure.

Grid capacity and access to electricity

As the demand for EV charging grows, city governments must proactively address grid capacity and access to electricity. While existing grids may accommodate short-term charging needs, the demand for larger charging stations, particularly those serving fleet vehicles, will require additional power sources. City governments should plan for supplementary power sources and align these projects with grid expansion plans. Encouraging the adoption of bidirectional charging at fleet and large-vehicle sites can bolster grid stability and future-proof infrastructure. Streamlining processes for accessing the grid and identifying ideal sites for charging stations will further facilitate the integration of EV infrastructure into the existing energy landscape.

Introduction

City governments can play a critical role in enabling the transition to electric mobility.

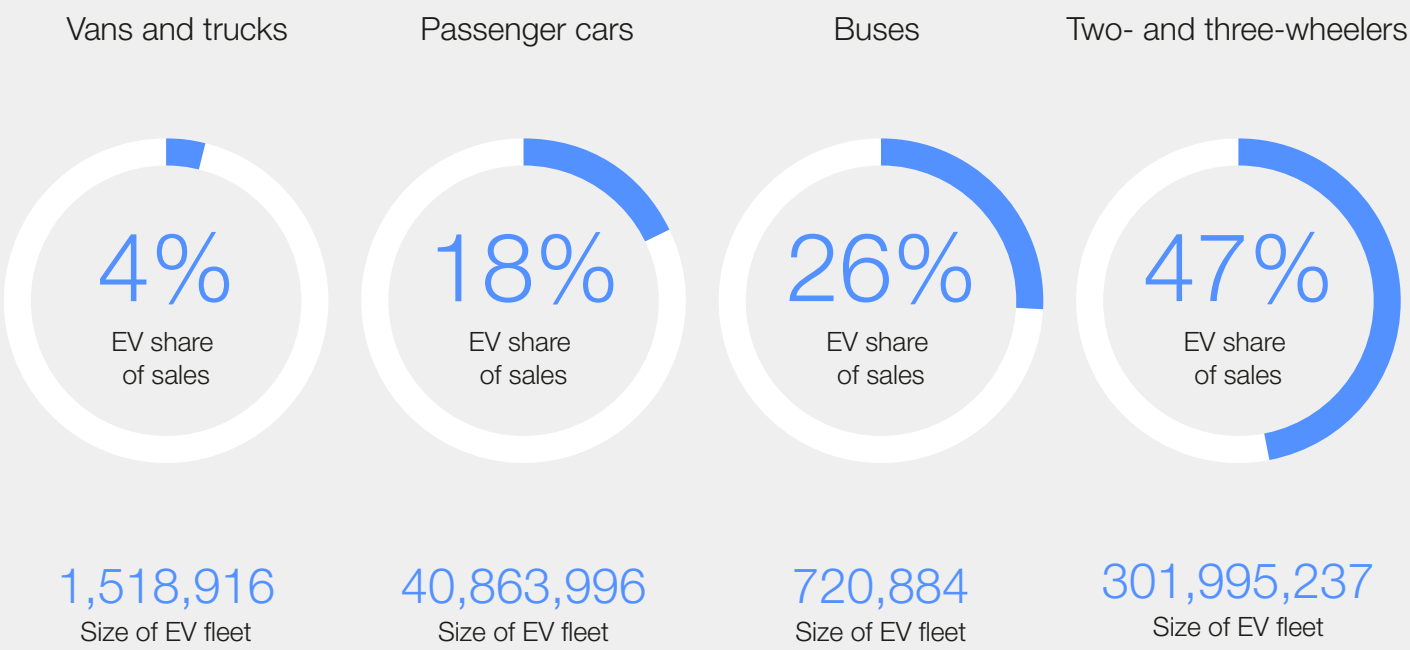
The transition to sustainable transportation systems is well under way, driven by evolving policy environments and technological advancements. Countries around the world have committed to ambitious net-zero goals, underpinned by short- to medium-term actions to accelerate progress. However, when it comes to putting these goals into practice, cities will be at the centre of this transition, especially as urban populations continue to rise. This is particularly relevant for the urban transportation sector, where electrification is a key enabler of the transition to Net Zero.

With passenger vehicles alone accounting for 70% of greenhouse gas (GHG) emissions from transportation, it is no surprise that the phase-out of internal combustion engine (ICE) vehicles is a priority.[2] This is crucial not only to help meet national goals on climate, but also to improve air quality, which is urgently needed to create healthier cities. In Europe, for example, this deadline is fast approaching: from 2035 onwards, all new vehicles will need to be zero-emission.[3]

With these goals on the horizon, EV sales have skyrocketed, with just under 14 million passenger EVs purchased globally in 2023, up from 10 million in 2022.[4] By 2040, it is predicted that there will be as many as 240 million passenger EVs on the road.[5] This shift is occurring across the transport landscape: for public transport, e-bus sales are growing exponentially, particularly in China.[6] Fleet operators and shared mobility are not left behind in this transition, with many major players committing to electric fleets by 2030.[7]

