



Mobility as a Service (MaaS) Index

Future Mobility II
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Future Mobility IL (FMI) is a nonprofit, public benefit organization established in 2018. Its aim is to create and promote efficient and sustainable mobility alternatives in order to alleviate traffic congestion and Israel's transportation crisis. The organization's goals include improving accessibility, productivity, and quality of life, as well as reducing the number of traffic accidents and decreasing air pollution. Ranked worst among OECD countries in traffic congestion, Israel suffers from the consequences of limited mobility that include the widening of wage gaps, low social mobility, the increased marginalization of peripheral communities, as well as health and environmental ramifications. As part of a global movement working to minimize traffic congestion and its effects, Israel is a leader in traffic mobility innovation, but far behind in its implementation. FMI, therefore, serves as a conduit between innovative solutions and the unsustainable reality that prevails on the country's roadways.

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PREFACE

In recent years we have been witness to ever increasing road congestion in Israel that has lengthened travel time during rush hour for both private and public transportation. This congestion is a result of traffic on the main roads, including intercity routes as well as central boulevards within municipalities. Today, Israel suffers from the worst traffic among all OECD countries.

Traffic in Israel costs its economy an estimated 50 billion shekels a year. On average, a private driver who enters the Tel Aviv metropolitan area during rush hour will waste between 200 and 250 hours on the road each year, the equivalent of five work weeks. If the use of private cars increases, it is expected that by 2030 people will spend 60 more minutes on the road than they do today. The estimated damage to the economy in this case would stand at approximately 70 billion shekels a year, and by 2040 that number would increase to about 100 billion shekels per year.

As we attempt to tackle the transportation crisis that Israel already experiences, and which is expected to worsen in the coming years, we must set clear and quantitative goals in order to improve the situation. Setting goals will encourage the initiation of new measures and ways to improve road congestion. Striving to achieve these objectives will lead to the integration of all relevant factors while reviewing the steps taken in order to test their effectiveness and contribution. Frequent evaluation over the course of time will help pinpoint Israel's progress in the different fields and determine which ones require further improvement.

In light of this, we at Future Mobility created the Mobility as a Service (MaaS) Index. In the index we evaluate the implementation of MaaS in Israel through measuring six main factors affecting its application. For each of these factors, we focus on one significant parameter that signifies its development in the field. We then give a score to either the Tel Aviv metropolitan area (the most congested and crowded in Israel) or to Israel as a whole, ranging from 1 to 10, based on that parameter's implementation. In creating the index, we used wherever possible existing and universally recognized indexes from reliable sources. We curved the results for each factor in the index in order to reach a score from 1 to 10. Additionally, we added Future Mobility's "Traffic Index" that gathers the statistics for real travel time for private cars versus public transportation from both Google and the Ministry of Transportation.

Likewise, for the purpose of comparing Israel's progress to the rest of the world, we measured seven additional countries and metropolitan areas chosen for their implementation of sustainable mobility as well as their innovative and efficient transportation systems.

EXECUTIVE SUMMARY

Key Results - MaaS Index 2020

Category	Evaluation	Weight	Score Tel Aviv Metropolitan Area/Israel 2020 (out of 10)
Traffic Congestion	Travel time at rush hour vs. off peak hours	10%	5.4
Public Transportation Times	Travel time by public transportation vs. private car	20%	3.3
Micro Mobility	Percentage of commutes done on bicycle/scooter	20%	4.4
Electric Transportation	Prevalence of electric vehicles	10%	0.1
Shared Transportation	Existing and available shared mobility services	20%	6.0
Integration and Digital Payment	Range of services available with smart ticketing	20%	9
Israel - Final score MaaS index			5.1

Goals which Israel must set for itself in order to measure its progress in integrating MaaS:

