Keep the current flowing

Vienna's path to electromobility

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The challenges of the climate crisis call for bold, innovative measures. As one of the main sources of greenhouse gas emissions, the mobility sector plays a key role in these efforts. That's why, here in Vienna, we are committed to making mobility in our city even more sustainable. And to do this, we need zero-emission transport.

The present document, "Keep the current flowing – Vienna's path to electromobility", marks a decisive step forward on Vienna's path to net zero by 2040. It outlines the strategic focus and the targets that we as a city have set ourselves. The outcome of an intensive process of dialogue and close collaboration between a large number of urban actors and stakeholders, it elucidates the steps necessary to accelerate the roll-out of e-mobility in Vienna.

It goes without saying that this path to net zero will require policy action on a large scale and processes of adjustment that will have to be agreed and initiated at many different levels.

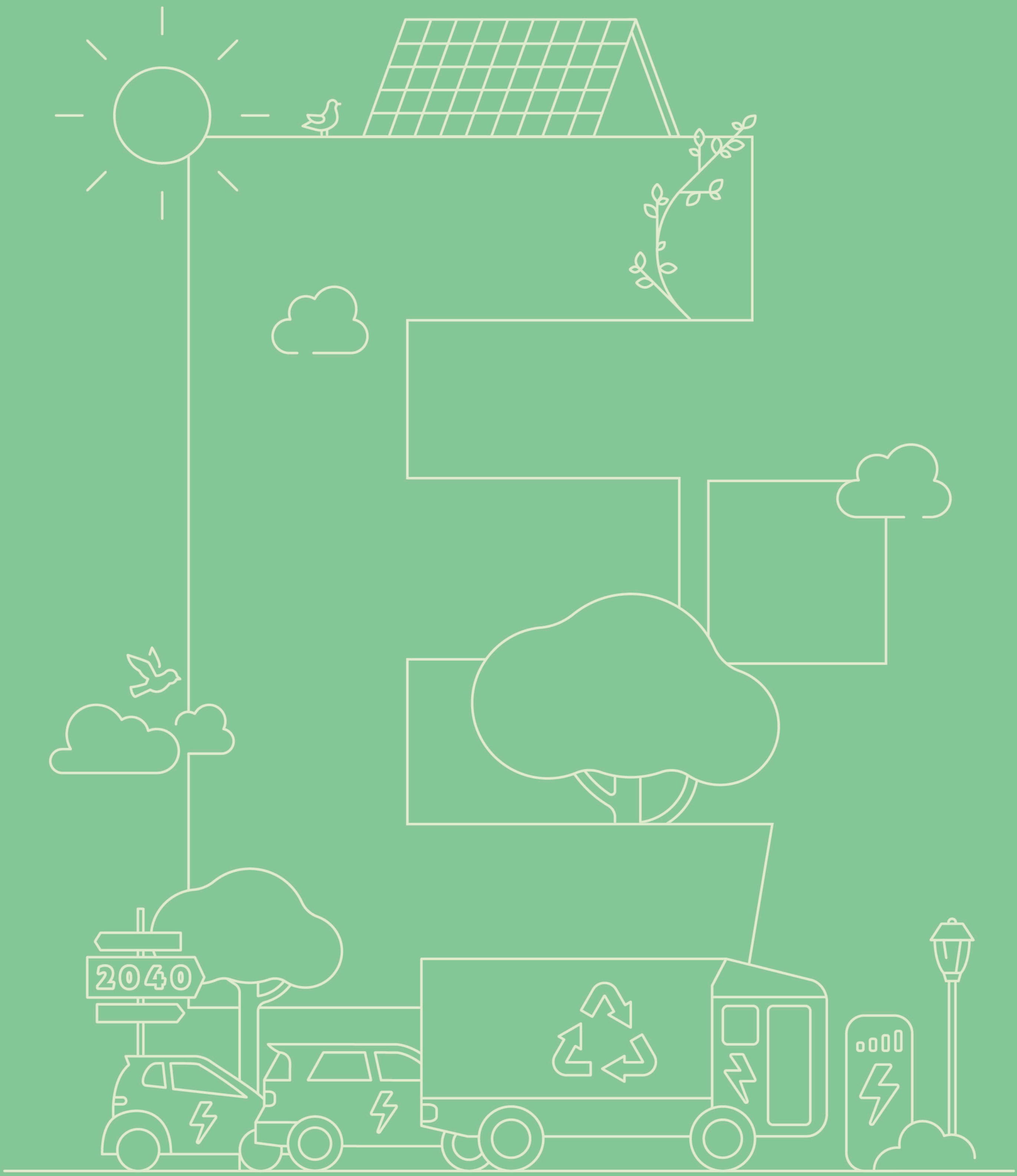
Nevertheless, we are resolved to leverage all the means at our disposal to accelerate decarbonisation of the mobility sector in Vienna, from rolling out the necessary charging infrastructure to supporting e-mobility and incentivising sustainable modes of transport.

The measures presented here are only a small part of the wide-ranging efforts our city is undertaking in order to transform the mobility sector. They complement the two other strategic dimensions of "Shifting" and "Avoiding" motorised individual transport, which are of equal importance in achieving our climate targets in the mobility sector.

With "Keep the current flowing – Vienna's path to electromobility" we are helping to build a future in which the City of Vienna is not only famous for its cultural diversity and quality of life, but also strengthens its leading role in the field of sustainable mobility. We invite you to be a part of this exciting journey and to join us in forging a climate-friendly path towards a liveable future.

Looking ahead with confidence we remain, yours sincerely,

EXTRA MILE



Contents

PATH TO SUCCESS

1. Mission statement

Tackling the climate crisis is the major challenge of our time, affecting many aspects of how we live together as a society. From the scientific point of view, a swift reduction in greenhouse gas emissions is imperative if we are to have any chance of mitigating the most severe consequences of climate change. The City of Vienna wants to do its part to help meet the global climate targets within its own sphere of action, and has committed to achieving net zero by 2040. This will entail some fundamental changes, especially for those sectors which currently produce significant amounts of greenhouse gas emissions.

Particularly affected in this context is the mobility sector, which as a whole is responsible for 43% of the greenhouse gas emissions[1] in Vienna that are relevant in relation to the headline goals. Around a third of this total is caused by car traffic in Vienna alone. Besides avoiding motorised individual transport (MIT) and making the transition to eco-friendly modes of transport (public transport, cycling, walking, taxis, car-sharing and car-pooling – "Modal shift"), the transition to local electric vehicles ("Shift to electric vehicles") will also play a decisive role here. The shift to electric vehicles is key to achieving net zero by 2040 and is therefore also defined as a core priority in the Vienna Climate Guide.

The Electromobility Roll-Out Programme launched in May 2023 is a comprehensive and timely city-wide programme that paves the way for local zero-emission vehicles, with a particular focus on battery electric vehicles (BEVs). It will thus play an instrumental role in ensuring that the path to net zero by 2040 outlined in the Vienna Climate Guide is successfully followed[2]. As well as contributing to achieving net zero, the shift to electric vehicles also entails a number of co-benefits, such as reduced traffic noise[3], a significant improvement in local air quality and a potential increase in energy autonomy.

The present document, "Keep the current flowing – Vienna's path to electromobility", is the key output of phase one of the Electromobility Roll-Out Programme[4] and reflects the findings of a comprehensive and wide-ranging preparation process. The latter comprised a study to produce the required data, plus a series of workshops with experts from the City of Vienna and the Wiener Stadtwerke Group.

"Keep the current flowing – Vienna's path to electromobility" is intended as a strategic document that maps out the path towards fully net-zero vehicles on our city's roads.

[1] Cf. the definition from the Vienna Climate Guide (p.42, abridged): Vienna's headline goal of climate neutrality by 2040 does not cover all emissions attributed to Vienna in the pollutant inventory of Environment Agency Austria. A considerable part of the emissions generated by the "Transport" sector are not taken into account in the headline indicator of the Smart City Strategy for Vienna because the latter uses a calculation method that excludes e.g. "fuel tourism". This is in line with the principle that is also applied in all the other sectors of only considering emissions released on the city's territory (territorial accounting).

[2] Only a limited part of the means of attaining these self-defined targets actually lies within the City of Vienna's sphere of influence. European and national policy frameworks significantly influence the city's scope for action.

[3] At speeds up to approx. 30 km/h, electric vehicles are generally quieter than vehicles with internal combustion engines; at higher speeds, the rolling noise of cars is louder than the engine noise.

[4] The Electromobility Roll-Out Programme is a key tool for achieving net zero in road transport. While the first phase of the programme (2023-24) focussed on the strategic framework, subsequent phases are devoted to implementation and monitoring.

EFFECTS

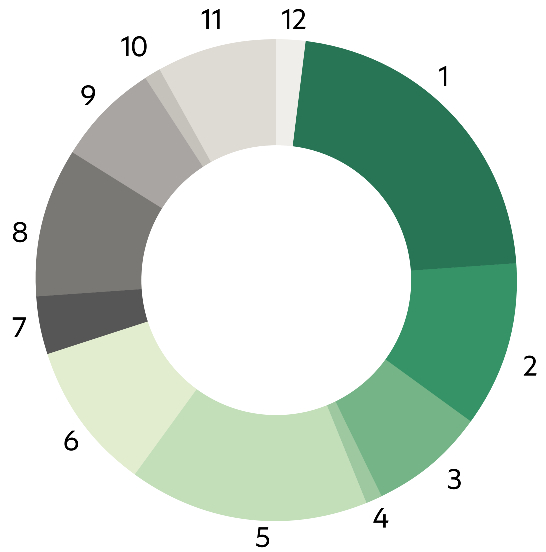
2. Strategic integration

Vienna wants to do its part to curb the climate crisis, aiming to achieve net-zero city status by 2040 – and that also includes a net-zero transport sector. There is still a long way to go here, given that this sector currently produces some 2.2 million tonnes of CO_2 equivalent annually.

In order to bring about a reduction in emissions and achieve net zero by 2040, a wide range of different measures are required. In the Mobility Master Plan of the Federal Ministry for Innovation, Mobility and Infrastructure these are summarised under the three dimensions "Avoid – Shift – Improve". The transition to local electric vehicles is thus only part of a broader strategy with the primary focus on avoiding unnecessary traffic flows and shifting to more energy-efficient, where possible zero-emission modes of transport.

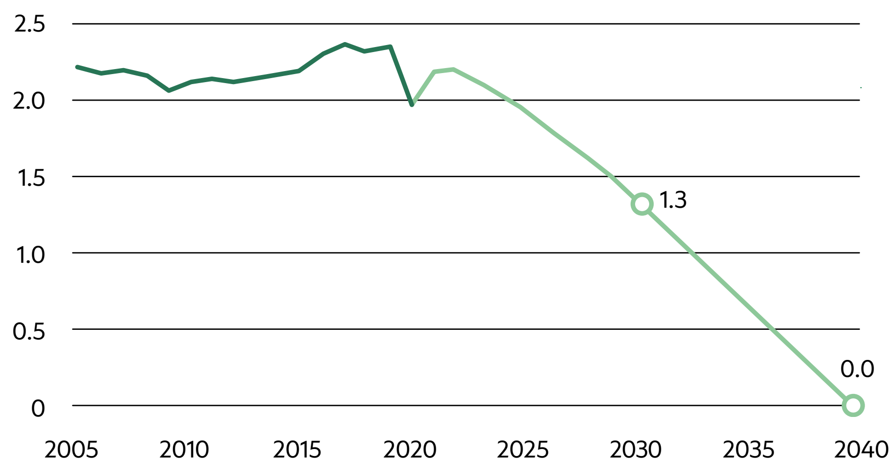
Fig. 1
Greenhouse gas emissions in Vienna

[5] As of 2019 (baseline year of Smart Climate City Strategy & Vienna Climate Guide)



1. Mobility: Motor vehicles registered in Vienna **22 %**
2. Mobility: Motor vehicles registered elsewhere **11 %**
3. Mobility: Goods transport **8 %**
4. Mobility: Public transport (buses) **1 %**
5. Buildings: Individual gas boilers **16 %**
6. Buildings: Gas central heating **10 %**
7. Buildings: Heating oil **4 %**
8. Waste management **10 %** (waste incineration, landfill, sewage treatment)
9. Business & industry **7 %** (mainly natural gas and diesel)
10. Agriculture **1 %**
11. Fluorinated gases **8 %**
12. Energy (non-ETS) **2 %**

Fig. 2
Target pathway for greenhouse gas emissions in the transport sector
Target pathway for greenhouse gas emissions in the transport sector until 2040
Greenhouse gas emissions in million tonnes of CO_2 equivalent



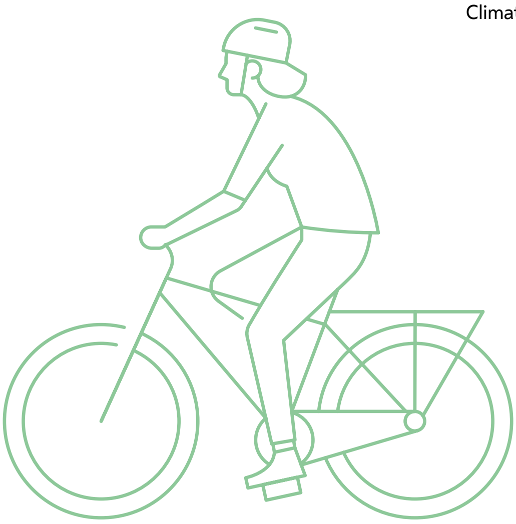
Indeed, for the foreseeable future, a shift from petrol and diesel vehicles to electric vehicles alone, if implemented to the required degree, would be very difficult to achieve purely with renewables. Nor would it lead to the envisaged reduction in the total amount of vehicles or lower the volume of resource consumption associated with vehicle manufacture. In order to ensure that the energy to power electric vehicles can be supplied from renewable sources, it is imperative to reduce the overall energy consumption associated with transport.

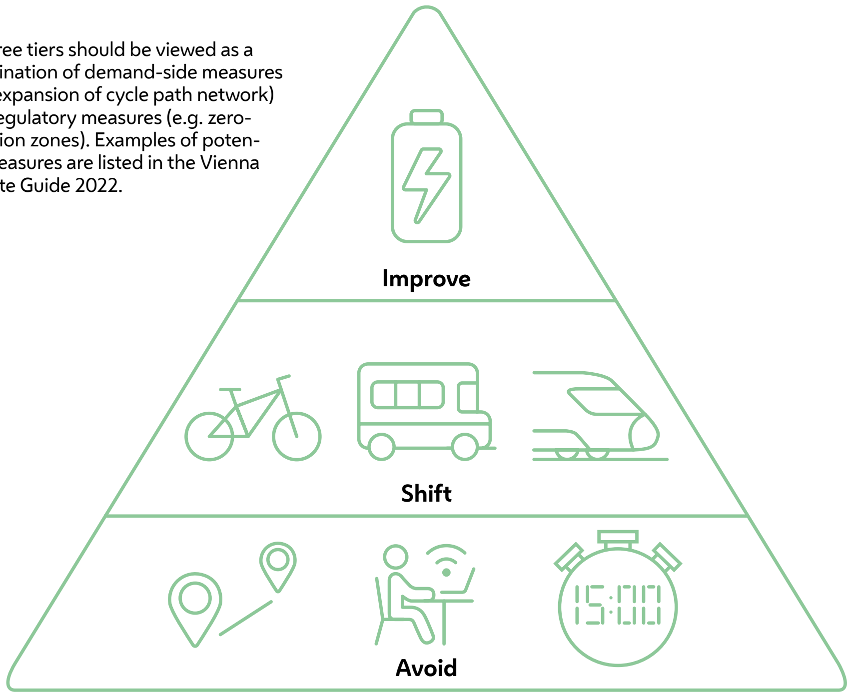
- **Avoid:** The concept of a 15-minute city means that basic everyday necessities and services such as leisure facilities, green spaces, educational institutions, community spaces, workplaces and shops can be reached within a maximum of 15 minutes on foot or by bike. This avoids longer journeys, which in turn curbs urban sprawl, makes efficient use of land and reduces emissions.