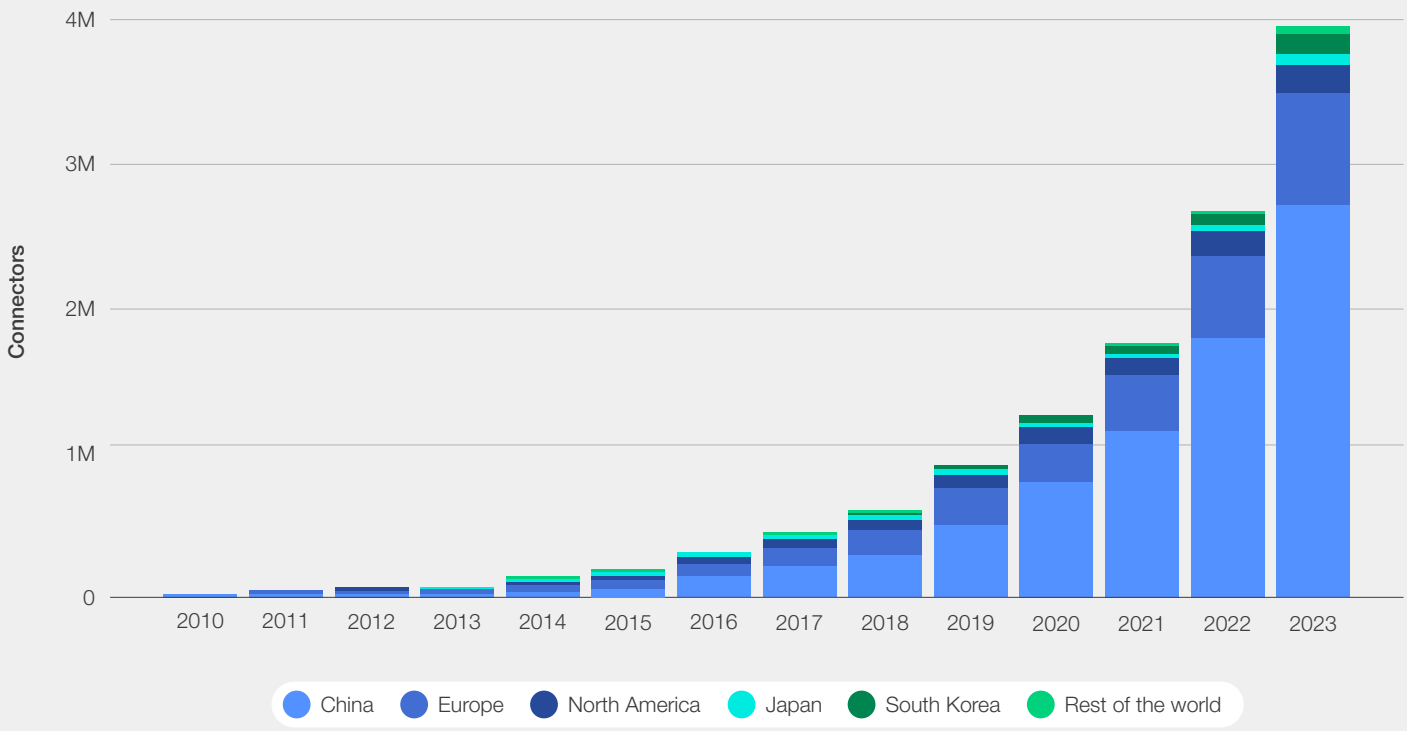
To accommodate the surge in EV adoption, charging networks are expanding rapidly in cities. The number of public and private EV chargers globally has increased from 3 million in 2019 to an estimated 15 million in 2023, with a projected 70 million to be in place by 2030.[9]

FIGURE 1 **EV share of sales has skyrocketed**



Source: BloombergNEF.[8]

FIGURE 2 | **Cumulative global public charging connectors**



Source: Electric Vehicle Outlook 2024, BloombergNEF.[10]

Lack of public charging is cited as a key barrier to EV adoption.

Notwithstanding this positive trend, the development of extensive publicly-available charging networks in cities is not progressing quickly enough to meet the increasing demand for charging and to progress towards decarbonization goals.

While many early-adopter EV drivers have access to private parking for charger installation, this will not be the case for all future EV drivers, particularly in cities. In the United Kingdom (UK), almost 25% of households lack access to off-street parking.[11] In Tokyo, less than 50% of new apartment buildings include access to parking.[12] Even in the United States, where detached housing comprises a high proportion, only 48% of people have access to private off-street parking with the possibility to install a charger.[13] Similarly, in the European Union (EU), it is expected that 50% of city-dwelling car owners will not be able to install their own at-home chargers, making publicly-accessible charging crucial, especially in cities.[14]

Indeed, the lack of public charging is cited as a key barrier to EV adoption. To remedy this situation in Europe alone, it is estimated that as many as 6.8 million public chargers will be needed by 2030 to support the electrification of passenger vehicles.[15]

Despite the urgent need, city governments face significant obstacles in rapidly expanding publicly-available charging in cities. While they may have ambitious goals, city governments are often constrained by the lack of regulatory authority and financial resources. For example, policy decisions around EVs are usually made at a national level, with cities left to ensure that local infrastructure is ready. City governments may be able to fund and manage a limited number of charging points themselves, but they often lack capacity to deliver and maintain the expansive public network needed for a widespread transition to EVs. Funding to support the transition is also usually controlled at the regional or national level. When spread across numerous projects over an entire country, national funding is often insufficient to cover substantial city projects.

Importantly from a city perspective, private passenger vehicles are not the only market to consider. As public transport, ride-sharing and fleet operations electrify, a broader range of charging options will also be needed for these vehicles. There is therefore a critical need to collaborate with other levels of government and key stakeholders in the EV infrastructure ecosystem.

A range of stakeholders collectively have the resources, knowledge and capital to invest in and scale charging infrastructure. These include charge-point operators and their investors, as well as fleet operators, utilities providers, equipment and vehicle manufacturers, land and infrastructure owners (e.g. residential developers, shopping malls and parking lots) and groups representing end-users. Together, city governments and the private sector can drive action.

By setting a clear and comprehensive strategy for charging, including standards and processes for infrastructure, robust data access and management, and, where possible, facilitating access to the grid and land for charging infrastructure, city governments can help create an environment conducive for private-sector investment. This paper provides insights and recommendations to help city officials navigate this complex landscape and collaborate effectively with private-sector stakeholders to expand and scale city-wide charging infrastructure.

FIGURE 3 **How EVs are changing transportation across the world**

Charging ahead: How EVs are changing transport across the world

Source: BloombergNEF; IEA. (2024). Global EV Outlook 2024: *Trends in Heavy Electric Vehicles*; IEA. (2023). Global EV Outlook 2023: *Trends in Charging Infrastructure*; ACEA. (2022). *White Paper: European Charging Infrastructure Masterplan*. p.52; ACEA. (2022). *White Paper: European Charging Infrastructure Masterplan*. p.7.

Note: Find out how the World Economic Forum is advancing action on sustainable mobility: initiatives.weforum.org/global-new-mobility-coalition

1 Policies, strategies and actions for cities

City governments cannot scale EV charging networks alone. Private-sector engagment and investment is crucial.

To accelerate the expansion of charging infrastructure, city governments should focus on developing a strategic EV plan supported by enabling policies and actions. This type of planning, accompanied by assurances about future charging conditions and anticipated demand, as well as the unlocking of access to data, land and electricity where possible, can help city governments mitigate investment risks. This also signals to charge-point operators (and their investors, such as banks and private equity firms) that their city is a prime investment location.