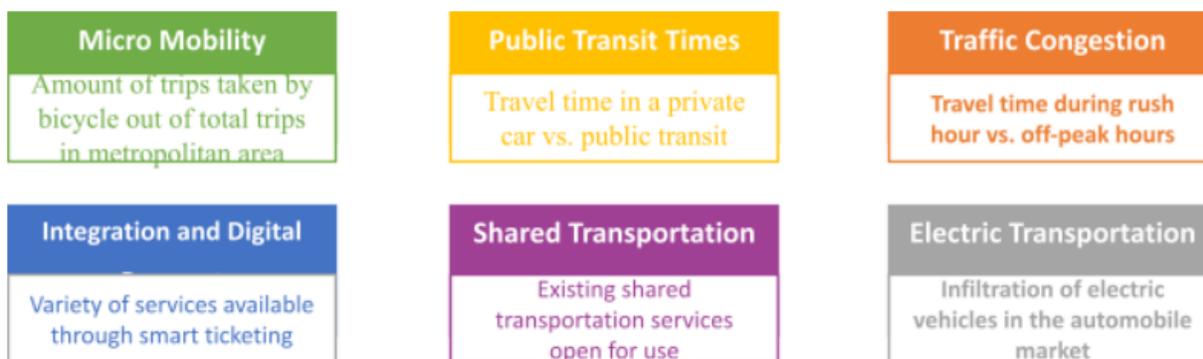
Category	Goal for 2022	Target Score 2022	Goal for 2025	Target Score 2025
Traffic Congestion	Reducing congestion by 2%	5.6	Reducing congestion by 6%	6
Public Transportation Times	Reducing the average gap in travel time between public transportation and private car by 50%	6.7	Reducing the average gap in travel time between public transportation and private car to 10%	9
Micro Mobility	Expanding the use of micro mobility in Tel Aviv by 50%	6.6	Expanding the use of micro mobility in Tel Aviv to 22% of all commutes	8.8
Electric Transportation	Setting as a target that 10% of new vehicles sold in Israel will be electric (100%)	5	Setting as a target that 30% of new vehicles sold in Israel will be electric (100%)	8
Shared Transportation	Opening the market in Israel to ride hailing services and expanding the micro transit services that are open to the public, whether or not the services are subsidized by the state	9	Integration of and encouraging the usage of all possible shared transportation means	10
Integration and Digital Payment	Inclusion of all public transportation with the option of payment for additional services	10	Inclusion of all public transportation with the option of payment for additional services	10

METHODOLOGY

This index examines the usage and application of the MaaS vision in Israel as a whole and the Tel Aviv metropolitan area in specific. Our goal is to measure the implementation of the MaaS concept in Israel and to follow its progress over the course of time. Implementing this idea will lead to a reduction in road traffic as well as economic savings through accessible and smart mobility. Additionally, MaaS will decrease the amount of traffic accidents and the damage caused by them and even reduce pollutant emissions in the air. Furthermore, MaaS will increase the accessibility to mobility services and narrow the gaps in social standings.

For the purpose of monitoring progress, seven countries and metropolitan areas from around the world, other than Israel, were selected due to their implementation of sustainable mobility as well as their efficient and innovative transportation systems. The seven include the United Kingdom (London), Australia (Sydney), the United States (Los Angeles), Singapore, Italy (Rome), the Netherlands (Amsterdam) and Sweden (Stockholm).

The implementation of the MaaS concept is based on six key components which we measured. In each of these components we examined one significant parameter that indicates progress in the field.



We gave a score for either the Tel Aviv metropolitan area (the busiest and most congested metropolis in Israel) or for Israel as a whole, between 1-10, depending on the application of each parameter. In creating the index, we used as many existing and widely accepted indexes as possible, from reliable sources. In addition, we added the "Traffic Index" of Future Mobility which draws travel data for both private cars

and public transportation from Google as well as real-time data published by the Ministry of Transportation. We curved the results in each of the components of the index in order to reach a score of 1-10. In order to determine Israel's final score in the index, we simply calculated the average of all its scores in the different categories, since we view them to be equally important for the implementation of MaaS.

After calculating the scores, goals were set for Israel to reach within two years (until 2022) and within five years (until 2025) in order to reduce the gaps with the rest of the world and to implement the concept of MaaS in Israel.

In the 2020 index, the results of which appear in this document, the data is mostly based on 2019.

All the information on which the index is based is visible information published to the public and includes reports, media, statements to the press and the like.