- **Shift:** This tier of the A-S-I approach entails a modal shift to environmentally friendly mobility options such as walking, cycling, public transport and shared-use schemes, to reduce emissions and consumption of resources.

- **Improve:** The "Improve" tier focuses on optimising vehicles and transport infrastructure, especially by introducing low- and/or zero-emission vehicles, and roll-out of the necessary vehicle charging infrastructure, both of which are crucial with regard to meeting the city's climate targets.

Fig. 3
All three tiers should be viewed as a combination of demand-side measures (e.g. expansion of cycle path network) and regulatory measures (e.g. zero-emission zones). Examples of potential measures are listed in the Vienna Climate Guide 2022.





2.1. Vienna's targets, goals and guidelines for local zero-emission mobility

The City of Vienna's efforts are focussed on setting a strategic policy framework that will allow it to make an immediate contribution to mitigating the climate crisis and swiftly reduce greenhouse gas emissions within its own sphere of action. Several different strategies address the issue of reducing greenhouse gas emissions and define targets and objectives for the transition to local zero-emission mobility.

SMART CLIMATE CITY STRATEGY FOR VIENNA (SCCSV)

The Smart City Strategy is the umbrella strategy for Vienna's climate governance package, which ensures that Vienna meets its Smart City and climate targets. As such, it defines the content framework for the City of Vienna's specialised thematic concepts, sectoral strategies and programmes. The SCCSV is a comprehensive strategy for the integrated sustainable development of the city based on the three pillars of Quality of Life, Resource Conservation and Innovation. The thematic field Mobility & Transport contains essential guidelines regarding zero-emission mobility in Vienna (cf. p.55-57).

- Per capita CO_2 emissions in the transport sector fall by 50% by 2030, and 100% by 2040.
- Per capita final energy consumption in the transport sector falls by 40% by 2030, and 70% by 2040.
- The share of journeys in Vienna made by eco-friendly modes of transport rises to 85% by 2030, and to well over 85% by 2050.
- Non-fossil-powered vehicles as a share of new vehicle registrations rises to 100% by 2030.
- Commercial traffic within the municipal boundaries is largely emission-free by 2030.

VIENNA CLIMATE GUIDE

The Vienna Climate Guide adopted in 2022 maps out Vienna's path to net-zero city status by 2040. It takes up the headline goals of the Smart Climate City Strategy and sets out the measures to be taken and the "levers" that need to be moved in order to achieve those goals. One of the key levers mentioned is phasing out fossil-powered vehicles.

GUIDELINES FOR SUSTAINABLE INTEGRATION OF ELECTROMOBILITY INTO THE TRANSPORT SYSTEM

1. In accordance with the Efficiency First principle, the most efficient type of engine should be employed for each type of use. With the exception of some specific use cases pertaining to HGV, buses/coaches and special vehicles, this means that battery electric vehicles should predominantly be used in future.

2. Installation of charging infrastructure in private and semi-public locations (e.g. indoor car parks, customer/destination car parks, workplace car parks) should be accelerated.

3. A basic infrastructure of (rapid) charging stations is to be installed in the public domain, observing exclusion zones to ensure long-term traffic calming. The use of these charging points should be managed with a view to maximising efficiency and capacity utilisation.

4. Charging infrastructure for buses/coaches (vehicle category M3) and heavy goods vehicles (vehicle category N3) is to be installed exclusively on private premises.

5. Residents of Vienna also have a significant need for charging facilities in the surrounding region, and provision of these must be ensured.

6. The frameworks and instruments put in place by the City of Vienna are designed to support managed, grid-compatible charging to keep the necessary grid expansion to a minimum.

CLARITY ON TECHNOLOGY OPTIONS IN VIENNA

In its electromobility planning, Vienna is guided by the latest scientific findings and by expert assessments. In future, the road transport sector will be dominated by battery electric vehicles, in some use cases supplemented by hydrogen fuel-cell vehicles. Based on these priorities, further measures such as roll-out of the necessary charging infrastructure and (on a significantly smaller scale) installation of a hydrogen refuelling infrastructure also need to be planned.

In the public discourse, synthetic vehicle fuels are sometimes viewed as a potential solution to the challenges posed by CO_2 emissions. However, there are numerous reasons why their broad use in road transport is inadvisable at present:

- The production of synthetic fuels requires considerable amounts of energy. At the same time, producing synthetic fuels from renewables is comparatively inefficient.

- Furthermore, the overall energy efficiency of vehicles with internal combustion engines is lower anyway, even before fuel production is factored in, resulting in an overall loss of energy in the system.

- The introduction of synthetic fuels would require substantial investment in new production facilities and full-scale adaptation of the existing infrastructure. It is therefore unlikely that we will be in a position to produce or import synthetic fuels in sufficient time and in a sufficient volume to supply the wider market.

- Based on the current state of knowledge, it is more effective to invest resources directly into sustainable technologies that are already fully developed and also more energy-efficient.

- In view of the limited production capacities for synthetic fuels, biogas and hydrogen, these are envisaged for use in sectors that have no other decarbonisation options, to avoid locational disadvantages and supply bottlenecks.

However, synthetic fuels could play an important role in the decarbonisation of shipping and aviation, as well as for special uses, e.g. for certain types of vehicles in the municipal vehicle fleet.

2.2. Future scenarios for local zero-emission road transport

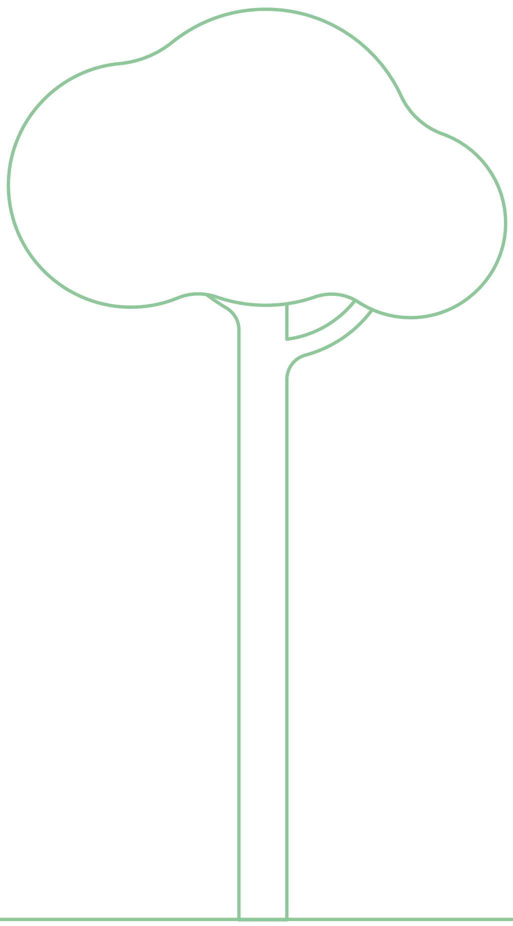
The forecasts and calculations presented here are based on the study "Forecast trajectory for vehicles and charging infrastructure requirements in the City of Vienna", which was carried out between December 2023 and December 2024 as part of the Electromobility Roll-Out Programme. The study built upon the findings of existing previous work and is clearly aligned towards the decarbonisation targets set out in the relevant policies. Accordingly, the study assessed how new vehicle registrations and the total number of vehicles on the road will have to develop over the next few years in order for the City of Vienna to achieve net zero by 2040. The calculations were based on the scenarios outlined below. Both scenarios assume a high degree of electrification across all vehicle categories and are firmly targeted at delivering net zero by 2040. The study used backcasting methodology, which means that instead of making forecasts based on current trends, it worked backwards from a desired future outcome (net zero by 2040) to model the steps necessary to achieve that outcome.

Scenario 1, "Shift to electric vehicles", is based on the assumption that current mobility trends will continue and that the number of vehicles on the road and the annual distance driven will remain relatively constant. Scenario 2, "Modal shift", factored in more radical changes in terms of a modal shift from road to other modes of transport.

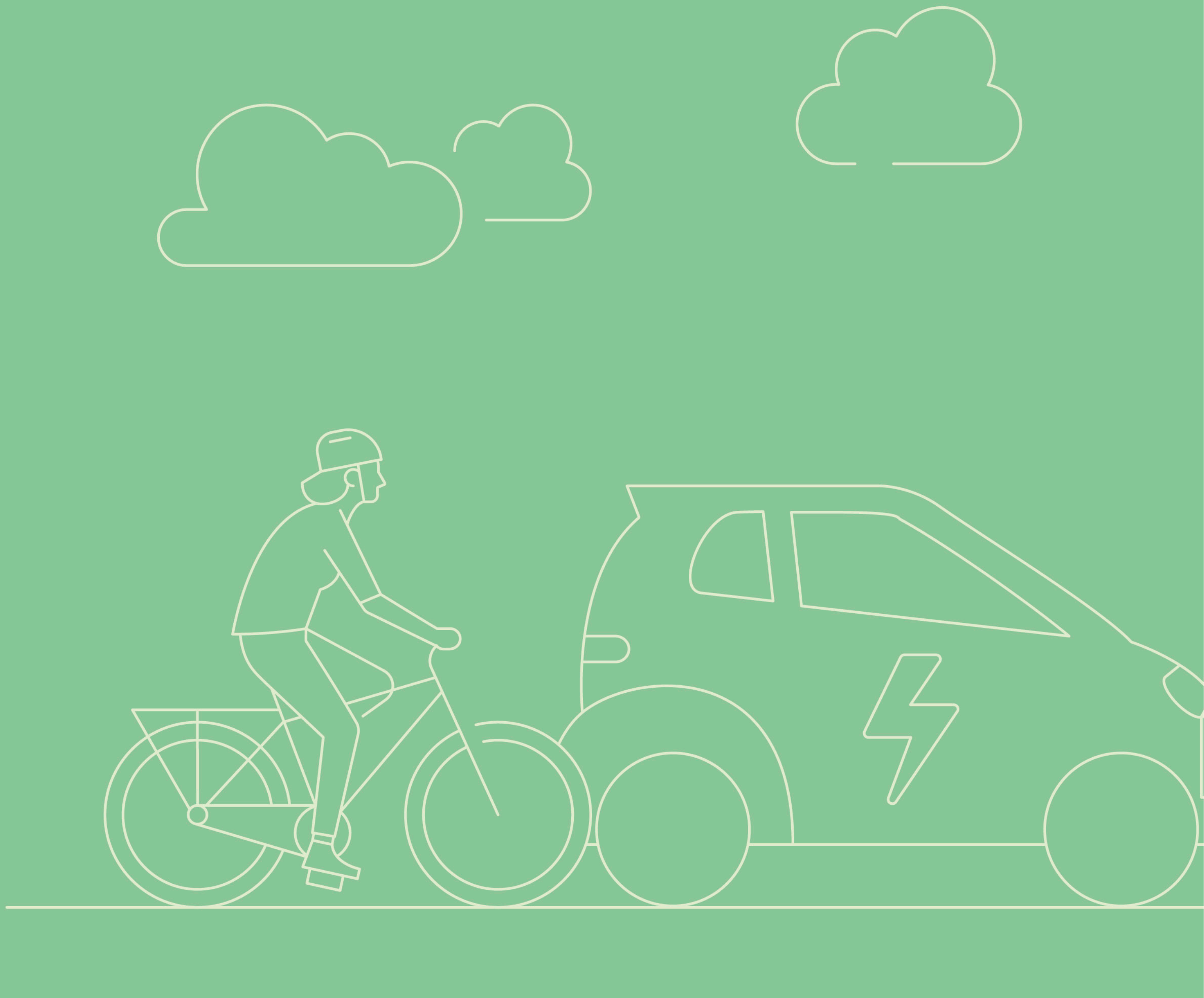
Scenario 1 Shift to electric vehicles with continuation of current trends: Alongside near-total vehicle electrification by 2040, this scenario is based on a continuation of current trends with regard to total number of vehicles on the road and annual distance driven. Despite a declining or stagnating rate of motorisation, in view of population growth this scenario nevertheless assumed that the total number of vehicles would rise, both in private as well as in commercial ownership. With regard to annual distance driven (incl. commuter journeys), the assumption was that there would be a slight increase in the distance travelled by private vehicles and a strong increase in commercial traffic mileage.

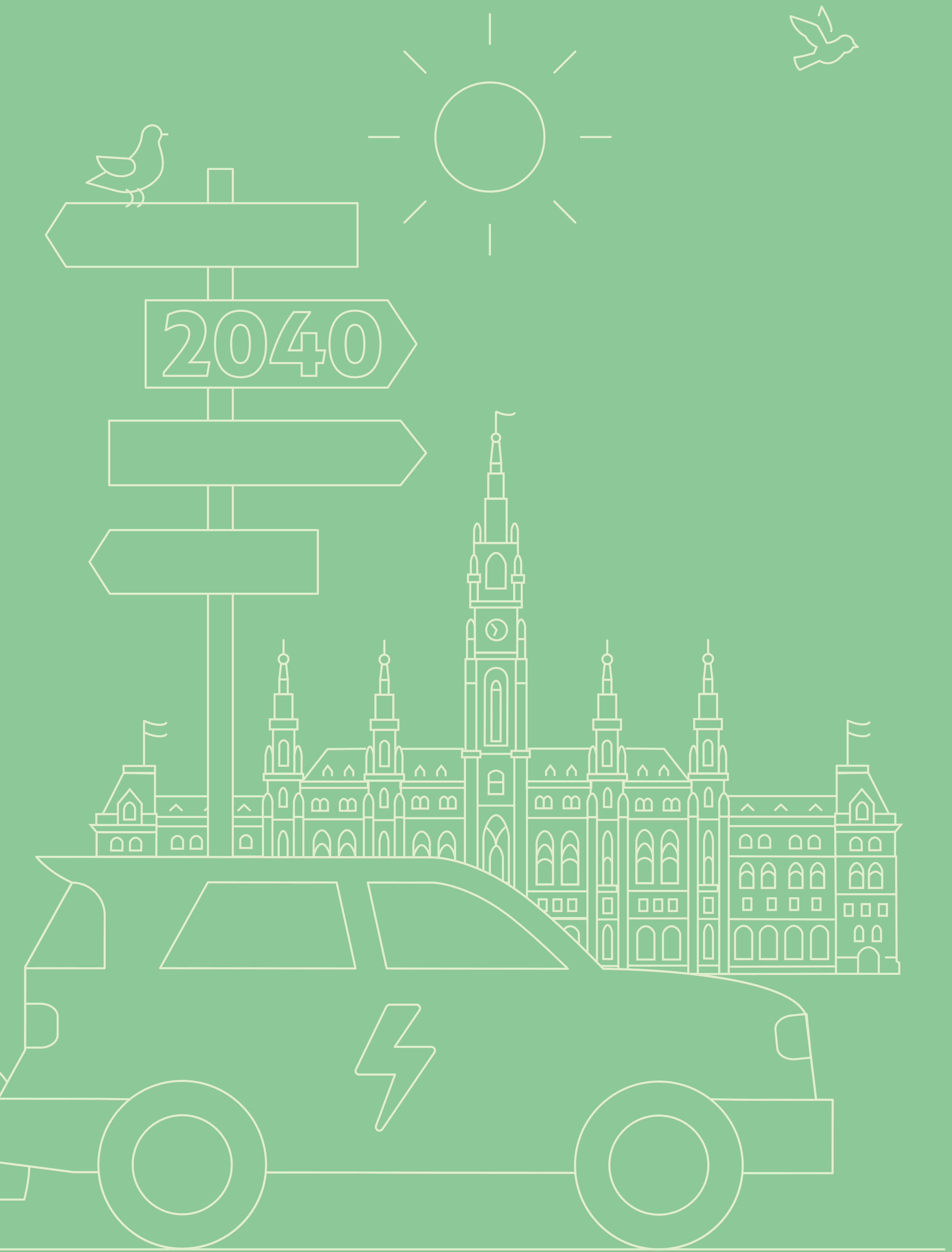
Scenario 2 Modal shift leading to transformation of mobility: In this scenario, vehicle electrification takes place in tandem with achieving the mobility goals set out in the Smart Climate City Strategy for Vienna and the Vienna Climate Guide. This implies a decline in the total number of private vehicles on the road by 2030 (despite population growth) and a stagnating number of commercial vehicles. This scenario assumes a substantial reduction in private vehicle mileage and a slight fall in the distance travelled by commercial vehicles.