This section outlines policies, actions and administrative changes that city governments can employ, set out in four key areas:

1. EV strategic planning
2. Standardization and processes
3. Data
4. Grid capacity and access to electricty

1.1 EV strategic planning

Cities including Paris, Barcelona, Amsterdam, Oslo, Tokyo, Portland and London .. have published dedicated strategies for EVs and charging.

By developing a strategic plan for the EV transition, city governments can send a strong signal to charge-point operators and their investors about future local conditions and demand for charging. A growing number of cities, including Paris,[16] Barcelona,[17] Amsterdam,[18] Oslo,[19] Tokyo,[20] Portland[21] and London[22] have published dedicated strategies for EVs and charging.

For EV charging, a city government's strategic planning process should begin with an assessment of current transportation and energy infrastructure, determining where gaps and opportunities lie, such as the land available for charging. City governments should then establish clear goals and timelines for the rollout of EVs. These goals may be aligned with those set at a national level, or could be more ambitious. For example, London has set a target of 2030 for a phase-out of sales of ICE taxis and ride-sharing vehicles, with a deadline for the phase-out of ICE passenger vehicle sales by 2035.[23] Similarly, San Francisco is looking to phase out new ICE passenger vehicles by 2030.[24]

To facilitate a comprehensive shift towards electrification, city governments should engage businesses, residents, landowners, utility companies, charge-point operators and their investors, fleet operators and other end-users in the EV strategic planning process. This is essential to ensure successful on-the-ground implementation. City governments should also consider how best to communicate strategic plans, and educate the public about the benefits of EV adoption. The strategic plan should be revisited and updated as needed, remaining responsive to changes in the market.

> **Setting out a strong strategy for charging has helped to set the narrative on electrification and showcase to the private sector what they can expect in London. Our EV Infrastructure Strategy and EV Infrastructure Delivery Programme have sent strong signals to charging operators on opportunities for charging, helping to grow infrastructure across the city.**
>
> Judith Hayton, Transport Strategy and Planning Manager, Transport for London, UK

As city governments and ecosystem stakeholders embark on their strategic planning, below are some key considerations to ensure the greatest impact specifically related to EV infrastructure. These considerations may be part of the overall EV strategic plan, or may be articulated in a dedicated plan specifically focused on EV infrastructure.

Identify priority charging areas

After taking stock of existing and planned charging infrastructure in the city, priority areas for charging should be identified, specifying the types of charging to be prioritized (fast or slow), acknowledging the necessary infrastructure upgrades (such as upgrades to the grid) and outlining expectations of the private sector's role. A mix of slow and fast chargers will likely be needed for the foreseeable future as fast chargers, though practical, demand more energy and increase user costs. Slow chargers are therefore preferable where vehicles are stationary for long periods, facilitating smart charging and vehicle-to-grid applications. Fast chargers can be strategically placed for quick top-ups.

Beyond public charging, city governments should also look to incentivize charger installation in private residences and developments (such as parking lots, hospitals, universities and fleet facilities). While not directly under a city government's control, collaborating with the relevant stakeholders who may have access to land for charging and may be able to act more quickly will be crucial for the overall electrification transition.

Address uncertainties in demand

Factors such as low demand, poor location of chargers, unsuitable charge speeds and compatibility issues can lead to under-utilization. While some infrastructure will inevitably have lower utilization (e.g. low-density areas), a minimum utilization rate (i.e. percentage of time a charging point is being used) is generally needed to deliver adequate financial returns. For example, a charging station with a utilization rate of 15% will likely operate at a loss, while a rate of 25% is likely to yield positive financial returns.[25] Future technological changes, such as increased battery range, also pose demand uncertainty as they could alter the frequency and location of future charging needs.

Such demand uncertainty is a key barrier to investment. City governments should therefore use the data at their disposal, and collaborate closely with the private sector and end users to understand current and future charging needs across the city. Armed with this knowledge, they can then more confidently advocate for private-sector investment in their city, providing confidence that investments will remain economically viable, even if net-zero commitments are delayed.

Account for the full spectrum of transportation modes

Planning for charging should extend beyond private cars. Urban fleets (e.g. delivery and ride-sharing vehicles) account for a significant proportion of vehicle kilometres in cities. Electrifying these modes can greatly reduce emissions. City governments should account for these in their strategies and policies for electrification. For example, Barcelona in its Electric Mobility Strategy specifically draws reference to a spectrum of EVs, from bicycles to trucks, as part of its journey to electric transportation.[26]

Similarly, public transport, particularly buses, contributes significantly to air pollution (around 6% of global transport emissions),[27] and thus should not be overlooked. City governments and public transport operators should collaborate to establish a pathway for public transport electrification, considering specific charging requirements.

Two- and three-wheelers are also a crucial mode of transport in many cities and should be included in electrification infrastructure planning. However, it is important to note differences in charging infrastructure for these vehicles, primarily the role of battery-swapping in some countries.

BOX 1 **Oslo: Charging for heavy frieght**

As various modes and sectors aim to electrify, challenges arise over the availability of charging infrastructure due to deployment speed, land availability, grid access and more. This is especially relevant for heavy industry (e.g. construction) and fleets (e.g. public transport and deliveries), which require high-powered charging and guaranteed land access.

Oslo in Norway has transformed its 24 bus depots to support its almost entirely electric bus fleet. Recognizing the need to electrify other modes, the city is discussing with the construction industry how bus depots could support charging for construction vehicles. This collaborative mindset between the public and private sectors is crucial for achieving electrification across different transport modes in cities.

Source: Byggeindustrien.[28]

> London's EV Infrastructure Strategy identified land unlocking as the public sector's most significant contribution to EV infrastructure delivery.

Consider wider mobility goals

Charging infrastructure plans should be balanced with other mobility objectives, such as reducing total vehicle numbers in a city (whether ICE or EV). For instance, city governments may look to strategically locate chargers across the city, taking into account anticipated reductions in overall vehicle numbers. Fast chargers could be prioritized in city centres for quick top-ups, while slow charging could be prioritized in residential areas, helping to reduce the number of vehicles seeking to charge in central areas. Considerations such as how charging stations can be integrated with transport interchange points may also be a priority.