TRAFFIC CONGESTION

The congestion element in the index is based on MOT-MOT's congestion index. ¹ This index examines the difference between the average travel time during rush hour in the Tel Aviv metropolitan area versus the travel time during off-peak hours on the same roads. The difference between the two times is the traffic congestion.

According to the index, the average travel time in Tel Aviv during rush hour in 2019 is 46% higher than the travel time during off-peak hours. Therefore, Tel Aviv is ranked in the 8th and last place in 2020 with a score of 5.4.

In Amsterdam, the average travel time during rush hour is 26% higher than during off-peak hours, and in Stockholm it is 27%. These two cities are ranked first with scores of 7.4 and 7.3, respectively.

PUBLIC TRANSPORTATION TIMES

Efficient and readily available public transportation is the key to reducing road congestion. Although the planned mass transit systems in the Tel Aviv metropolitan area are expected to significantly improve the mobility options in the area, they will only be operational in many years from now. Therefore, the public transportation system that exists today plays an important and central role.

Based on the Future Mobility IL traffic index, the difference in travel time for public transportation and private cars during rush hour is measured on popular travel routes around the country. These routes represent the most frequent commutes to work according to the commute data published by the CBS.

According to the index, Israel's current score is 3.3. The average travel time on public transit on selected routes in January 2020 was 70 minutes, compared to only 42 minutes by private car.

The state must set a goal to improve the index by 50% within two years, i.e. - reducing the time gap between public transportation and private cars by 50%.

This goal will bring Israel to a score of 6.6

MICRO MOBILITY

These means of transportation, such as bicycles and scooters, are a good and green alternative for short distances. The potential inherent in them is great since they can be used for trips within the city - whether as the first / last kilometer solution or simply for the city's residents who can use them to get to work and other places.

<p>In this category, the breakdown of bicycle trips in the Tel Aviv metropolitan area is measured, i.e. the number of trips made by bicycle out of the total number of trips in the metropolitan area.</p>	<p>In Tel Aviv, 11% of all trips are made by micro-mobility. Thus, Tel Aviv is ranked second in the index with a score of 4.4, followed by Amsterdam leading with a score of 10, where 30% of trips are made by bicycle.</p> <p>Sydney and Los Angeles are ranked last with a score of 0.4 (only 1% of trips are made by bike).</p>	<p>The Tel Aviv Municipality has set a goal of doubling the number of trips made by micro mobility within 5 years, from 11% today to 22% of all trips in 2025.</p> <p>The state must set a goal of 50% improvement in the index within two years. That is, an increase in the percentage of passengers who use micro mobility in their daily trips in Tel Aviv by 5%. This goal will bring Israel to a score of 8.8 (25% mobility in micro mobility earns a score of 10).</p> <p>At the same time, the state must set goals for the use of micro mobility in other metropolitan areas and cities in Israel.</p>
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ELECTRIC TRANSPORTATION

Electric transportation alone will not solve the congestion on Israeli roads. At the same time, electric transportation is the basis for future transportation - and countries where electric transportation will falter - it is expected that autonomous vehicles and other new technologies will also be delayed. In addition, electric transportation has advantages in terms of air pollution and therefore, it is better that today's transportation is less dependent on oil and more on electricity, especially when most of the electricity in Israel is expected to be from natural gas sources or other means.

<p>In this category, the infiltration of electric vehicles (100%) into the Israeli market is measured. i.e. the number of electric vehicle sales out of total vehicle sales per year. 1</p>	<p>In Israel in 2019, 612 electric vehicles were sold, out of approximately a total of 261,000 vehicle sales. According to the index, Israel is ranked sixth and last in 2020, with a score of 0.1.</p> <p>The countries leading the ranking are Sweden and the Netherlands. In Sweden, which is in second place, 16% of cars sold were electric vehicles, giving it a score of 6.4. In the Netherlands, 29% of cars sold were electric vehicles, giving it a score of 10. (25% of sales earn the maximum score).</p>	<p>The Ministry of Energy stated its goal is for 5% of all vehicles sold to be electric by 2022. This target will bring Israel to a score of 2. Assuming no progress among the other countries in the index, Israel will move up to third place in the rankings.</p> <p>We recommend setting a target according to which 20% of the new vehicles sold in Israel will be electric (100%) by 2025. This target will bring Israel to a score of 8, and if no progress is made among the other countries measured, Israel will be in second place in the index.</p>
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SHARED TRANSPORTATION

Shared transportation is growing all over the world as part of the trend of the sharing economy in the world and is a good and efficient alternative to using a private vehicle as a single driver. It offers a variety of options that vary depending on travel destinations, convenience, usage costs and more.