Both scenarios deliver net zero in road transport, yet their outcomes differ widely in terms of the number of charging stations and the amount of energy required as well as with regard to expansion of the grid infrastructure. Furthermore, the two scenarios also have different consequences and implications with regard to climate-proofing of the public space, which is essential as climate change progresses.



CURRENT STATUS




2040

3. Status quo and external policy frameworks

In Vienna, electromobility plays a pivotal role in the future vision of a sustainable net-zero mobility system. Good progress has already been made with the roll-out of charging infrastructure over the past few years. To date there have only been slight changes in the number of vehicles on the road, although the percentage of e-vehicles among new car registrations is growing. In electromobility as in other sectors, Vienna cannot be viewed in isolation – on the contrary, developments in Vienna are strongly dependent on external policy frameworks that are defined at federal and EU level. The following chapter attempts to provide an overview of the status quo and of the external legislative frameworks that also have a significant impact on the activities of the City of Vienna.

3.1. Electromobility in Vienna

OVERVIEW OF CHARGING INFRASTRUCTURE

Since 2018, Vienna has been installing charging stations in public spaces with the aim of establishing a basic infrastructure. As of the end of 2023, around 1,000 on-street charging points were available for public use. A further 175 normal charging points are to be installed by the end of 2025, demonstrating that swift roll-out of the necessary charging infrastructure is a current priority. These charging points are designed for so-called normal charging, where a vehicle is usually fully charged within several hours. Besides these 11kW charging points in public spaces, efforts are also underway to have more so-called high-power charging (HPC) hubs installed. The latter are columns with a high charging capacity (150kW DC and above), grouped together in easily accessible locations, that allow e-vehicles to be charged in a significantly shorter time. Initially, four further hubs with a total of 32 HPC points are to be installed in 2025 to supplement those already installed on the Gürtel ringroad in 2023. The hub on the Verteilerkreis roundabout has also been upgraded.

Alongside these public charging facilities, a further 2,200 or so "semi-public" charging points are also available in Vienna. These are located in supermarket car parks, indoor car parks or park-and-ride facilities, for example, and are the responsibility of the respective operators. Publicly accessible charging points are important for en-route charging and other situations where no private charging options are available.

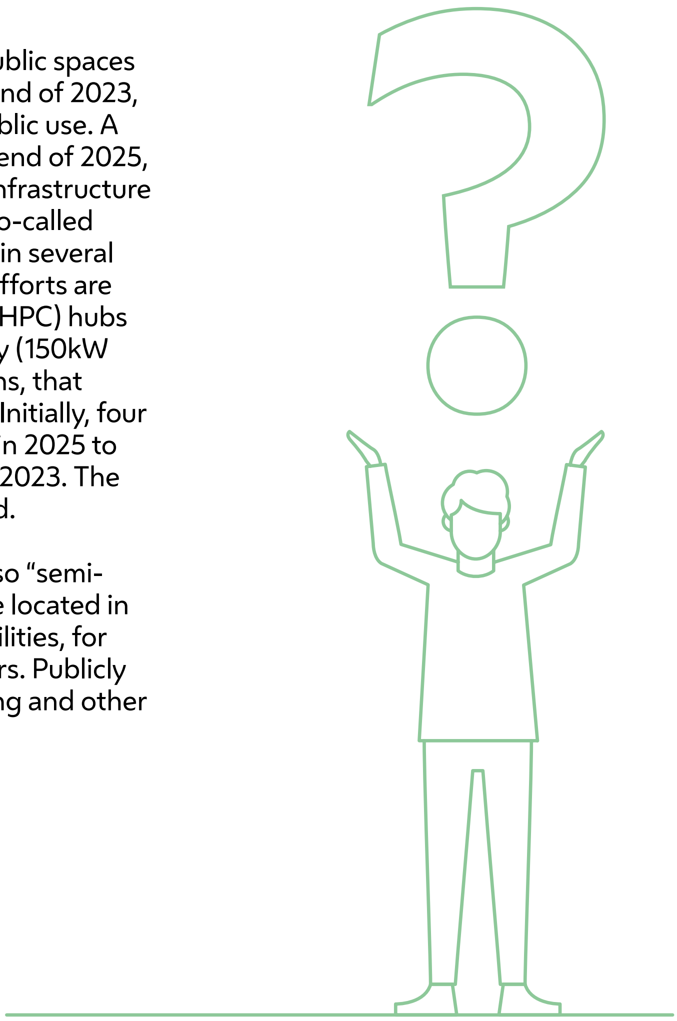


Table 1 provides an overview of the different types of charging infrastructure location and their accessibility.

Table 1
Overview of different types of charging infrastructure and their accessibility

Location type	Public	Semi-public	Private
Explanation	Full and unrestricted access for all users.	The charging infrastructure is publicly accessible, but on privately owned premises.	Only accessible to specific persons or groups and secured by a physical or legal boundary.
Examples	Charging station at a public on-street parking area.	Charging station in a supermarket car park or multi-storey.	Private wallbox charger in the garage of a single-family home, apartment complex or workplace.

In terms of charging infrastructure, there are basically three types of charging points.

TYPES OF CHARGING INFRASTRUCTURE

Table 2
Types of charging infrastructure

Source: Austrian Lead Agency for Electromobility (OLÉ)

Type of charging infrastructure	Type of electricity supply	Charging capacity	Publicly accessible charging points in Vienna
Normal charging	Alternating current (AC)	Under 23 kW	approx. 2,750
Rapid charging	Direct current (DC)	From 23 to 150 kW	approx. 250
Ultra-rapid charging	Direct current (DC)	150 kW and above	approx. 150

There are no reliable data on the extent of private charging infrastructure, given that charging stations with an output of up to 3.7kW do not require authorisation from the grid operator and the hardware is freely available to buy. However, it can be assumed that the private charging infrastructure is many times larger than the publicly accessible charging infrastructure.

NUMBER AND TYPE OF CARS ON THE ROAD IN VIENNA IN 2023 AND 2024

In 2024, there were a total of 735,829 cars on the road in Vienna. At just under 44% (323,533 vehicles), the majority of these were diesel-powered. In comparison, the share of battery electric vehicles was 4.9% (36,002). Between year-end 2023 and year-end 2024, the absolute number of battery electric cars rose by just over 8,000. As of 31/12/2023, the share of battery electric vehicles was still only 3.8%.

A total of just over 57,000 new car registrations were recorded in Vienna in 2024. Of these, the majority were vehicles with hybrid drives (19,528), followed by petrol (16,180), battery electric (11,278) and diesel vehicles (9,839). Hydrogen-powered and bivalent cars played a subordinate role among new registrations in this vehicle category in 2024.

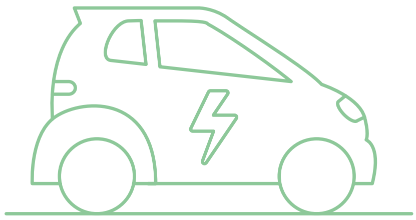


Table 3 Number of vehicles in category M1 on the road in Vienna, by fuel or energy source; Source: Statistics Austria, rounded percentages

Fuel or energy source	Number as of 31/12/2023	% of total 2023	Number as of 31/12/2024	% of total 2024	New vehicle registrations 2024	% of new vehicle registrations 2024
BEV	27,745	3.8%	36,002	4.9%	11,278	19.8%
Hybrid	52,268	7.2%	65,137	8.9%	19,528	34.4%
All other engine types	650,934	89.1%	634,690	86.3%	26,022	45.8%
Total	730,947	100.0%	735,829	100.0%	56,828	100.0%

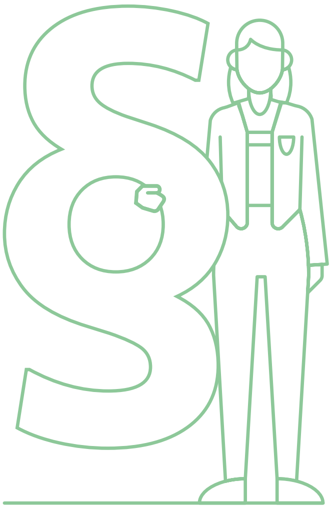
NUMBER AND TYPE OF BUSES/COACHES AND GOODS VEHICLES ON THE ROAD IN VIENNA IN 2023

It is evident that a clear majority of buses/coaches (categories M2 and M3) and goods vehicles (categories N1, N2 and N3) on the road in 2024, across all categories, were diesel-powered (74,164 vehicles). Battery electric buses/coaches and goods vehicles already ranked in second place with 5,399 vehicles, which is equivalent to 6.4% of all buses/coaches and goods vehicles on the road across all categories. Most of the pure battery electric goods vehicles in Vienna, numbering 5,233, were in the light goods vehicles category (N1). Hybrid, liquid and natural gas-powered and hydrogen-powered vehicles played a subordinate role in the 2024 statistics for buses and goods vehicles.

NUMBER OF VEHICLES IN THE CATEGORIES M2+M3, N1, N2 AND N3 ON THE ROAD IN VIENNA AS OF 31/12/2024, BY FUEL OR ENERGY SOURCE

Table 4 Number of vehicles in the categories M2+M3, N1, N2 and N3 on the road in Vienna as of 31/12/2023, by fuel or energy source

Fuel or energy source	M2+M3	N1	N2	N3	Gesamt	Engine types in %
BEV	108	5,233	32	26	5,399	6.4%
Hybrid	100	249	0	0	349	0.4%
All other engine types	4,034	69,698	1,276	3,470	78,478	93.2%
Total	4,242	75,180	1,308	3,496	84,226	100.0%
Vehicle categories share in %	5.0%	89.3%	1.6%	4.2%	100.0%	



3.2. Legal provisions and policy guidelines

Trends and developments in Vienna are embedded within an overarching regulatory context. As a consequence, Vienna's scope for action is essentially dependent on European and national policy frameworks.

Table 5 Overview of national and EU legal and policy frameworks

European level	CO_2 emission standards	Alternative Fuels Infrastructure Regulation	Energy Performance Buildings Directive
National level/ Federal provisions	Action Plan for Sustainable Public Procurement	National Energy and Climate Plan	Mobility Masterplan 2030
	Housing legislation	Regulation on Charging Point Data	Immediate Action Plan on Renewables in Mobility
Local level/ Viennese provisions	Vienna Indoor Car Parks Act	Vienna Building Code	Urban Development Plan and Sustainable Urban Mobility Plan

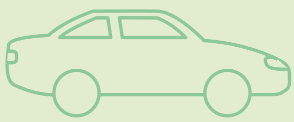
FORECASTS

4. Vienna's trajectory to net zero by 2040

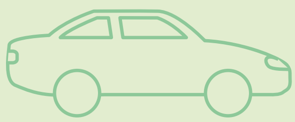
The City of Vienna has set itself the goal of achieving net zero by 2040 as its local contribution to tackling and mitigating the global climate crisis. With this goal in mind, road vehicles in the city will also have to make the transition to net zero emissions. A study was thus conducted to analyse how the percentage share of electric vehicles would have to evolve (so-called trajectories) in order to enable full decarbonisation by 2040. The forecasts were modelled on two scenarios, which are described in greater detail in Chapter 2.2. It is clearly evident that the goal of net zero by 2040 is only achievable if the share of electric vehicles among new vehicle registrations rises in line with the required trajectory early in the next few years. Furthermore, it can also be assumed that in the coming years a proportion of vehicles with combustion engines will have to be withdrawn from service early, i.e. before the actual end of their useful life, in order to achieve the required rate of electrification by 2040.

The City of Vienna and its public utilities provider Wiener Stadtwerke both have their own vehicle fleets to ensure the smooth functioning of the municipal infrastructure and services. With the aim of assuming a leading role in the transition to zero-emission vehicles, the latter launched their own project in connection with the Electromobility Roll-Out Programme to address the issue of decarbonising the municipal vehicle fleet. This involved taking full inventories, drawing up detailed transition plans and checking the availability of (special-purpose) vehicles, among other activities. The project's findings have been published in a separate report. The following chapters will look at the forecast trajectory for vehicles and roll-out of charging infrastructure in terms of achieving the City of Vienna's self-defined decarbonisation targets. All findings are based on the 2024 study "Forecast trajectory for vehicles and charging infrastructure requirements in the City of Vienna", which was carried out by the Reiner Lemoine Institut and Localiser on behalf of the City of Vienna and Wiener Stadtwerke.

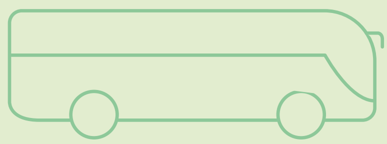
4.1. Passenger mobility



BEV (car) (M1)
Battery electric car
(Passenger vehicle: category M1)



PHEV (car) (M1)
Plug-in car (Passenger vehicle: category M1; plug-in hybrid electric vehicle)



BEV (bus) (M2 + M3)
Battery electric bus
(Passenger vehicle: category M2 + M3)

4.1.1. Private and commercial passenger vehicles (vehicle category M1)

RELEVANCE

Both in terms of the absolute number of vehicles on the road and the amount of emissions produced, car traffic (vehicle category M1) accounts for the largest share of the total in Vienna. At the same time, most battery electric models available belong to this category, and the shift to net-zero vehicles is already more visible here than in other categories.

Furthermore, it is in this category that zero-emission technology is most sophisticated, given that the industry has been testing and developing electric cars for decades. According to the current status of planning, a full transition to BEVs is possible in this category, with the exception of special-use vehicles (e.g. cars used in shift operations, crisis management, or with special attachments). While the percentage share of electric cars is currently still rather low, it is assumed that there will be a stronger increase in the coming years.