Importantly, while EVs will be a key part of the transition to zero-emissions vehicles, they are not the only option available. As part of strategic planning, city governments will also need to consider the role that other zero-emissions technologies (such as hydrogen vehicles and biofuels) will play in the overall transition, and how this will influence city infrastructure needs over time.

Ensure equity, accessibility and inclusion

For a genuine transformation, EV infrastructure should be accessible and affordable for all residents and visitors. For example, charging should be well distributed throughout the city and pricing should be comparable to private charging to avoid disadvantaging those without home charging access. Public charging should also be easily accessible for those with disabilities, and should not impede footpath or cycleway access.

Build internal resources for charging

City governments face challenges due to the novelty of EVs and the potential lack of staff expertise, particularly regarding charging. The complexity of charging infrastructure may also require knowledge and resources dispersed across different city departments (e.g. energy, planning and transport). As part of their strategic planning process, city governments should consider creating a dedicated team to coordinate infrastructure planning across departments and agencies, while pooling resources. This is particularly important for addressing issues such as charging locations, permitting, grid requirements and other technical aspects.

Explore public-private collaboration

Collaboration could involve co-financing or sharing of infrastructure for hard-to-electrify modes. There are many examples of cities exploring partnerships with charge-point operators and others on charging. In Ohio, USA, the Smart Columbus project saw a collaboration involving the city government with over 100 organizations across utilities, automotive companies, academia and beyond to expand charging in multi-unit dwellings (MUDs). Through rebates and commitments from the city, the collaboration saw over 900 chargers installed in MUDs in one year, helping to encourage over 3,000 people to purchase EVs.[29] Collaboration can expedite infrastructure roll-out and leverage each party's strengths.

Identify land for charging infrastructure

Lack of space for charging is a major barrier, given the intense competition for urban real estate. As such, support from city governments to identify and unlock access to land is crucial. Indeed, London's EV Infrastructure Strategy identified land unlocking as the public sector's most significant contribution to charging infrastructure delivery. Initial estimates suggest public-sector land in London could house a quarter of the 4,000 rapid chargers needed by 2030.[30]

In the short term, charging may be able to integrate with the existing grid. However, large charging stations, particularly those serving fleet vehicles, will require power beyond current grid capabilities.

Delhi has also taken steps to make land available to charge-point operators, for example by aggregating areas of land owned by different public agencies through a citywide tender.[31] Land for charging infrastructure may be publicly- or privately-owned. In the case of the latter, for example in universities, parking lots and shopping malls, city governments can act as convenors helping to connect stakeholders.

Importantly though, city governments cannot simply provide free access to land to private operators: instead, they must ensure that provision of land will serve the public interest and follow appropriate public procurement processes. Recommendations for competitive public procurement processes for EV charging are set out in Section 2.

Consider long-term grid needs

In the short term, charging may be able to integrate with the existing grid. However, large charging stations, particularly those serving fleet vehicles, will require power beyond current grid capabilities. In these circumstances, decisions will need to be made regarding how such charging infrastructure will interact with the grid, what supplementary power sources should be part of these projects, and how these projects align with broader grid expansion plans. Given the future competition for renewable electricity, city transport officials should collaborate with other departments and agencies to maintain an overarching view of city needs.

1.2 Standardization and processes

Standardizing processes for charging is crucial in delivering a seamless offering for EV drivers. Providing predictable and consistent processes, such as contactless payments for charging, is crucial to growing EV adoption in cities and attracting investment in infrastructure.

Anna Grau Galvany, Director, Fleet and Mobility Solutions, Visa

In addition to developing a strategic plan, city governments should enact policies and standards that ease charger installation, payments and maintenance in alignment with a city government's strategic goals. These kinds of policies not only aid current users, they also help increase EV uptake and demand for charging infrastructure (by removing key barriers). Critically, they ensure all charge-point operators are on a level playing field and build confidence that investments in EV infrastructure meet current and future technical requirements, which helps to de-risk these large investments.

While it is important that city governments create an environment conducive to investment, the overall charging system implemented for a city needs to ultimately serve end-users and encourage a transition to EVs. As such, there may be some standards or requirements that city governments may need to impose on charge-point operators providing publicly accessible charging, especially where publicly-owned land is involved, to ensure overall accessibility. Charge-point operators should not be prevented from providing quality services, rather regulation or standards should be used to ensure basic access for all. Some key EV enabling policies and standards may include:

Making charging capability the new building standard

City governments should aim to establish regulations for charging in residential and commercial buildings to future-proof them. Such regulations signal to the private sector strong future demand for charging, ensuring a reliable revenue forecast. If these regulations are controlled at national or regional levels, city governments should collaborate with the relevant government levels to normalize charging capabilities in buildings. In the EU, for example, upcoming legislation is expected to mandate pre-cabling for renovations or new buildings with a certain number of parking spaces for easy charger installation.[32] In Tokyo, with over 70% of the population living in apartments, the city plans to introduce similar measures in 2025.[33]

However, this does not address existing buildings. For instance, in Switzerland, where over half the population rents, landlords can deny tenants the right to install charging infrastructure, hindering EV adoption. In the US, some cities have introduced "right to charge" laws to address the same challenge, allowing tenants to install charging with limited landlord approval.[34] Investment hesitancy may also arise in existing buildings due to perceived safety issues, such as fire hazards from outdated wiring, power supply issues and irregular maintenance. New mandates or regulations should therefore be accompanied by clear city-wide standards, aligned with national requirements, and coordinated with relevant agencies.

Simplifying and streamlining processes around charging

A common concern regarding charging infrastructure delivery is the complexity and rigidity of planning and installation requirements. These processes can add significant cost, time and

resources to a project, delaying charging roll-out and reducing the appeal for charge-point operators and others to commit to installing infrastructure. While some processes may be controlled by national or regional government, city governments can still streamline and support process simplification.

A significant barrier is the time and complexity involved in obtaining planning and installation permissions, a barrier that is particularly challenging for smaller companies with limited resources. The process can take years, even when suitable land has been identified and purchased. Approvals can be further complicated when stakeholders are installing charging hubs with ancillary services. City governments should aim to streamline planning processes for EV infrastructure to reduce the lead time between installation requests and deployment.