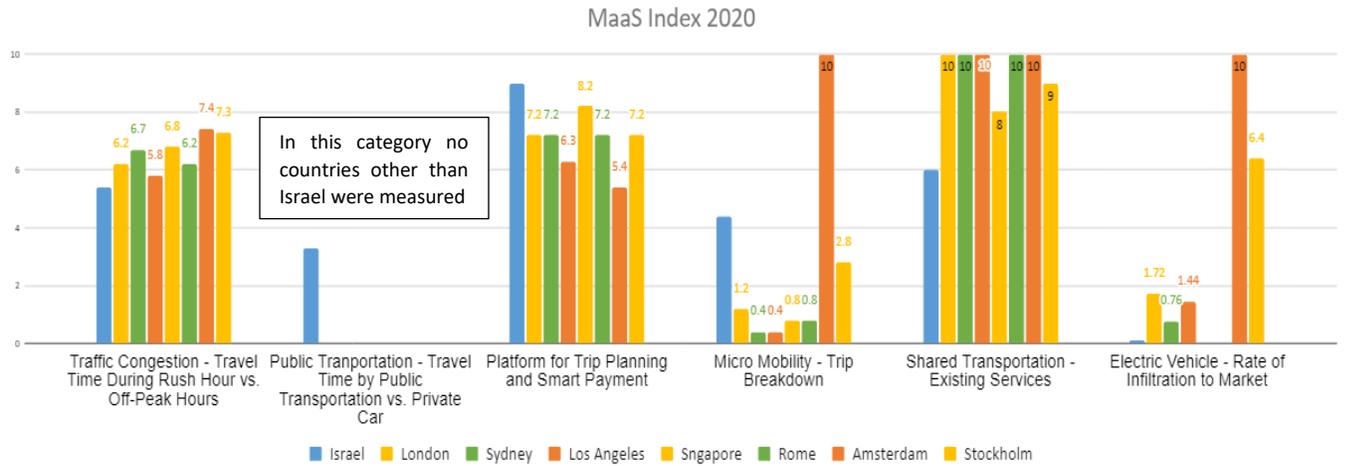
<p>This component measures the extent of shared transportation options open to the public in Israel:</p> <ul style="list-style-type: none"> • Car sharing P2P (Peer to peer), renting a private car directly. • B2C vehicle sharing (Business to customer) For example, Car2Go. • Carpooling, trip sharing in a private car. • Ride-hailing, trip sharing in a private car, but through commercial ownership (For example, Uber and Lyft). • Micro Transit (for example the service offered by Via). 	<p>Ride-hailing services are not open to the public in Israel. In addition, P2P services are only partially incorporated, as are Micro Transit services. Therefore, Israel is ranked eighth and last in 2020, with a score of 6.</p> <p>With the exception of Sweden and Singapore, which received scores 9 and 8, respectively, in which Micro Transit services are not completely integrated, the other countries in the index received a score of 10, since all the mentioned shared transportation services are open to the public.</p>	<p>The state must set a goal to improve the index by 50% within two years, i.e. open the market to Ride-hailing services and expand open Micro Transit services to the public, whether these services are state-subsidized or not.</p>
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INTEGRATION AND DIGITAL PAYMENT

A significant aspect of the MaaS concept is the ability to pay using any one of a wide range of payment options, for all modes of transportation, and to be able to plan all parts of the trip.