TREND IN NUMBER OF VEHICLES

Developments in the total number of cars on the road up to 2040 were modelled according to the two scenarios described above (based on Vienna's targets for the mobility sector). In the "Shift to electric vehicles" scenario, the declining rate of motorisation combined with the forecast population growth nevertheless results in an increase in the total number of cars on the road. The "Modal shift" scenario initially leads to a clear decrease in line with the targets defined by the SCCSV. Here too, however, there is a subsequent rise in the absolute number of cars on the road due to population growth. The trend in private car ownership is calculated from the total number of cars on the road minus the number used for commercial purposes, not including taxis. The taxi sector is dealt with separately in **Chapter 4.1.2.**

Figure 4
Total number of vehicles

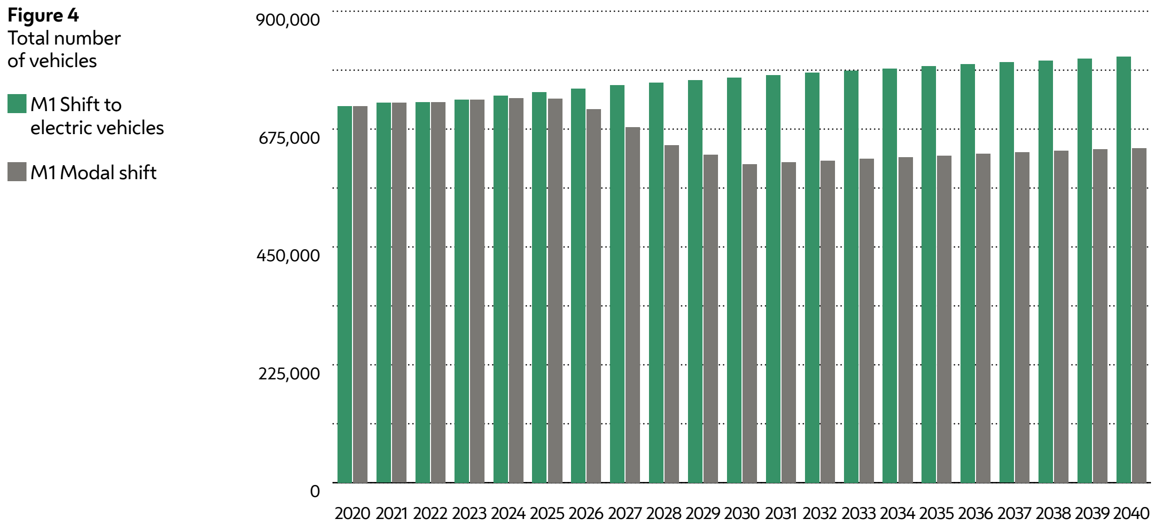


Figure 5
Total number of commercial vehicles

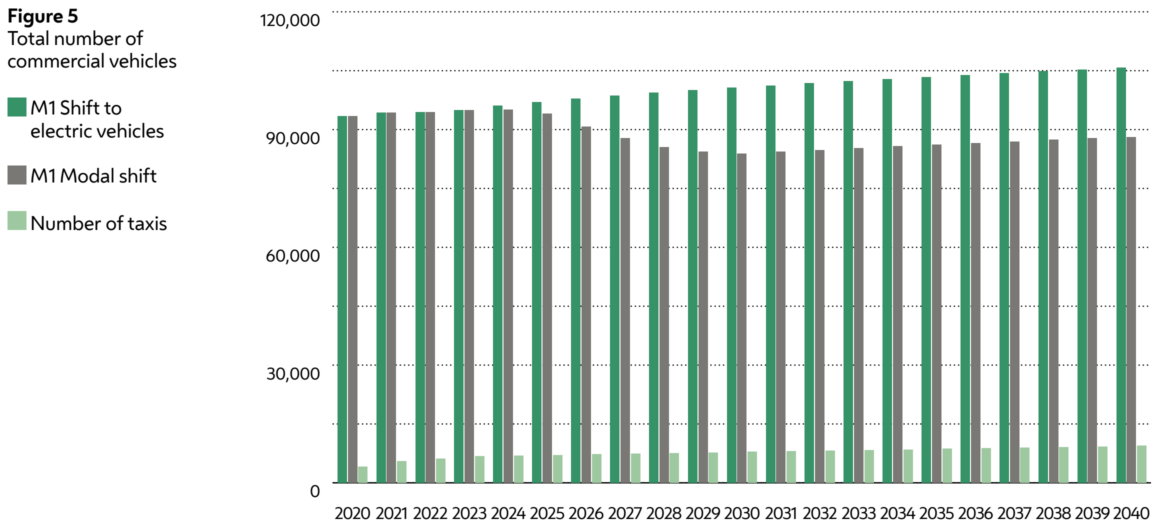


Figure 6
Total number of private vehicles

M1 Shift to electric vehicles

M1 Modal shift

[5] Detailed charts showing private and commercially used cars separately are attached in the appendix. The trajectory for private cars lags a year behind the overall trajectory, whereas the trajectory for commercially used cars is three years ahead, because companies are shifting to e-mobility faster than private individuals.

FORECAST TRAJECTORY

In order to meet the climate targets by 2040, a swift increase in the percentage of BEVs as a share of all new car registrations is absolutely imperative. This forecast trajectory was modelled for both scenarios. The subcategories of private and commercially used cars were amalgamated in the calculations.[5]

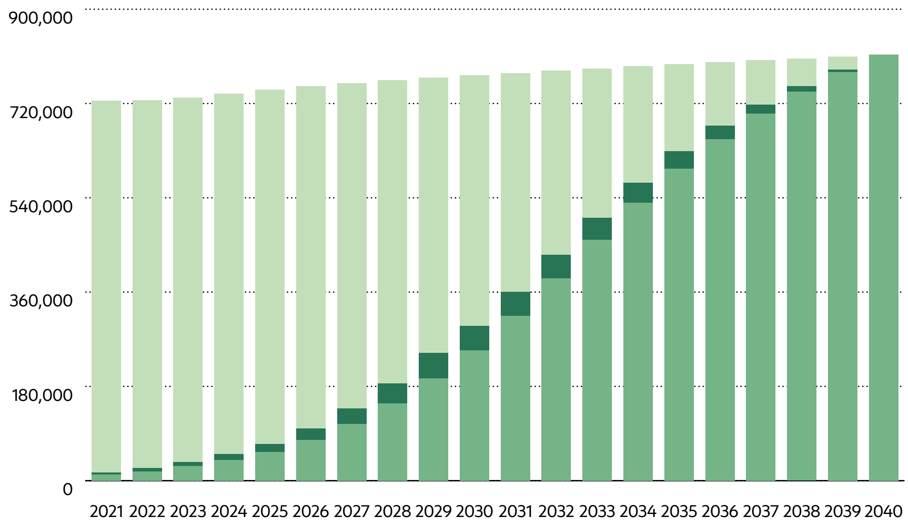


Figure 7
Total number of BEV and PHEV, "Shift to electric vehicles" scenario

BEV

PHEV

Others

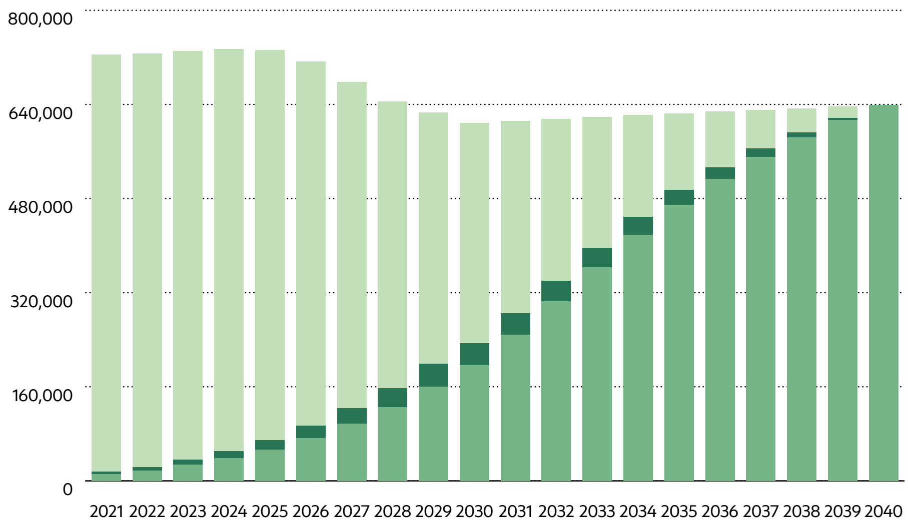


Figure 8
Total number of BEV and PHEV, "Modal shift" scenario

BEV

PHEV

Others

4.1.2. Taxi fleets

RELEVANCE

For several years now, the City of Vienna has been making efforts to bring about a shift to electric vehicles in the taxi sector. At present there are approx. 15,000 taxi licences issued in Vienna, around 7,000 of which are in active use. The eTaxi project is piloting new technologies and infrastructures to see how they can facilitate the transition.

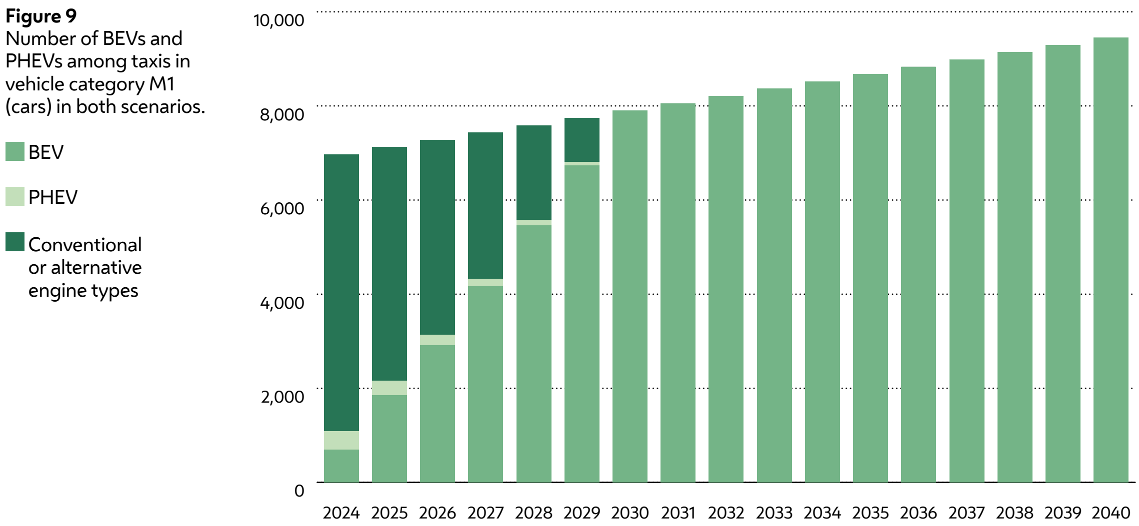
TREND IN NUMBER OF VEHICLES

Taxis also belong to vehicle category M1. The total number on the road was forecast by projecting the current trend forward to 2040. In this case the scenarios “Shift to electric vehicles” and “Modal shift” were not modelled separately, because taxis can help reduce the number of private cars on the road and so are excluded from the measures to reduce the rate of motorisation in the “Modal shift” scenario. Taxis thus play an important role in both scenarios (Figure 9).

FORECAST TRAJECTORY

The share of plug-in hybrid electric vehicles (PHEV) among taxis follows a similar trajectory to that among commercially used cars, although their penetration among taxis is higher. This is because PHEVs are often more attractive than BEVs for taxi services on account of the limited plannability of travel routes and the sometimes high daily mileage. From 2025 onwards, new licences in Vienna will anyway only be issued for electric taxis, with each licence being valid for a maximum of five years. Taxis are likewise assumed to have an average useful life of five years. All taxis on the road will thus be fully electrified by 2030.

Figure 9
Number of BEVs and PHEVs among taxis in vehicle category M1 (cars) in both scenarios.



4.1.3. Commercial buses/coaches (excluding Wiener Linien vehicles)

RELEVANCE

Approx. 4,200 buses/coaches in vehicle categories M2 (up to 5 tonnes) and M3 (over 5 tonnes) are registered in Vienna, most of which are commercially used to transport larger groups of passengers. These journeys are usually to destinations outside Vienna. Buses operated by Wiener Linien are not included here, as Vienna's public transport provider has its own decarbonisation plan.

TREND IN NUMBER OF VEHICLES

The forecast trend in the number of vehicles was based on continuation of the current trend, which would mean a moderate increase. The same trend was assumed for both scenarios, because this segment is also expected to grow in the event of a modal shift leading to a reduction in motorised individual transport.

FORECAST TRAJECTORY

A BEV share of 80 per cent is forecast for the target year 2040, with the remaining 20 per cent covered by hydrogen-powered or other zero-emission vehicles.

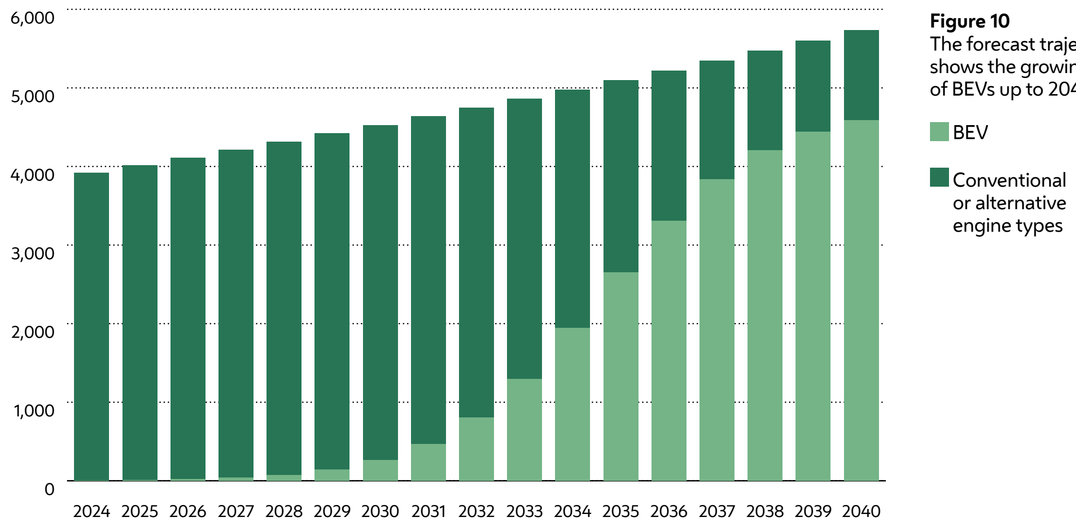
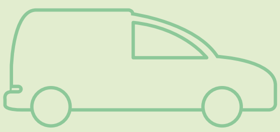


Figure 10
The forecast trajectory shows the growing share of BEVs up to 2040..

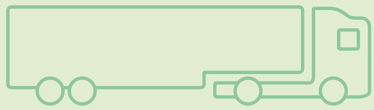
4.2. Goods mobility

Goods vehicles transport goods around the city and beyond its boundaries, from small parcels right up to building materials weighing multiple tonnes. They keep economic systems running and supply us with our everyday necessities. In purely numeric terms they are a relatively small group compared to the vast numbers of cars. Nevertheless, a net-zero city also requires sustainable goods transport.



BEV (van) (N1)
Battery electric light goods vehicle (Goods transport: category N1; ≤ 3.5 t)

BEV (truck) (N2)
Battery electric heavy goods vehicle (Goods transport: category N2; 3.5t < x ≤ 12.0 t)



BEV (truck) (N3)
Battery electric heavy goods vehicle (Goods transport: category N3; > 12.0 t)

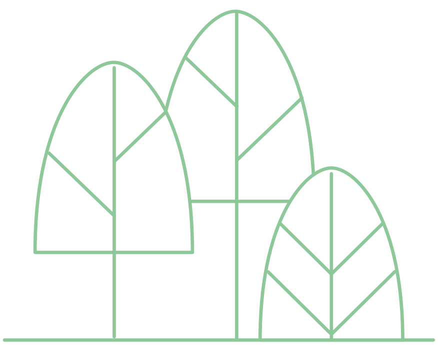
4.2.1. Light goods vehicles (vehicle category N1)

RELEVANCE

The lion's share of goods vehicles are vans in vehicle category N1 (light goods vehicles). These are vehicles weighing up 3.5 tonnes that are used by tradespeople, for example, as well as by parcel delivery services.

In commercial goods vehicle fleets, the transition to local electric vehicles takes place in an entirely different context to the shift to electric cars. The work done during the drafting of Vienna's Urban Logistics Masterplan has delivered important findings for this endeavour. The results of this planning process show that many companies already have their own transition plans in place. Where possible, these vehicles should use charging infrastructure that has been installed on the companies' own premises. At the same time, however, a large proportion of vehicles in this category are likely to be registered to firms that do not have their own car park. A publicly accessible (rapid) charging infrastructure must be provided to cover the charging needs of these enterprises.

TREND IN NUMBER OF VEHICLES



The forecast number of vehicles in the "Shift to electric vehicles" scenario is based on continuation of the current trend, resulting in a total of just over 100,000 vehicles in 2040. The "Modal shift" scenario assumes that there will be a general stagnation in the number of vehicles (despite population growth). Despite the recent strong growth in traffic from courier and delivery services, the assumption here is that the urban environment is particularly well suited to avoiding a further increase, at least to some extent (e.g. by installing parcel collection points) or to shifting these services to other modes of transport (e.g. cargo bikes).

FORECAST TRAJECTORY

Light goods vehicles in urban areas are well suited to electrification. At present it seems likely that there will be an almost complete future transition to battery electric vehicles (BEVs) in category N1.

Nevertheless, it is assumed that there will also be a small proportion of vehicles with other zero-emission engine types, e.g. to cope with longer journeys. A BEV share of 97 per cent is forecast for the target year 2040, with the remaining 3 per cent covered by hydrogen-powered or other zero-emission vehicles.