City government departments and agencies should also align criteria for installing charging, with a common set of requirements. Private-sector players often face multiple requirements and approvals from different city departments responsible for planning, installation and energy. This is particularly challenging and time-consuming for large projects, such as the installation of substations and grid upgrades for fleet charging.

Ensuring that grants are accessible

Charge-point operators and their investors often find that city-managed grants can be restrictive in terms of the criteria set, or the types of companies that can apply. In some cases, innovative business models, such as those involving multiple companies, or those undertaking specific kinds of charging operations, do not meet the criteria.

Any city government grants or incentives should be accessible and open to a wide range of stakeholders, focusing on outcomes, rather than limiting grants to a small range of traditional business models. City governments should consult with key stakeholders before launching any funding programmes to ensure that criteria remain inclusive.

Developing technology and data standards

Technology and data standards are crucial for scaling EV use. Incompatibility between vehicles and chargers can hinder user experience and undermine system confidence. City governments should ensure that public chargers are accessible for as many vehicle types as possible, providing a consistent experience for all EV drivers.

Standardization is also key to addressing the reliability of chargers. Faulty chargers are common, with reports showing that nearly one in five attempts to use public chargers fail because stations are out of order.[35] EV drivers may not even be able to report faulty charging points if they are not registered with the charging provider. In the UK, a standard of minimum 99% reliability has been set (i.e. the percentage of time a charger is available to use).[36] Though it is possible that states or countries may later set standards, city governments can still set their own requirements to ensure a reliable city-wide charging network.

Data collection and sharing is another critical standardization element. Cities including Madrid and Rotterdam require charge-point operators to report charging data (e.g. frequency and time of charging). Cities should ensure charge-point operators provide regular, standardized data on charging use to inform future city policy (e.g. priority charging locations and demand for charging). City governments should also consider how charging data (e.g. average distance to charging station and frequency of charging per vehicle) can be shared with the public to improve user experience and encourage EV adoption.

Standardizing charging payments

Consumers need the assurance that they can pay for charging in a simple, efficient manner. Today, 67% of EV drivers want to use bank cards for charging.[37] However, many face inconsistencies in the payment experience, such as requirements to use brand-specific payment cards or needing to register with a specific charge-point operator. This adds complexity and inconvenience to the charging experience and hinders EV adoption.

Existing legislation such as the EU's Alternative Fuels Infrastructure Regulation (AFIR) and the US's National Electric Vehicle Infrastructure Formula Program (NEVI) require charging stations to have contactless, open-loop payments as standard.[38] This makes charging more seamless and predictable for drivers and aids cross-border transport. While some national regulation on standardized charging may be in the distant future, city governments can future-proof infrastructure by requiring standardized payments, such as open-loop payments today. Charge-point operators can still offer additional services and discounts through their membership models, while ensuring basic accessibility for all.

1.3 Data

> **Data is vital in informing where and what type of charging is prioritized. Actionable insights can help build the investment case for charging, particularly in areas traditionally underserved by infrastructure investment. Continued collaboration between companies and cities on data sharing will be crucial in driving the EV transition forward in an equitable way.**
>
> Thibaud Simphal, Global Head of Sustainability, Uber Technologies

Provide data to charging operators, investors and fleet operators

Companies involved in charging need key data to evaluate whether to invest in charging systems in particular localities. Data such as about average incomes in city suburbs, existing EV ownership, traffic demand forecasts, existing or planned charging infrastructure, utilization rates, electricity costs and rates for electricity buy-back can all help charging providers and their investors understand when and where to invest. However, in many cities, it is challenging for the private sector to access or consolidate this data. Where this kind of data is not easily available, city governments can support this process by gathering, managing and providing this data to the private sector to help build a robust business case.

City governments can also attract private investment by providing information on potential revenue streams arising from interaction with the grid. For instance, companies may be willing to participate in demand-side response (charging during off-peak hours to reduce demand on the grid) or frequency containment reserves (providing power back to the grid during periods of high demand), but it can be difficult to know where these opportunities exist. If charging operators can understand the data and financial opportunities of engaging in these systems, it will help them build a business case for implementation. Particularly for fleet operations, knowing what kind of electricity rates and connections are available can help determine what types of EVs and even battery sizes are most suitable for their operations, thus enabling them to build out their business models.

Explore data partnerships with the private sector

City governments can also collaborate with private players to obtain relevant data. Working collaboratively with the private sector to source data on charging demand can help city governments in identifying priority locations for future charging, helping to build confidence in the future utilization of infrastructure.

For instance, fleet operators may be able to provide insights on charging needs and patterns, with charging data for potentially thousands of drivers. Digital infrastructure players, such as payments providers, actively collect data that can inform decisions on infrastructure rollout, consumer support for EVs, and policy decision-making. These insights can also provide data on factors such as affluence and purchasing patterns to predict future use and demand for charging.

BOX 2 Uber: Data-sharing and charging funding

An electric ride-share car can yield emissions savings four times higher than a private electric car. However, many ride-share drivers are reliant on public charging, facing challenges due to limited installations, competition with other EV drivers, and limited fast-charging options.

Uber has been collaborating with cities worldwide to inform decision-making on charger installations. They have created different charging demand scenarios, based on expectations about the percentage of near-home charging for drivers, versus "top-up" rapid charging near drop-off and pick-up locations. This data is used to identify charging demand from Uber drivers in different city areas and inform cities' priority areas for installing EV charging.

In London, Uber has gone a step further. It has contributed £5 million to install 700 new public charging points in three London boroughs that lacked the necessary charging infrastructure. This funding expanded London's overall charging network by over 7%, enabling Uber drivers to switch to EVs while expanding the public charging network. This initiative also promotes sustainable travel choices, giving more Uber customers access to EV-only "Uber Green" services.

Source: Uber Technologies.[39]

1.4 Grid capacity and access to electricity

> **To create expansive charging networks in cities, electricity grids must be prioritized. Collaboration between charging operators, utilities and city governments can ensure that EV charging plays a role in creating resilient, flexible grids fit for the future.**
>
> Pedro Gomes, Clean Vehicles and Air Quality Cluster Lead, POLIS Network

The grid is a critical factor in scaling investment in charging. As electrification increases in all industries, grids face growing pressure to meet power demand. This is especially true for fleet operators who need large amounts of electricity and fast charging. While most city governments do not manage grids, they may still be able to play a role in facilitating relationships and bringing greater clarity to the private sector.