<p>This component measures the variety of payment options available for the most common modes of transportation in Israel, and the options that the payment card for travel (Rav-Kav) allows. In doing so, various aspects are examined:</p> <ul style="list-style-type: none"> • Option to pay with a single ticket on a variety of modes of transportation. • Remote charging, not only at stations. • Mobile ticketing without the need for a physical card. • Option to pay via credit card without the need for a dedicated plastic card. • Contactless payment - direct payment with a WiFi credit card and smart payment apps such as Apple and Google • Using a rechargeable card for additional services, other than transportation. 	<p>Thanks to the new digital payment reform for public transportation, according to the index, Israel ranks first with a score of 9. With the implementation of the reform, digital payment options for public transportation were added - if previously it was possible only with the "Rav-Kav", today one can also pay via smartphone using one of several apps. The only missing component is the option to pay for services other than public transportation, though it is likely this will be possible in Israel in the coming years.</p> <p>Second in the index is Singapore, with a score of 8.2, where all ticketing options are open except for direct mobile ticketing (for example through a dedicated app) without the need for a card.</p>	<p>Implementation of the digital payment reform for public transportation began in December 2020. However, not all modes of transportation are included in it, and it also does not yet allow payment for additional services.</p> <p>Therefore, by expanding the service in these two areas, Israel can easily bring itself to a maximum score of 10 in the index.</p>
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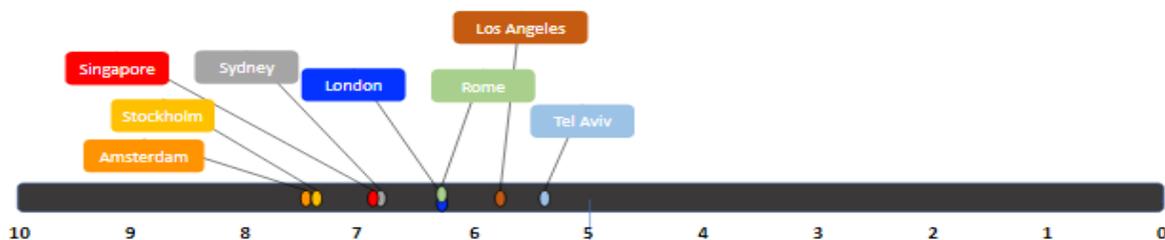
SUMMARY – MaaS INDEX 2020 RESULTS (2019 DATA)



ATTACHMENT A – DETAILED ASSESSMENT OF CATEGORIES AND THE MaaS INDEX 2020 RESULTS

Traffic Congestion

This component is measured based on the TOM-TOM index and is computed from the difference between travel time in the city during off-peak hours (which constitutes the base time) and the average travel time in the city throughout the day. In the TOM-TOM index, a score is given based on the difference in time (as a percentage) between the average duration of the trip and the same trip at base time. The gap between that percentage and 100 is what then determines the score. The maximum score (10) represents a situation in which the average travel time and the travel time during off-peak hours are the same.



Public Transportation Quality

This is determined by the difference in travel time between public transportation and private cars on popular commuter routes across the country. The routes and times are taken from data published by the CBS and are based on the Future Mobility IL traffic index. The maximum score (10) represents a situation in which the travel times by public transportation and private car are the same.

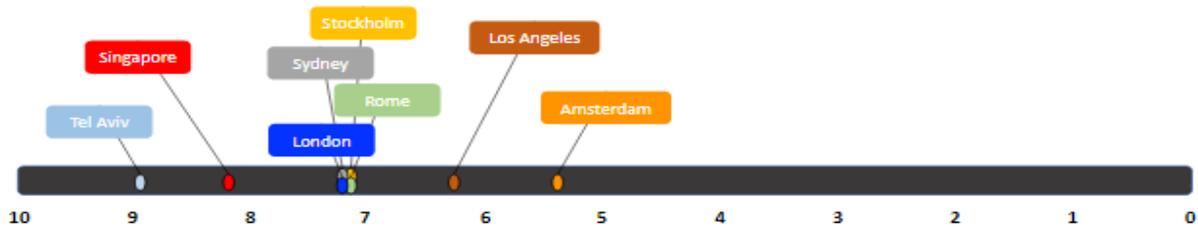
This index examines the 20 most common routes in Israel, with small changes in order to create a quality measurement group. This index does not have an international comparison, as it is an index that is uniquely measured by Future Mobility.

The average travel time by public transportation in 2019 was 1.67% higher than the average travel time by private car, and therefore Israel received a score of 3.3 in the index in 2020.