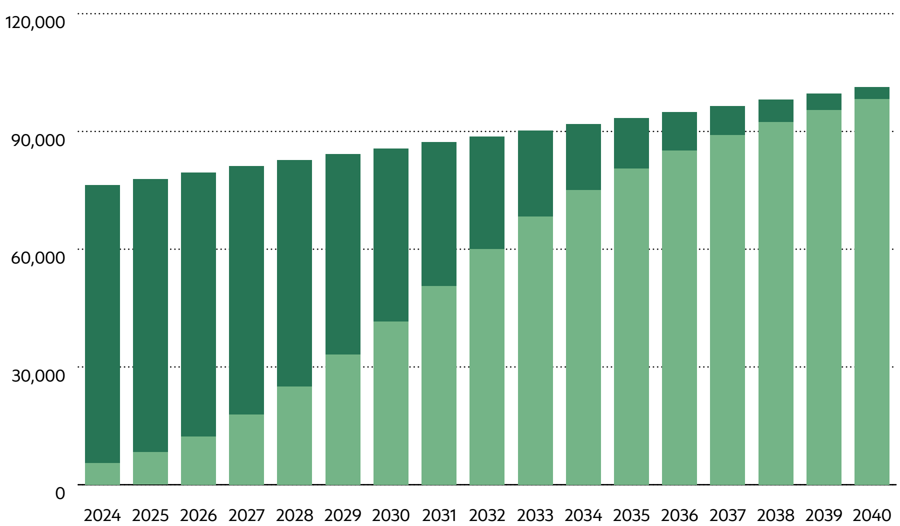


Figure 11
Number of BEVs in vehicle category N1 in the "Shift to electric vehicles" scenario.[6]

[6] The segment "Conventional or alternative engine types" covers all non-electric vehicles. Based on Vienna's climate targets, these also have to be net zero overall by 2040.

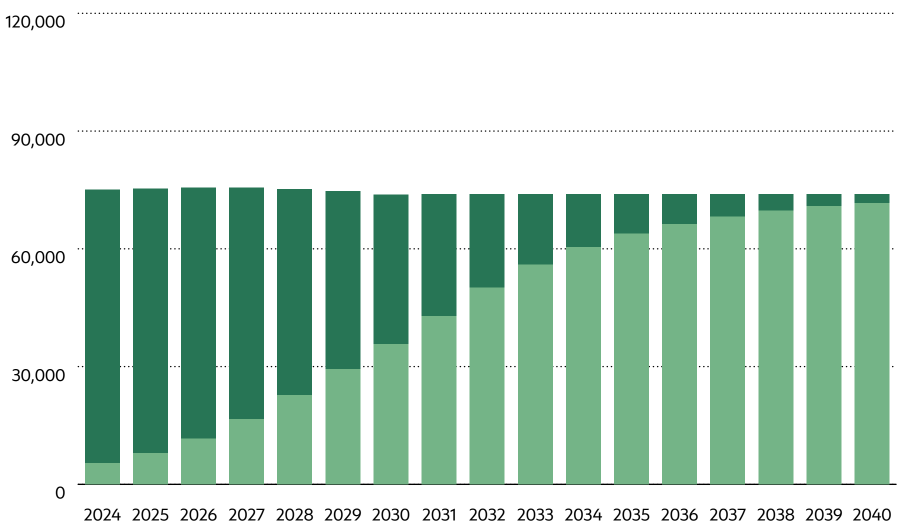
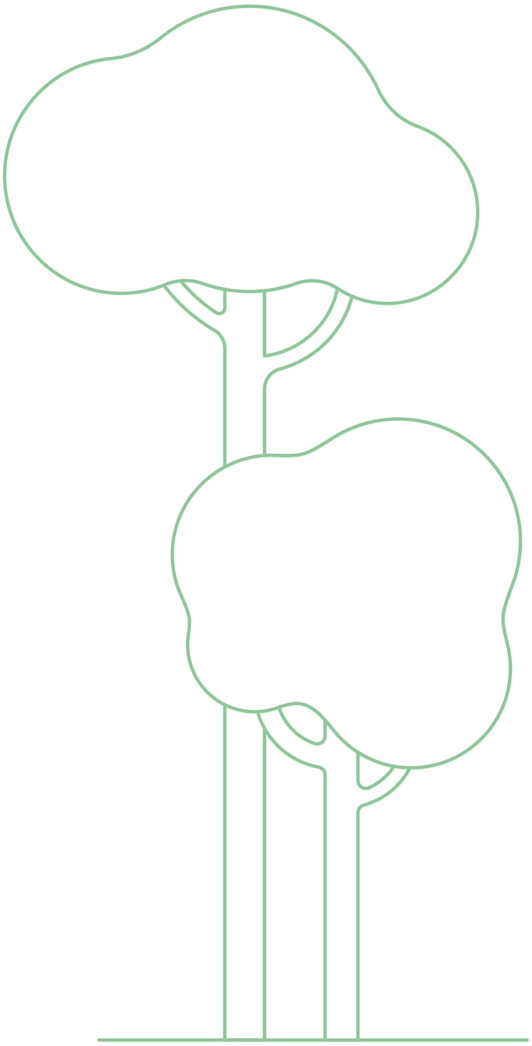


Figure 12
Number of BEVs in vehicle category N1 in the "Modal shift" scenario.

4.2.2. Heavy goods vehicles (vehicle categories N2 and N3)



RELEVANCE

The vehicle categories N2 (3.5t–12t) and N3 (>12t) comprise heavy goods vehicles weighing up to and over 12 tonnes, respectively, commonly known as lorries or trucks. Vehicles in these two categories are used for a very wide range of purposes, from delivering goods to supermarkets to transporting building materials.

As things stand at present, it appears that a significant proportion of the charging infrastructure for these vehicle fleets will be installed on companies' own premises. That means that companies will increasingly be investing in their own charging infrastructure.

TREND IN NUMBER OF VEHICLES

Vehicle category N2 is an outlier, with declining numbers of vehicles forecast. There are two reasons for this: Firstly, it is assumed that these fleets will see a partial transition from category N2 to category N3 vehicles in future. This trend can be deduced from vehicle figures over the past few years. Part of any increase in numbers will thus be in category N3. A further assumption is that N2 fleets will locate in the region surrounding Vienna in future, and will thus primarily require charging infrastructure at their depots there. The "Shift to electric vehicles" scenario works on the basis of a stagnation from 2024 onwards, whereas the "Modal shift" scenario projects the declining trend forward.

The "Shift to electric vehicles" scenario for vehicle category N3 assumes a continuation of the current trend, resulting in a slight increase in numbers. Additional vehicles may also come from the switch from N2 to N3 in this vehicle category. However, as with vehicle category N2, it is assumed that new businesses with fleets of this kind will primarily locate in the region surrounding Vienna. The "Modal shift" scenario works on the basis of a stagnation in numbers from 2024 onwards.

FORECAST TRAJECTORIES

The forecasts for vehicles in categories N2 and N3 are rather less clear-cut than those for cars or for vehicles in category N1. Nevertheless, it is highly likely that there will also be a transition to BEVs in vehicle category N2. There will probably also be greater numbers of BEVs on the road in vehicle category N3, though it is less certain here than in the other categories of goods vehicles.

It is forecast that hydrogen-powered or other zero-emission vehicles will account for 3 per cent of vehicles in category N2 by 2040. BEVs thus account for 97 per cent of the total in both scenarios.

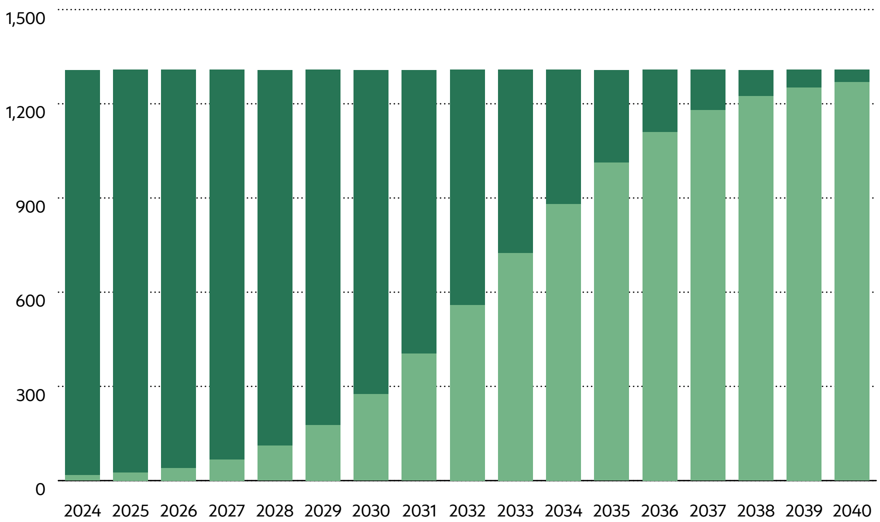


Figure 13
Number of BEVs in vehicle category N2 in the "Shift to electric vehicles" scenario.

BEV

Conventional or alternative engine types

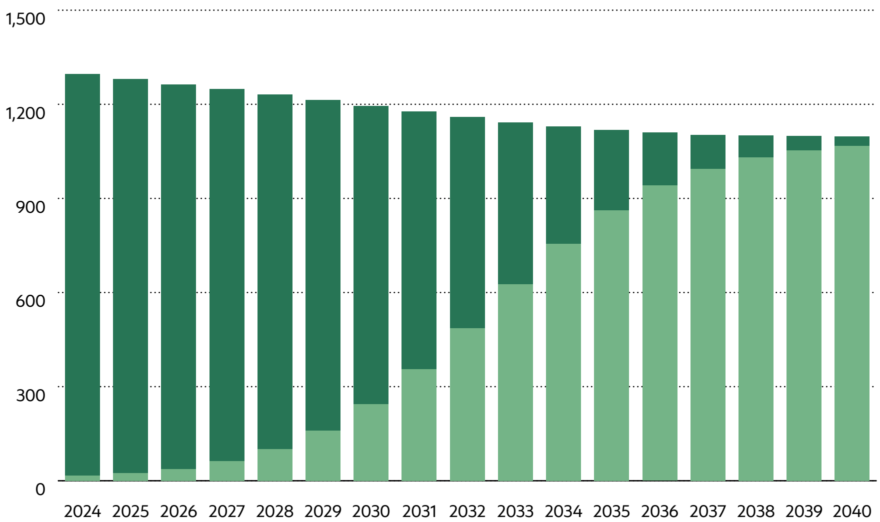


Figure 14
Number of BEVs in vehicle category N2 in the "Modal shift" scenario.

BEV

Conventional or alternative engine types

It is not yet foreseeable whether there will be a full uptake of battery technology in vehicle category N3. A BEV share of 80 per cent is therefore forecast for 2040 – similar to the trend forecast for buses/coaches. The remaining share will be covered by hydrogen-powered or other zero-emission vehicles. The year with the biggest increase in BEV numbers is 2035, when there will be around 520 additional BEVs on the road in the "Shift to electric vehicles" scenario and around 450 in the "Modal shift" scenario.

Figure 15
Number of BEVs in vehicle category N3 in the "Shift to electric vehicles" scenario.

BEV

Conventional or alternative engine types

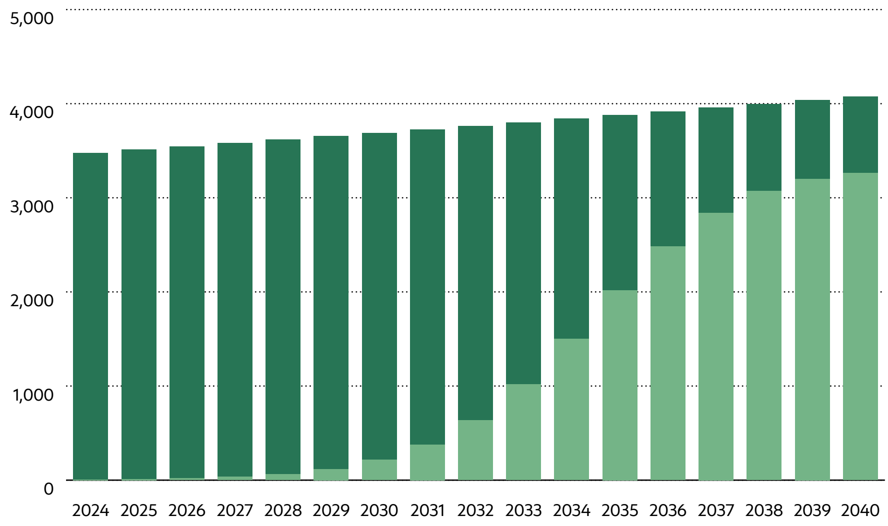
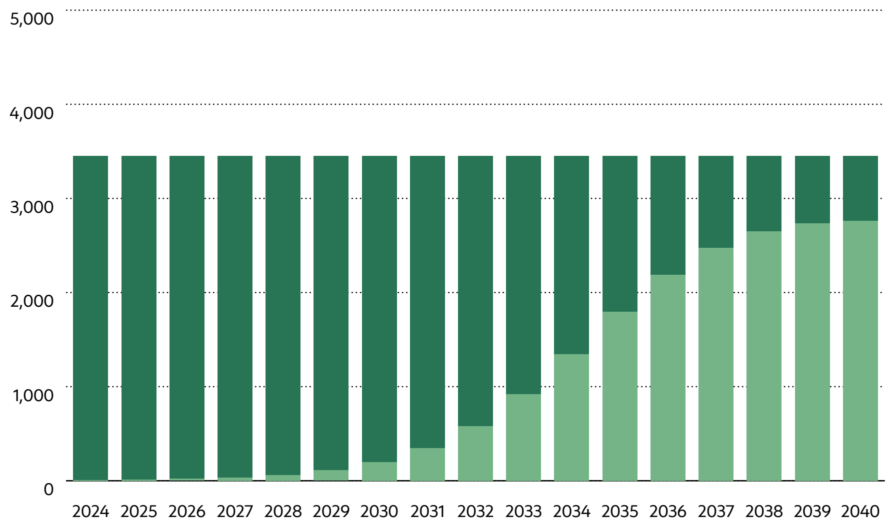
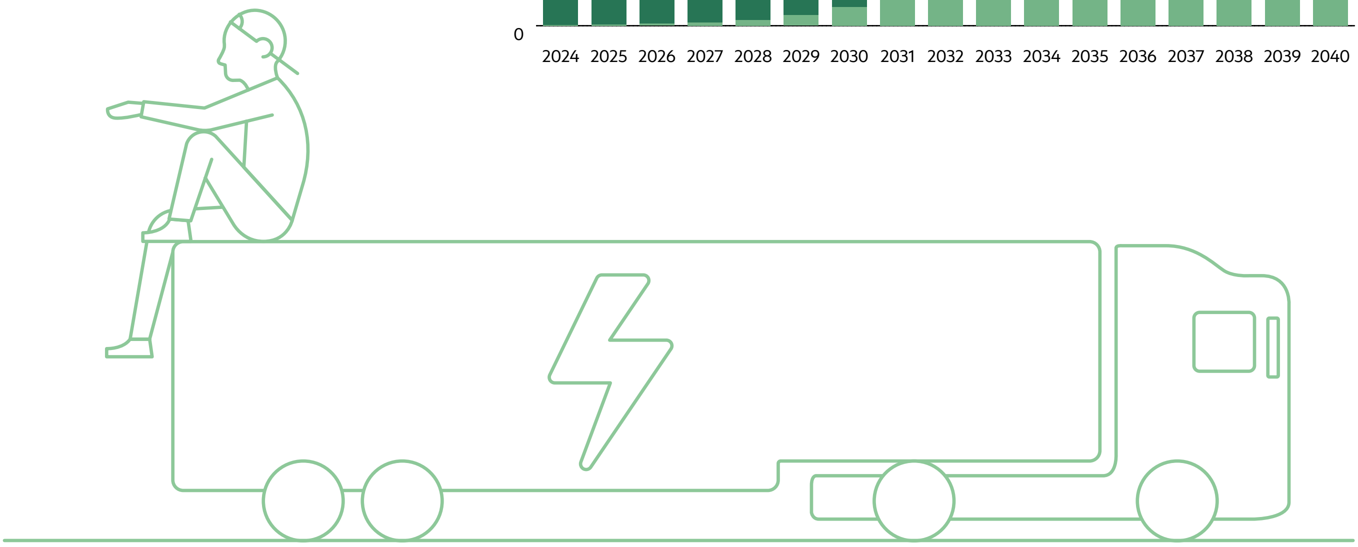


Figure 16
Number of BEVs in vehicle category N3 in the "Modal shift" scenario.