Facilitate relationships with utilities providers

Utility companies play a significant role in charging and grid access, with their influence varying across regions and countries. In some cities, utilities lead, while in others city governments have more authority. The regulatory environment for grids also varies, creating a complex landscape for charging players, often leading to confusion about authority over grid-related issues.

City governments can play a role in facilitating relationships between utilities and providers by engaging and collaborating with utilities and distribution system operators around future grid requirements, and providing clarity on this to private players. This can help charge-point operators and their investors understand local frameworks, facilitate connections and potentially negotiate favourable access rates with utilities providers.

BOX 3 **Nottingham: Bidirectional EV charging**

The city administration of Nottingham, England, committed to installing 40 bidirectional chargers following the purchase of a new fleet of around 250 EVs. This installation of vehicle-to-grid (V2G) chargers is one of the largest in the UK.

These chargers are paired with solar arrays and batteries for on-site energy production and storage. The V2G chargers allow the vehicles and solar arrays to charge the site's batteries, which can then power the site directly or feed back into the grid to support load balancing. This solution brings flexibility to the grid, reduces demand during peak times, and allows EVs to generate income for the city when feeding into the grid.

This EV infrastructure has future-proofed the facility and provided a more lucrative, flexible solution as part of the transition to EVs.

Source: Electrive.[40]

> City governments can incentivize the private sector to adopt bidirectional charging at key locations to enhance grid stability and future-proof infrastructure.

Provide information on how and where the private sector can access the grid

City governments and utilities can support private-sector investment by providing detailed information about grid access. Companies aiming to connect charging facilities to the grid often struggle to identify suitable areas within a city. This information is also crucial for companies needing to understand where grid upgrades are feasible, and if there are areas the city government is already prioritizing for upgrades.

Prioritize and support grid upgrades in areas of high EV and fast-charging demand

Charging installations are dependent on grid connections and enhancements. In areas where slow charging is used, grid upgrades may not be necessary. However, for fast charging, which is needed for large fleets or time-sensitive operations, grid upgrades are usually required. Typically, private operators requiring the upgrade bear the costs, adding significant expense to projects and potentially causing delays.

City governments with sufficient resources could look to provide financial incentives to companies undertaking grid upgrades, particularly where this results in investment in the city's infrastructure. For example, some cities in France have offered subsidies for grid upgrades, covering up to 40% of costs.[41] However, for larger costs such as for substations, financial support is rarely available, posing a barrier to investment, particularly for smaller companies. Where possible, city governments could consider supporting substation upgrades for major installations where clear public benefits can be realized.

Balance the grid through charging

City governments can incentivize the private sector to adopt bidirectional charging at key locations to enhance grid stability and future-proof infrastructure. This is particularly effective at sites where fleets charge over extended periods, or in long-stay car parks.

EV fleets (e.g. delivery vehicles and buses), in particular those with predictable demand, can supply or draw power from the grid to maintain electricity balance during periods of high demand or supply.

Lower rates for charging at night, when demand is lower, could be another approach. Incentivizing fleet operators to participate in overnight charging could make EVs more cost-competitive than ICE vehicles. Overnight charging is already incentivized by many utility companies;[42] city governments may seek to work with utility companies to ensure that fleet operators can take part in overnight charging at preferential rates to help balance grids.

Simplify the process for supplementary power sources

City governments should streamline processes for the installation of supplementary power sources at large charging stations where the complexity of regulatory processes often hinders operators and increases costs. Additionally, where possible, city governments should support efforts to lower renewable electricity production costs. For example, while some charging stations utilize modest solar canopies and battery storage, these cover only a small fraction of power needs (typically 5-15%). A more effective solution could involve larger solar arrays located further away, with connections to local substations. However, the currently high administrative and capital costs often negate any gains.

To encourage charge-point operators to generate their own energy, where possible, city governments could seek to review tariffs with local energy and network providers, making supplementary power installations more appealing. Collaboration across government departments would likely be required to realize such ambition.

BOX 4

Volta Trucks: Fleet EV infrastructure

Upgrading infrastructure for EV fleets is complex and resource-intensive, creating numerous adoption barriers. Volta Trucks assisted a delivery fleet manager in electrifying their fleet and upgrading their depot for charging. This required a local grid upgrade, installation of a 1.6 MW transformer, six slow chargers, and one rapid charger. The project involved multiple stakeholders, including the fleet operator, a charging provider, a sub-station provider, a utility company, suppliers and subcontractors. The total cost was €115,000, with a grid upgrade fee of €20,000 – a substantial amount for a small company. The city government provided a subsidy of €8,000.

Key lessons include:

- Start upgrades only after all signatories are committed, and once all necessary government departments have approved technical plans. Failing to do so leads to delays and complications.
- Government support in coordination and understanding processes can ease the process, particularly when dealing with utility companies.
- Financial support from government – particularly where upgrades concern the grid – can make a big difference to operators, given the high costs and risks involved in such projects.
- Any subsidies should be flexible to accommodate different circumstances and business models.

Source: Volta Trucks.

2 Public procurement best practices

Competitive public procurement processes are a tool that cities can use to direct and encourage investment in EV infrastructure.

“ City governments can implement strategies to create tenders that encourage the private sector to bid on providing EV charging infrastructure.

While some city governments may establish limited public charging networks, most lack the resources for long-term, widespread infrastructure management. It is therefore crucial for city governments to encourage private-sector participation in charging infrastructure provision to ensure a successful shift to electrification.

To promote the installation of charging infrastructure on city land, city governments often use a competitive public procurement process, including public tenders. These tenders should clearly define all requirements and specifications for charging solutions while simultaneously crafting conditions that are both attractive and profitable for charge-point operators.

The following considerations are not intended to be a complete list of factors for inclusion in public tenders, but rather a collection of best practices shared by key stakeholders.

Best-practice tender requirements and specifications:

Reliability and maintenance: Requirements for charging station reliability and frequency of maintenance should be explicitly set out.