BEV

Conventional or alternative engine types





EXPANSION

5. Basic planning principles for charging infrastructure in Vienna

5.1. Charging use cases

Battery electric vehicles are not viable without the appropriate charging infrastructure. The roll-out of charging infrastructure must therefore be aligned to the forecast trajectory for vehicles. In Vienna, charging infrastructure is planned on the basis of so-called charging use cases. Alongside technical aspects such as charging capacity and the type of power output (direct current – DC, or alternating current – AC), spatial factors such as whether the facilities are located on public or private premises also play a critical role. Some charging use cases are based on rapid charging of BEVs, while others envisage vehicles charging over longer periods of time, e.g. while parked at home or at the workplace.

Based on these parameters, we can identify different types and modalities of usage for charging infrastructure, known as charging use cases (CUC). These CUC help us quantify and localise charging infrastructure requirements by creating a structure that takes into account the needs and requirements of different user groups. The CUC can also be used for monitoring the roll-out of charging infrastructure and to obtain a better picture of potential instruments and leverage factors available to the City of Vienna.

The following CUC were defined for Vienna within the context of the study outlined above. Subtypes were defined for individual CUC to take account of the different categories of land ownership.

OVERVIEW: CHARGING USE CASES FOR CARS AND LIGHT GOODS VEHICLES

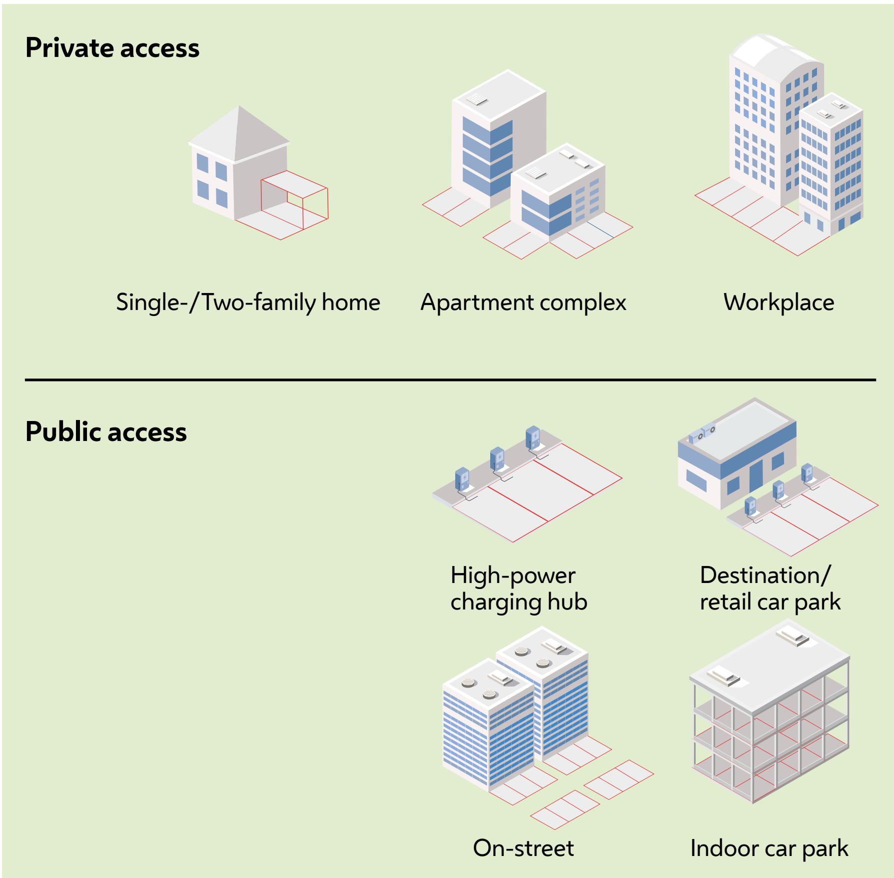


Figure 17
German Commission for Electrical, Electronic & Information Technologies (DKE) (2023): Technical Guideline: Charging Infrastructure Electromobility, Version 4.1, p. 3

Table 6 Overview of the various charging use cases for cars and light goods vehicles

Type of access	Designation	Charging use case	Land ownership	Typical charging capacity	Standing times
Private access	Single-/Two-family home	1	Private	3.7–11 kW	Up to 14 hours overnight
	Apartment complex	2.p	Private	3.7–11 kW	Up to 14 hours overnight
		2.m	Municipality		
		2.c	Housing cooperative		
	Workplace	3	Private	3.7–11 kW	Up to 8 hours during the day
Public access	HPC hub	4.p	Private	150–400 kW	10–30 minutes
		4.m	Municipality		
	Destination/retail car park	5	Private	11–50 kW	30–90 minutes
	On-street	6	Municipality	11–50 kW	30 minutes to 14 hours overnight
	Multi-storey car park	7.p	Private	11–50 kW	30 minutes to 14 hours overnight
		7.m	Municipality		

OVERVIEW: CHARGING USE CASES FOR LIGHT AND HEAVY GOODS VEHICLES

Figure 18
German Federal Ministry for Digital and Transport (BMDV) (2023): Einfach E-LKW laden („Simple Charging of eHGV“), p. 18 ff.

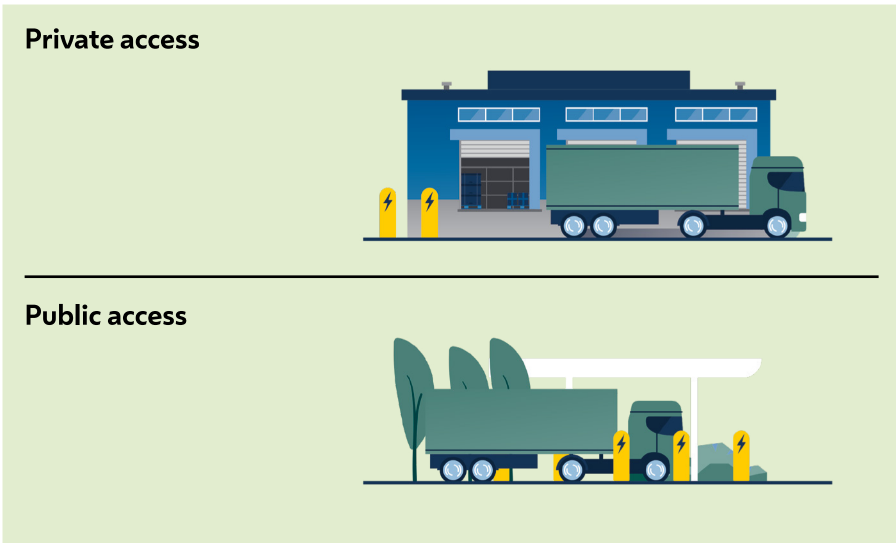


Table 7 Overview of charging use cases for light and heavy goods vehicles

Type of access	Designation	Charging use case	Land ownership	Charging capacity	Standing times
Private access	Commercial depot	A	Private	11–400 kW	30 minutes to 14 hours overnight
Public access	MCS hub	B	Private or municipality	1 MW and above	15–45 minutes

5.2. EV charging and charging infrastructure requirements

The future charging requirements of electric vehicles and the associated charging infrastructure requirements were calculated on the basis of the forecast trajectories outlined in Chapter 4. From these figures we can subsequently also extrapolate the future requirements in terms of amounts of energy and charging capacity, as well as the associated capital investment costs. All of the forecasts show large differences between the two scenarios "Shift to electric vehicles with continuation of current trends" and "Modal shift leading to transformation of mobility".[7]

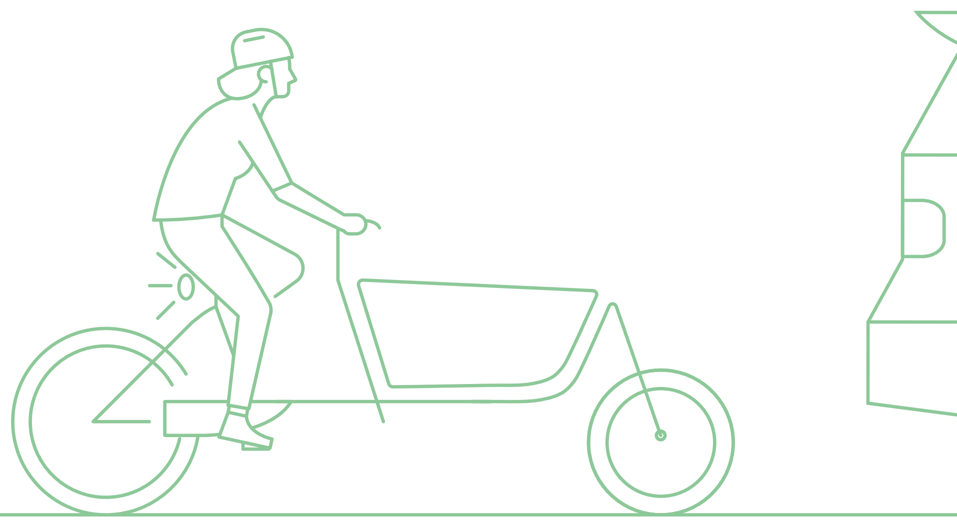
The figures given in this chapter represent an initial approach to a complex issue. Despite the precise scientific methodology applied, it is impossible to accurately forecast all future (market) dynamics and technological developments. The calculations presented here and the distributions across the various charging use cases therefore need to be reassessed at regular intervals and adjusted as and where necessary. This is the only way of ensuring that Vienna's charging infrastructure is rolled out efficiently and in line with requirements.

CHARGING POINT REQUIREMENTS

The distribution of charging infrastructure requirements across the different charging use cases (CUC) for the year 2030 is shown in detail in Table 8. There is a significant overall difference between the two scenarios. Whereas the "Shift to electric vehicles" scenario requires approx. 100,500 charging points, the "Modal shift" scenario calls for approx. 70,500, i.e. a difference of approx. 30,000 charging points.

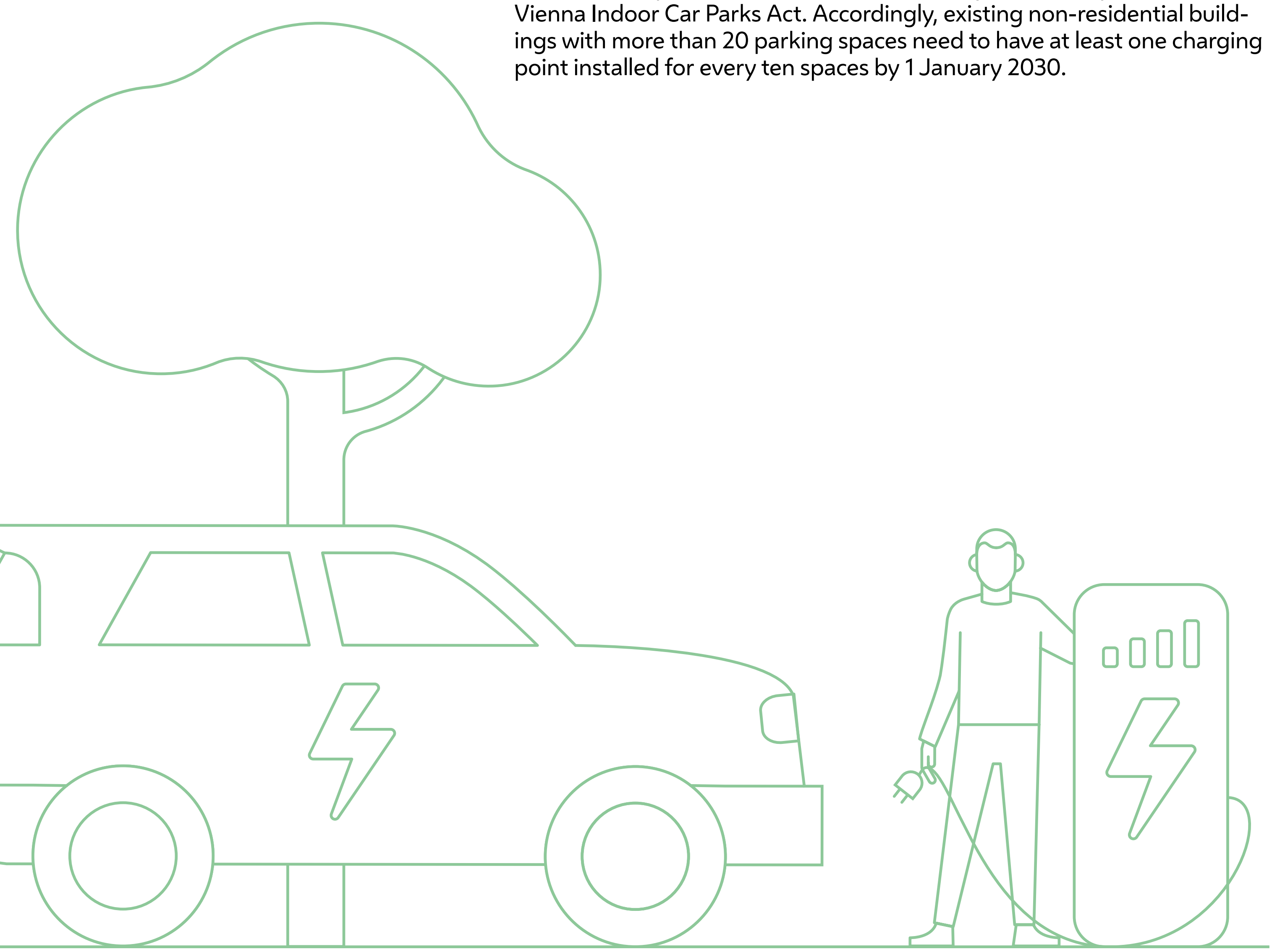
The percentage share of charging points across the various charging use cases hardly differs between the two scenarios studied. As a general note, it should be borne in mind that the total numbers of charging points shown in the forecasts include existing charging points.

[7] In the following, the scenarios will be referred to by their short titles, "Shift to electric vehicles" and "Modal shift".



In 2030, the majority of the requirement for charging infrastructure is on private premises. Within this segment, it is evident that a substantial proportion, i.e. 24,900 to 37,500 charging points, is attributable to charging use case CUC-2 (apartment complex). Next in the ranking is CUC-1 (single-/two-family home), with 16,800 to 24,200 charging points, followed by CUC-3 (workplace), which will require 7,500 to 12,700 charging points. Charging use case A (commercial depot) requires between 5,400 and 6,800 charging points.

With a share of 20 per cent, the charging use cases with public access account for a relatively small proportion of the overall requirement for charging infrastructure in 2030. Of these, 3,500 to 5,300 are on-street charging points (CUC-6) and 2,000 to 2,900 are charging points in destination/retail car parks (CUC-5). In both scenarios, approx. 10,000 charging points are required in indoor car parks and P&R facilities (CUC-7). This is due to the mandatory implementation of the EU Buildings Directive, the provisions of which have already been incorporated into the Vienna Indoor Car Parks Act. Accordingly, existing non-residential buildings with more than 20 parking spaces need to have at least one charging point installed for every ten spaces by 1 January 2030.



[8] HPC stands for "high-power charging", MCS for "megawatt charging system"

In numerical terms, HPC and MCS hubs[8] only account for a minimal share of total charging point requirements. It is calculated that 390 to 560 charging points will be required for CUC-4 (HPC hub), and just 4 charging points for CUC-B (MCS hub).

This overall picture of charging point distribution underlines the importance of private premises for the roll-out of charging infrastructure. When looking at these results, as well as in future monitoring of CI developments, a fundamental principle of charging infrastructure roll-out should always be borne in mind, namely the way in which the different charging use cases impact upon one another. If too few charging points are installed for one use case, the shortfall has to be compensated by a disproportionate number of charging points in other segments in order to cover the overall requirements. By the same token, targeted regulatory frameworks can be used to accelerate roll-out for a specific CUC and thus relieve the pressure on other segments.