Future-proofing: Conditions for future upgrades should be included to ensure longevity of charging stations.

Mandatory minimum criteria: Criteria such as 24x7 operation and technical support should be standard to assure drivers of the reliability of the charging infrastructure at all times.

Smart charging requirement: Smart charging can optimize power supply, manage energy flow and reduce costs, thereby future-proofing EV charging and enhancing grid resilience. These should be included in tender requirements.

Data: Requirements for the provision of data from charging stations (e.g. utilization rates, time of use and number of users) are useful to help inform future decision-making and policy.

Standardized payments: Stipulating open-loop, contactless payments as standard in tenders for EV charging, as well as ensuring that users have access to information on expected costs of charging prior to use, should be considered.

Profitability information for charge-point operators: Tenders should provide crucial information on potential profitability by:

- Identifying suitable locations for charging infrastructure, backed by data on land availability and grid access.
- Providing key information on potential challenges, such as the likelihood of grid upgrades, estimated costs of upgrades or anticipated connection times.

By incorporating these elements, tenders can provide clarity and evidence to support investment decisions, instilling confidence in companies about the availability of suitable charging areas and the ease of installation.

Building an attractive tender: Key strategies and best practices

City governments can implement strategies to create tenders that encourage the private sector to bid on providing EV charging infrastructure. Some key steps and considerations that can help to build an attractive case for charge-point operators and others include:

Business case assessment: City governments can start by scoping an initial business case and then tendering for specific locations in the city. This approach can instil confidence in investors about the financial viability of the tender.

Longer contract terms and concession models: To assure potential bidders about the financial prospects of tenders, city governments can offer longer-term contracts. A contract of 10-15 years can facilitate a strong return on investment for a charge-point operator and reduce the risk for investors.

Zero-capital models: Where city governments have limited financial capital, they might opt for zero-capital models. These models are more feasible where demand for charging is already high, building a more attractive business case for charge-point operators. However, they may necessitate additional guarantees, such as longer-term contracts or guaranteed charging prices, to improve the financial case.

Demand guarantees: Mechanisms that guarantee a fixed cashflow or demand can significantly reduce investment risks. One approach is setting a revenue floor and ensuring a minimum demand level. If there is a shortfall in charging utilization, the city government can step in, instilling investor confidence and protecting users. These mechanisms can be implemented through contracts for difference or subsidies.

Land availability and access: Land availability is a significant concern for charge-point operators, who often compete with other sectors for land. City governments can foster investment by pre-identifying available land (particularly city-owned land) in key areas and focusing tenders around these areas.

Support for larger projects: For larger charging projects, such as for fleets, city governments can support charge-point operators by making large sites available through tenders. Alternatively, they can assist the private sector in identifying suitable land that can be prioritized for charging.

Balancing prime and less desirable locations: Charging is needed across the city, but in some areas, the business case may be less evident. Bundling prime locations with less desirable ones in tenders can address this challenge. However, the overall project still needs to have a viable business case to attract bidders.

Consult with stakeholders as tenders are developed: This can help identify potential challenges ahead of time, and ensure that charge-point operators and others will be able to positively respond to tenders.

BOX 5 **Rotterdam: A market-driven approach to charging**

Rotterdam has adopted a market-driven approach to scale charging, structured to instil confidence in investors. Before initiating a tender, the city consulted with charge-point operators to understand their investment conditions for charging infrastructure. Recognizing that charge-point operators needed sufficient time to recoup their initial investment, the city offered long-term contracts and prioritized maintenance of infrastructure to ensure longevity. The city also committed to compensating charge-point operators if the predicted demand for charging fell short, in return for a payment of 2 cents per kWh, without any capital investment for infrastructure installation.

Real-time data on charging use and demand was provided, demonstrating to charge-point operators and others the ongoing demand for charging. By analysing the utilization rates and the amount of electricity delivered per charger, the city aims to expand the network. If a public charger is regularly used by multiple cars, the city responds by adding more chargers to meet demand. The city is also predicting future demand for chargers by mapping neighbourhoods and EV ownership rates.

To date, the city boasts over 5,400 public charging points, providing a comprehensive charging network to support electrification.

Source: Municipality of Rotterdam.

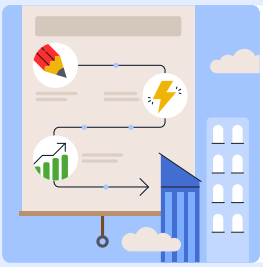
3 Key actions for city governments

As the epicentre of the transition to sustainable mobility, city governments can play a pivotal role in setting the narrative and driving action to scale EV infrastructure.

Despite financial and resource constraints, city governments can leverage their influence to increase confidence and attract investment from the private sector, including financiers and charge-point operators. However, this cannot be achieved in isolation. Robust collaboration within administrations, and with other levels of government, utilities providers and the private sector is crucial. Recognizing charge-point operators, fleet operators and others within the charging landscape as valuable partners in policy and infrastructure roll-out can catalyse city governments' efforts towards achieving charging infrastructure objectives.

The key actions and best practices for cities are summarized under the four main themes of this paper: EV strategic planning, standardization and processes, data, and grid capacity and access to electricity.

How city governments can support EV infrastructure scale-up



EV strategic planning

Develop a strategic plan for the EV transition

A clear strategy and delivery plan demonstrating a transition to electrification, including anticipated EV infrastructure needs, can bring confidence to charge-point operators, fleet operators and investors.

Identify priority charging areas

There should be a clear understanding of where existing infrastructure is located and what future needs will be, taking into account the types of chargers needed and any associated grid upgrades.

Address uncertainties in demand

City governments should use the data at their disposal and collaborate closely with the private sector to understand current and future demand throughout the city.

Account for the full spectrum of transportation modes

Private vehicles, urban fleets, shared transport and two- and three-wheelers should be included, noting the differing charging needs and challenges for each mode.

Consider wider mobility goals

The need for charging infrastructure should be balanced against plans to reduce overall private vehicle use, or promotion of shared and active transport modes.

Ensure equity, accessibility and inclusion

Charging infrastructure should be accessible and affordable for all residents and visitors.

Build internal resources for charging

Sufficient expertise, particularly on infrastructure, may not exist within city governments. Governments may consider appointing a specialist team to coordinate across departments.