Table 8 Distribution of charging points across charging use cases in the two scenarios

	Private			**Publicly accessible**				**Private**	**P. a.**
	CUC-1 Single-/two-family home	**CUC-2** Apartment complex	**CUC-3** Workplace	**CUC-4** HPC hub	**CUC-5** Destination/retail car park	**CUC-6** On-street	**CUC-7** Indoor car park	**CUC-A** Commercial depot	**CUC-B** MCS Hub
Shift to electric vehicles	24,200	37,500	12,700	560	2,900	5,300	10,400	6,800	4
	74,400			19,160				**6,804**	
	93,560								
Modal shift	16,800	24,900	7,500	390	2,000	3,500	10,000	5,400	4
	49,200			15,890				**5,404**	
	65,090								

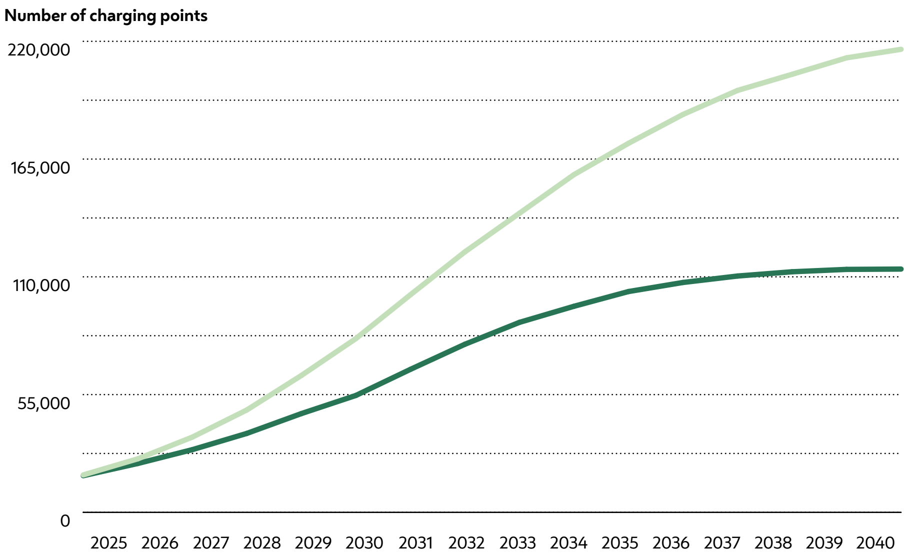
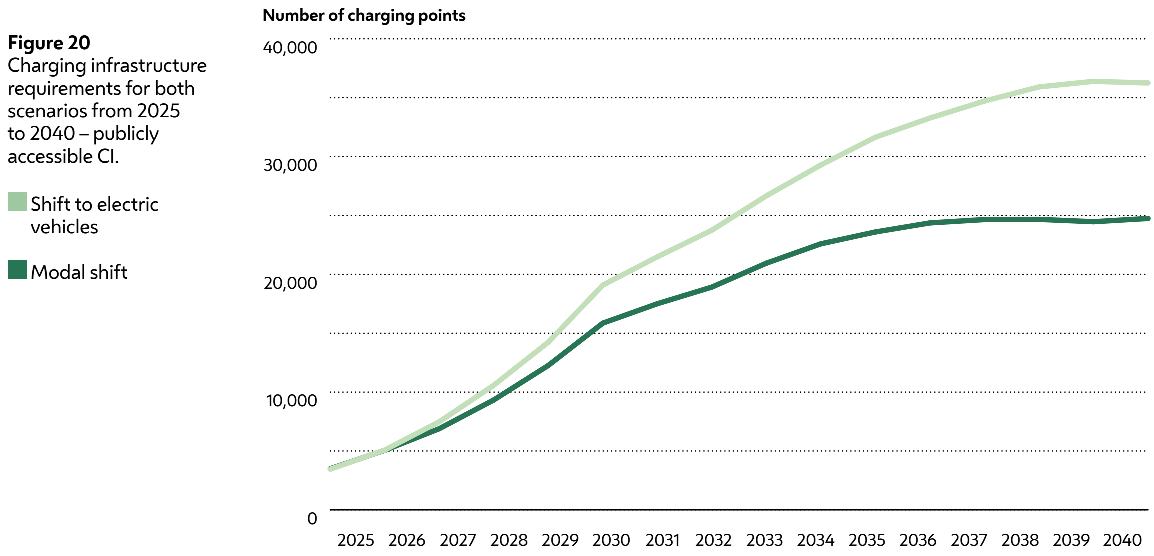


Figure 19
Charging infrastructure requirements for both scenarios from 2025 to 2040 – private CI.

Figure 20
Charging infrastructure requirements for both scenarios from 2025 to 2040 – publicly accessible CI.

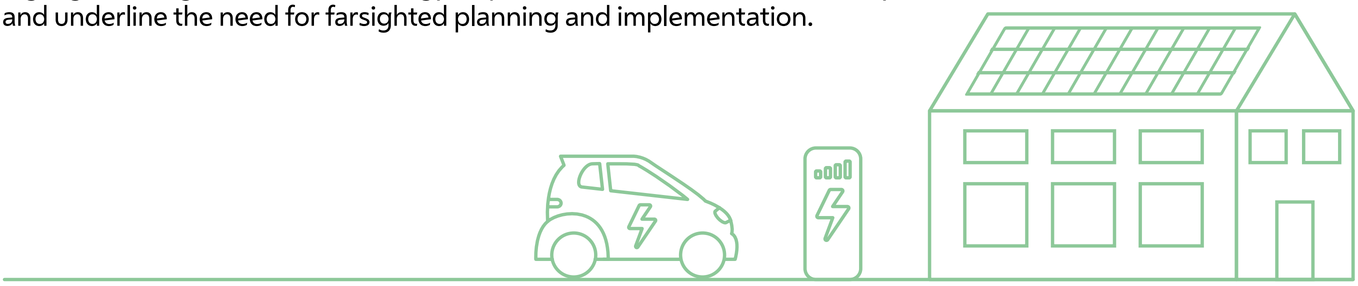


ENERGY REQUIRED FOR EV CHARGING

The forecasts show that the amounts of energy required for EV charging on private premises are always higher than in publicly accessible locations. A total of between 697 GWh and 915 GWh of electricity will be required for electromobility purposes in 2030, depending on the scenario. The difference between the scenarios is thus a substantial 218 GWh.

This requirement will grow to 1,775–2,802 GWh (difference between scenarios = 1,027 GWh) by 2040, to keep the by then fully decarbonised road transport sector supplied with electricity. In order to make these amounts of energy available, smart technologies must be deployed to avoid load peaks and utilise power at times when it is not required by other sectors. If this electricity is drawn from the grid at favourable times, the EV charging infrastructure can be supplied without the need for major grid expansion. In addition, Vienna – like any other city or large industrial operation – will increasingly have to rely on imports of renewable electricity from the wider region in order to cover demand, as set out in the Vienna Climate Guide.

In 2030, 388–539 GWh annually are used for charging on private premises, while between 309 and 376 GWh are required to charge EV at public charging points. By 2040, these figures rise to 1,193–1,923 GWh on private premises and 582–879 GWh (“Modal shift” scenario and “Shift to electric vehicles” scenario, respectively) in publicly accessible locations. These data highlight the significant rise in energy required as a result of electromobility and underline the need for farsighted planning and implementation.



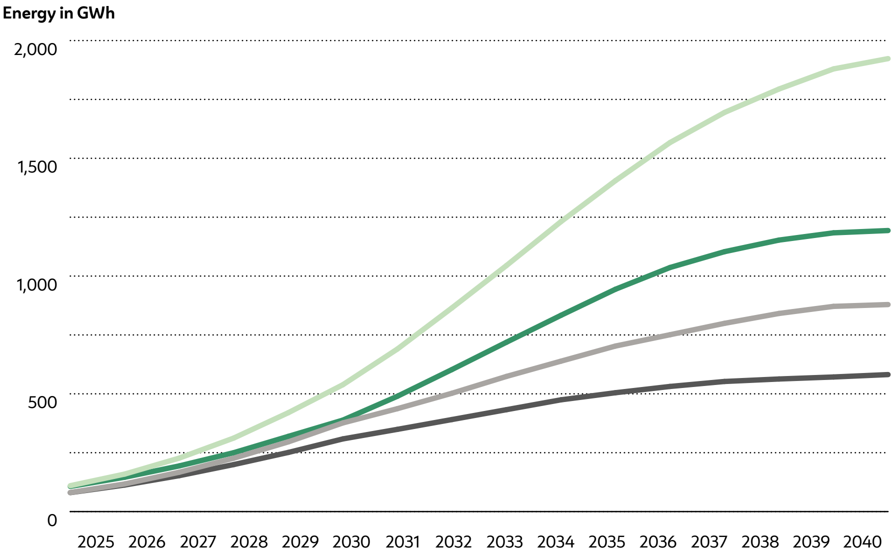


Figure 21
Forecast amounts of energy required for EV charging at private and public charging points by scenario, 2025 to 2040.

- Shift to electric vehicles – private
- Modal shift – private
- Shift to electric vehicles – publicly accessible
- Modal shift – publicly accessible

Table 9 Energy requirement per charging use case for both scenarios in MWh, 2030

	Private			**Publicly accessible**				**Private**	**P. a.**
	CUC-1 Single-/two-family home	**CUC-2** Apartment complex	**CUC-3** Workplace	**CUC-4** HPC Hub	**CUC-5** Destination/retail car park	**CUC-6** On-street	**CUC-7** Indoor car park	**CUC-A** Commercial depot	**CUC-B** MCS Hub
Shift to electric vehicles	45,500	178,600	74,700	69,700	44,600	177,300	83,000	239,700	1,950
	298,800			374,600				**241,650**	
	673,400								
Modal shift	30,400	118,800	45,300	49,300	31,400	149,300	76,800	193,900	1,760
	194,500			306,800				**195,660**	
	501,300								

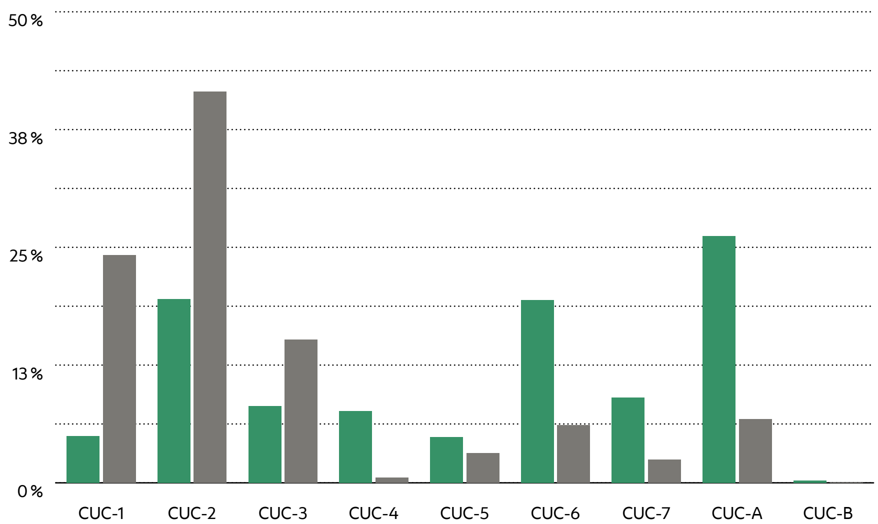
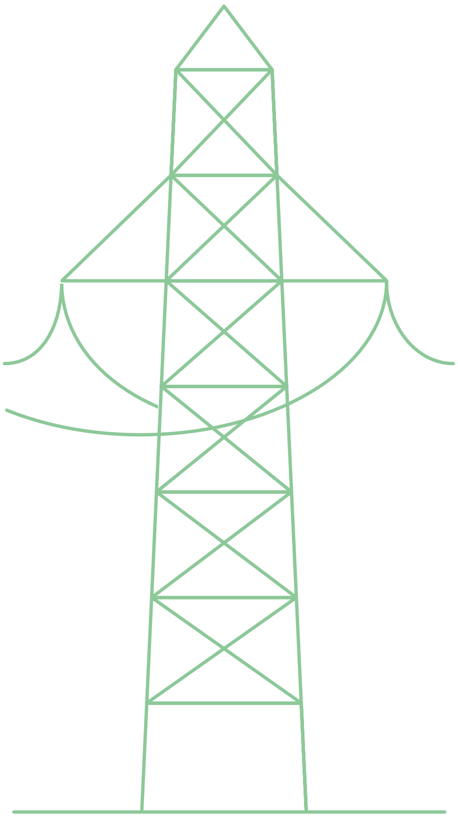


Figure 22
Energy and CI requirements in 2030 in "Shift to electric vehicles" scenario.

- Energy requirement
- CI requirement



INSTALLED CAPACITY

Looking at the amount of energy needed and the number of charging points alone is not sufficient to obtain a full picture of the requirements in terms of charging infrastructure. On the contrary, the installed capacity must also be taken into account. The installed capacity refers to the total available charging capacity of all charging points, i.e. not only the number of charging points, but also their power output categories.

Here it should be noted that the actual peak power output is considerably lower than the installed capacity figure suggests, because all of the charging points in the City of Vienna are never in use at the same time. The simultaneity factor refers to the typical simultaneous occupation rate of the charging points and thus their typical simultaneous power output. This was not covered by the study discussed here, however, and is to be examined further in retrospect.

Figure 23 shows the forecast installed capacity of private and public charging points from 2025 to 2030 in both scenarios. The installed capacity of charging points on private premises is significantly higher than that of those in locations with public access. In 2030, the installed capacity on private premises will need to be between 619 and 901 MW, whereas only 339 to 447 MW will need to be installed at public charging points.
By 2040, the installed capacity on private premises will need to increase to between 1,553 MW and 2,670 MW, whereas in public locations 600 MW to 970 MW will be required, i.e. around 60 per cent less than the necessary private capacity.

These figures affirm the great importance of private premises for the roll-out of charging infrastructure. A total of up to 3,640 MW of charging capacity could be installed in Vienna by 2040. Here too, however, the combined capacity requirements across the CUC vary widely between the two scenarios. A cumulative capacity requirement of approx. 1,348 MW is forecast in the "Shift to electric vehicles" scenario, whereas in the "Modal shift" scenario the figure is just 958 MW – a difference of some 390 MW.

Table 10 Distribution of installed capacity across charging use cases in 2030 for both scenarios in kW.

	Private			Publicly accessible				Private	P. a.
	CUC-1 Single-/two-family home	CUC-2 Apartment complex	CUC-3 Workplace	CUC-4 HPC Hub	CUC-5 Destination/retail car park	CUC-6 On-street	CUC-7 Indoor car park	CUC-A Commercial depot	CUC-B MCS Hub
Shift to electric vehicles	169,700	412,000	139,200	116,300	76,100	92,100	159,500	179,900	3,000
	720,900			444,000				**182,900**	
	1,164,900								
Modal shift	117,400	273,700	82,700	82,600	52,400	52,100	148,900	145,300	3,000
	473,800			336,000				**145,600**	
	809,800								

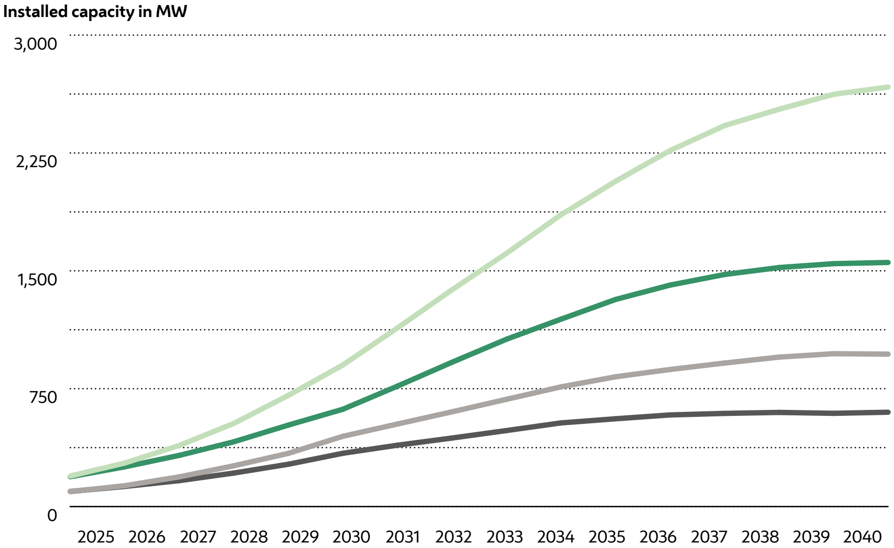


Figure 23
Installed capacity on private and public premises for both scenarios, 2025 to 2040.