Explore public-private collaboration

The private sector, utility companies and broader city stakeholders have a key role to play. Collaboration can expedite infrastructure roll-out and leverage each party's strengths.

Identify land for charging infrastructure

Support to identify and provide access to suitable land for EV infrastructure is one of the most impactful moves a city government can make to drive infrastructure scale-up.

Consider long-term grid needs

City governments can proactively plan and implement supplementary power sources for large charging stations, aligning these projects with grid-expansion plans, and fostering inter-agency collaboration to ensure a comprehensive view of the city's renewable electricity needs.

Data

Provide data to charging operators, investors and fleet operators

Data on existing EV ownership, traffic demand forecasts, and existing or planned EV infrastructure are key sources that can help cities, operators and investors understand when and where to invest.

Explore data partnerships with the private sector

Such partnerships enable cities to access a wider range of data to inform decision-making and de-risk investments.

Grid capacity and access to electricity

Facilitate relationships with utilities providers

Collaborative planning with distribution system operators can help charge-point operators and investors better understand local frameworks, facilitating connections and potentially helping negotiate favourable access rates.

Provide information on how and where the private sector can access the grid

Enable companies to better plan future priority sites for charging, understand which sites are most accessible, and identify where they can have facilitated access.

Prioritize and support grid upgrades in areas of high EV and fast-charging demand

Facilitate easier grid access through streamlined processes, collaboration with utilities and ideal site identification. Consider options to collectively contribute to or reduce the financial impact of grid upgrades.

Balance the grid through charging

To bolster grid stability and future-proof infrastructure, city governments should encourage the private sector to adopt bidirectional charging, particularly at fleet and large-vehicle charging sites.

Simplify the process for supplementary power sources

Streamlining the process for installing supplementary power sources at charging stations, reducing complexities and encouraging renewable energy production, can help make investment in larger charging operations more attractive.

Standardization and processes

Make charging capability the new building standard

This should be complemented by standards for charging installation for existing buildings, aligned with or exceeding national requirements, in consultation with relevant planning agencies.

Simplify and streamline processes around charging

City governments should reduce the complexities that lead to project delays, thereby increasing the attractiveness for charge-point operators to commit to installing infrastructure.

Ensure grants are accessible

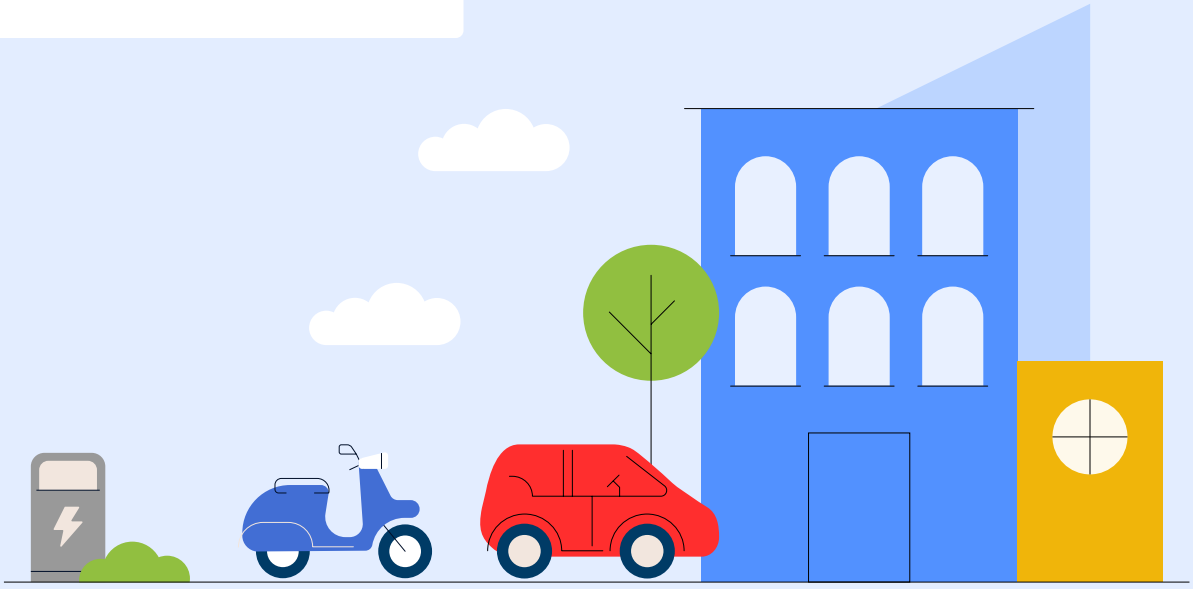
Any city-level grants should be accessible and open to a wide range of stakeholders, focusing on outcomes rather than limiting funding to traditional business models.

Develop technology and data standards

City governments should seek to ensure that charging is accessible to as many vehicle models as possible, allowing for a consistent and predictable experience for EV drivers.

Standardize charging payments

Contactless, open-loop payments should be considered for charging, facilitating open access to all public charging infrastructure.



Contributors

World Economic Forum

Adrienne Gibbs
Lead, Urban Mobility, World Economic Forum

Jamie Wylie
Lead, Urban Mobility, World Economic Forum

Acknowledgements

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Taskforce members

Accenture

AtkinsRéalis

Centre for the Fourth Industrial Revolution India, World Economic Forum

C40 Cities Climate Leadership Group

City of Rotterdam

Drees & Sommer

EMT Madrid

Enel

Hyundai Motor Group

Infinium Logistics

ING Group

Ingka Group

International Council on Clean Transportation

Institute for Transportation and Development Policy

MTR Corporation

Mundys

Perch Mobility

POLIS Network

Shared Use Mobility Center

Swing Mobility

Tata Motors

The Climate Group

The Inter-American Development Bank (IDB)

Transport for London

Uber Technologies

UBS Asset Management

Visa

Volta Trucks

Production

Laurence Denmark
Creative Director, Studio Miko

Jay Kelly
Designer, Studio Miko

Madhur Singh
Editor, World Economic Forum

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World Economic Forum
91–93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland

Tel.: +41 (0) 22 869 1212
Fax: +41 (0) 22 786 2744
contact@weforum.org
www.weforum.org