- Shift to electric vehicles – private
- Modal shift – private
- Shift to electric vehicles – publicly accessible
- Modal shift – publicly accessible

CAPITAL INVESTMENT REQUIREMENTS

This section estimates the capital investment needed to cover the charging infrastructure requirements in 2030. The capital investment for one charging point (CP) comprises the building/installation costs, the costs of approval, planning and site selection, the costs of connection to the power grid and the costs of the hardware (cf. Figure 24).

The first three cost items are only incurred in full for the initial installation. When the hardware is renewed, the hardware costs plus a portion of the building/installation costs are incurred again. The service life of charging infrastructure (CI) is estimated at 8–15 years, depending on the component[9].

[9] **pubdb.bfe.admin.ch/de/publication/download/11492**

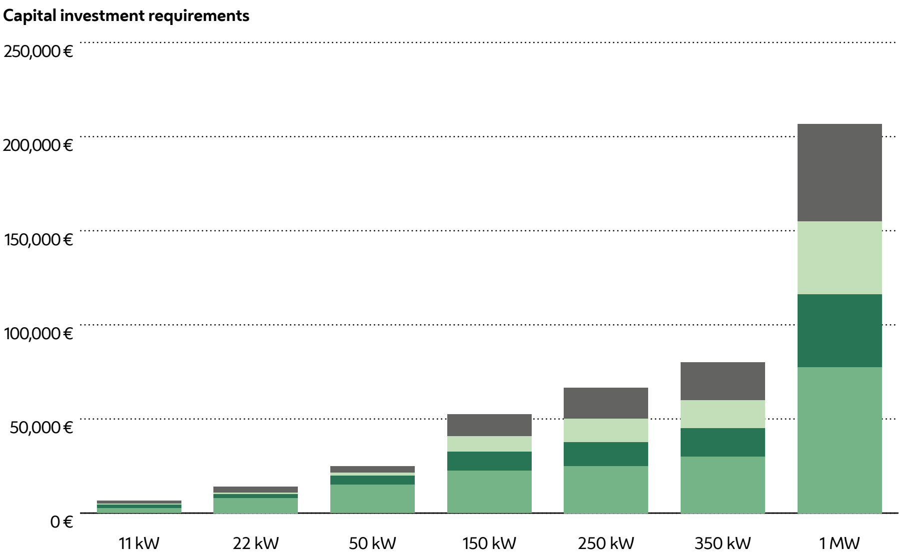


Figure 24
Capital investment requirements for publicly accessible CP.

- Building costs
- Approval/planning/site selection costs
- Costs of connection to power grid
- Hardware costs

Figure 25 compares the total capital investment per charging use case for the two scenarios. It is evident that the investment requirements for every charging use case in the "Shift to electric vehicles" scenario are higher than in the "Modal shift" scenario. This reflects the assumption that the amount of vehicle traffic will decrease in the "Modal shift" scenario, thus reducing the requirement for CI. This results in a difference of up to €34m per charging use case. The total capital investment requirement across all charging use cases in the "Modal shift" scenario is approx. €517m, whereas in the "Shift to electric vehicles" scenario the figure is approx. €718m – a difference of approx. €200m.

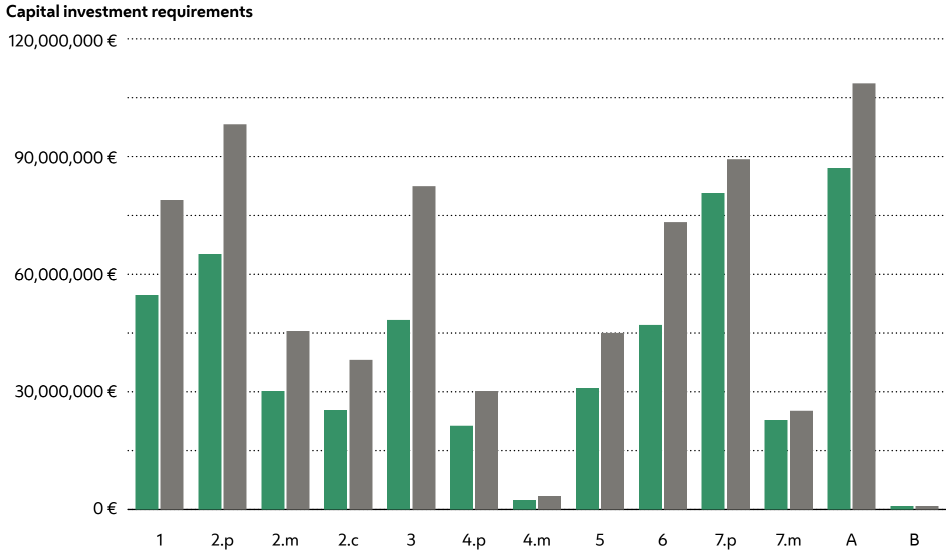


Figure 25
Comparison of capital investment requirements per charging use case
CUC = 1: Single-/two-family home,
2: Apartment complex (private, municipal, housing cooperative),
3: Workplace,
4: HPC hub (private, municipal),
5: Destination/retail car park,
6: On-street,
7: Indoor car parks (private, municipal),
A: Commercial depot,
B: MCS hub.

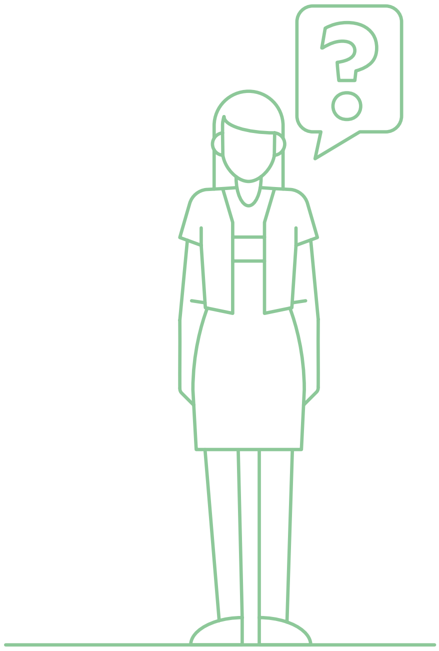
Modal shift

Shift to electric vehicles

MEASURES

6. Levels of action

The transformation pathway outlined in the previous chapters can only be realised through a comprehensive package of measures across multiple different spatial and administrative tiers. A whole series of highly relevant parameters are beyond the control of the City of Vienna. These include, for instance, the availability and price of electric vehicles, taxation modalities, emissions limits for vehicle manufacturers at EU level, technical advances in the vehicle sector and financial incentives at federal level. Despite these limitations, the City of Vienna is endeavouring to leverage all the means at its disposal on all the various levels to accelerate decarbonisation of the mobility sector. While making no claims to completeness, the following overview lists measures that will be pursued as a priority over the next few years. This does not include the measures outlined above under "Shift" and "Avoid" (cf. Chapter 2), hence the measures outlined here are not universal ones pertaining to the mobility sector as a whole.



USING STRATEGIC FORESIGHT TO HELP US DELIVER OUR GOALS

1. Regular consultation with the Austrian Lead Agency for Electromobility (OLÉ), the Austrian motorways agency ASFINAG and other stakeholders on charging infrastructure along Austria's major road transport corridors.

2. Dialogue and cooperation with stakeholders from the private property development sector to ensure roll-out of the necessary charging infrastructure in new-build and existing projects.

3. Further development of the strategic framework created by the Electromobility Roll-Out Programme and evaluation of further measures to incentivise electromobility.

4. Dialogue and cooperation with major companies that have large numbers of commuters, e.g. within the context of the regional Climate Alliances.

5. Accelerating and coordinating roll-out of charging infrastructure at existing P+R facilities in consultation with the relevant stakeholders (incl. Austrian Federal Railways (ÖBB)).

6. Implementation of decarbonisation measures from the Urban Logistics Masterplan.

7. Intensification of PR activities to promote electromobility in the form of information and outreach campaigns (focus on general public).

8. Evaluation of a possible employment drive for electromobility professionals to ensure that strategies can actually be implemented in practice.

SETTING THE LEGAL AND REGULATORY FRAMEWORK FOR OUR FUTURE PATHWAY

1. Evaluation of further improvements to the provisions of the Vienna Building Code and the Vienna Indoor Car Parks Act to ensure an appropriate legal framework is in place for the required charging infrastructure in existing and new-build projects.

2. Evaluation and further development of regulatory provisions to support the decarbonisation of commercial transport.

3. Efforts to remove regulatory barriers preventing activation of potential sites (under private ownership) for publicly accessible charging infrastructure.

4. Evaluation of legal prerequisites for the introduction of so-called "zero-emission zones" (cf. Vienna Climate Guide).

5. Variable road pricing und parking charges on roads and in indoor car parks in Vienna to reflect specific CO_2 emissions and/or vehicle size (cf. Vienna Climate Guide).

LEVERAGING PLANNING INSTRUMENTS TO DRIVE THE TRANSFORMATION

1. Drafting of an integrated roll-out plan for charging infrastructure across all charging use cases, in line with requirements – taking account of the City of Vienna's varying degrees of control over the respective charging use cases.

2. Analysis of technical challenges and elaboration of grid-compatible solutions to accelerate the integration of electromobility, with a view to ensuring the necessary grid capacity going forward. Assessment of (spatial) potential for charging infrastructure in the context of private parking facilities (CUC 1, CUC 2, CUC 3), to ensure availability of better data as a basis for planning.

3. E-mobility to be factored into plans for urban development zones in a spatially compatible manner (general rule: no charging infrastructure in public spaces); prioritise charging infrastructure in neighbourhood indoor parking facilities.

4. Utilise synergies with other planning instruments and objectives (e.g. Solar Potential Map).

5. Align planning across the wider metropolitan region via relevant initiatives, working groups, etc.

6. Take account of synergies in the context of climate-proofing the public space (e.g. Phasing Out Gas, solar power initiative) and shifting car parking facilities onto private premises.

7. Definition of exclusion zones when planning charging infrastructure to ensure long-term high quality of usage in the public space.

IMPLEMENTING VIENNA'S TRANSITION TO E-MOBILITY

1. Leading by example – decarbonisation of the municipal vehicle fleets under the leadership of Wiener Stadtwerke and Municipal Dept. MA 48.

2. Roll-out of public charging infrastructure (normal charging points) in WiPark municipal indoor car parks (CUC 7.m) together with a basic, spatially compatible on-street charging infrastructure (CUC 6).

3. Evaluation and development of suitable business and funding models and subsidy schemes to reconcile the costs of installing and maintaining EV charging points with Vienna's affordable housing policy.

4. Installation of public rapid-charging hubs (CUC 4.m).

5. Plan installation of charging infrastructure at municipal parking spaces and/or enterprises of the City of Vienna (CUC 2 and CUC 5).

6. Incentivise decarbonisation and a shift away from motorised individual transport in the context of corporate mobility management schemes.

7. Evaluate possible introduction of an "E-Mobility Competence Centre" to advise on conversion of commercial and private vehicle fleets.

8. Establish a central regular monitoring framework for CI roll-out (private/public) and vehicle trajectories.

9. Accelerate roll-out and expansion of e-car sharing schemes.

FEDERAL LEVEL

At federal level, Vienna is advocating that important legal and economic frameworks be put in place to support decarbonisation of the mobility sector. These include, inter alia,

1. Amendment of the Austrian Highway Code (StVO) to allow automatic surveillance of limited access zones;

2. Incorporation of "right to plug" in the Tenancy Act and the Housing Cooperatives Act – as already done in the 2022 amendment to the Freehold Property Act;

3. Evaluation of the legal framework for the introduction of so-called "zero-emission zones";

4. Evaluation of the Austrian Highway Code (StVO) from the constitutional law perspective, to establish whether environmental and climate protection can be added as basic principles alongside the existing ones of traffic safety, ease of traffic movement and free flow of traffic;

5. Abolition and/or socially inclusive greening of subsidy schemes that are damaging to the environment: abolition of tax benefits for company cars, greening of commuter allowance scheme, abolition of diesel tax subsidy;

6. Reduction of fuel tourism using the available legal instruments;

7. Ensuring long-term support and subsidy for electromobility, incl. continuation of tax benefits until an announced date, to ensure planning certainty for all stakeholders.

CONCERTED ACTION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7. Challenges and opportunities on the path to net-zero mobility

The advancement of electromobility crucially depends upon a number of different factors, the future development of which is difficult to predict at the current point in time. As a result, the present strategic document can only provide a snapshot of the current situation and will require further adjustments over the coming years.

A key element of uncertainty in this context is the availability of battery electric vehicles on the market. The car industry is moving towards broader electrification, and an increasing number of manufacturers are offering electric vehicles in various segments.

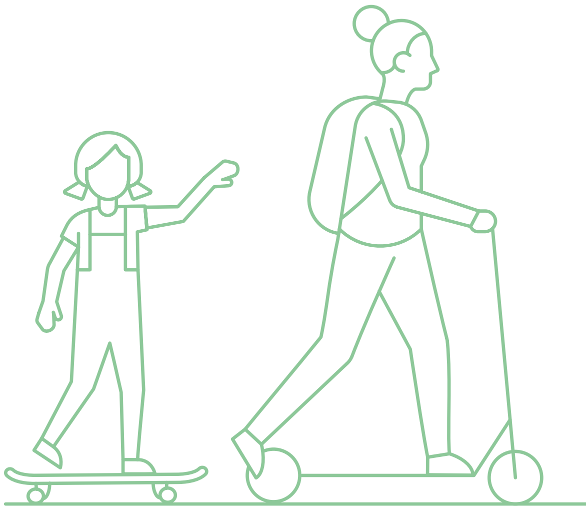
The continuous evolution of battery electric vehicles is key to the success of electromobility. Improved battery performance, greater range, shorter charging times and smaller, cheaper models are crucial to increasing the attractiveness of electric vehicles.

The trend in energy prices, especially the price of electricity, is another decisive factor influencing the attractiveness of electromobility. Rising electricity prices could drive up the operating costs of electric vehicles and thus reduce their competitiveness in comparison with conventional vehicles. By the same token, higher oil prices make electric vehicles more attractive.

Finally, policy measures also have a central role to play. Over the past few years, the EU has introduced a series of subsidy programmes, regulations and incentives to accelerate the transition to zero-emission vehicles. Were this political support to wane or waver, it could have a negative impact on companies' willingness to invest, as well as on consumer confidence. A consistent, long-term policy is therefore essential in order to create planning certainty.

This includes clear legal regulations, a stable subsidy framework and reliable incentives to encourage both the car industry and consumers to make the shift to electromobility.

Alongside electromobility, other measures to reduce CO_2 emissions also play an important role, including programmes such as "Phasing Out Gas", for instance, or municipal climate adaptation initiatives. We will only succeed in achieving the climate goals by adopting a coordinated approach that interlinks different measures and leverages synergies. Building renovation measures and roll-out of charging infrastructure can be carried out in parallel, for example, to lower costs and maximise efficiency.



All in all, it is evident that the path to net zero is influenced by a whole range of factors that are sometimes difficult to foresee. Electromobility has the potential to make a major contribution to decarbonising the transport sector. It will, however, be crucial to respond flexibly to developments and, if necessary, take additional measures in order to achieve the goals we have set ourselves. Only through close cooperation between policymakers, industry and the public will we be able to master the challenges ahead and successfully deliver net zero by 2040.