Integration and Digital Payment

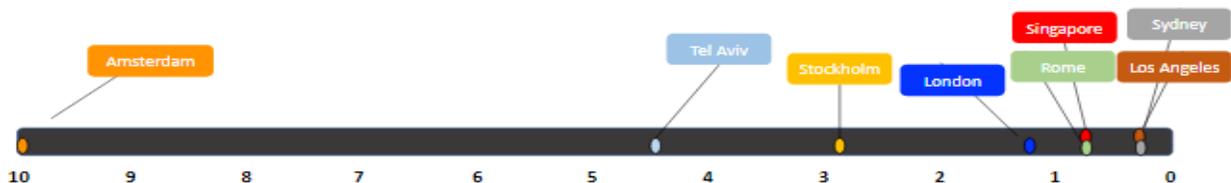
The component measured is the variety and advancement of payment options for the various modes of public transportation. The final score comprises an array of possible payment options in the city, out of the designated payment options. Each option is given weight according to its importance in promoting MaaS. The maximum score (10) represents a situation in which all payment options are open to the public:

- Payment for a wide variety of modes of transportation.
- Option to top up remotely, and not only at charging stations.
- Mobile ticketing option, without the need to purchase a separate travel ticket.
- Credit card payment option, without the need for a prepaid card.
- Contactless payment - direct payment with a WIFI credit card and smart payment apps such as Apple and Google
- Option to use rechargeable cards for additional services, other than transportation.



Micro Mobility

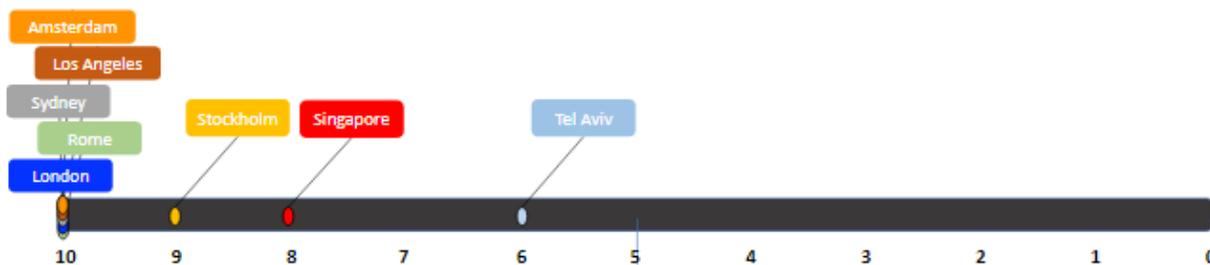
The component assessed here is the breakdown of trips, i.e. the number of trips made by bicycle and scooters out of the total number of trips in the metropolis. The maximum score (10) represents a situation in which 25% of metropolitan travel is done by micro mobility means.



Shared Transportation

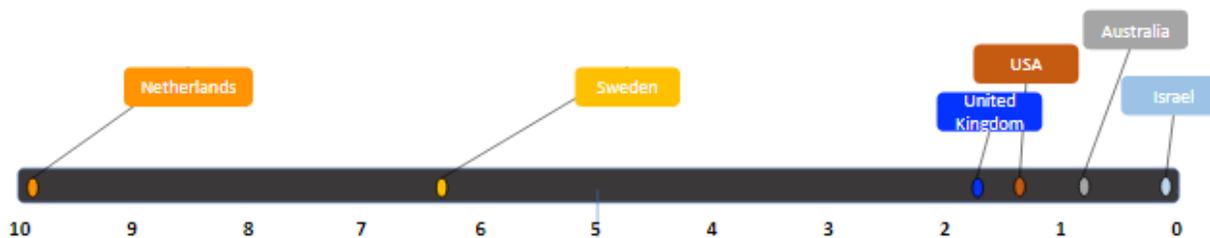
The component measured is the shared transportation options open to the public in the city. The final score is based on the extent of shared transportation options available in the city (regardless of their actual use), from the set shared transportation options. Each option is given weight [weight] according to its centrality in promoting MaaS. The maximum score (10) represents a situation in which all cooperative transportation options are allowed to operate and open to the public:

- P2P (Peer to peer) vehicle sharing, direct car rental from one private individual to another.
- B2C car sharing (Business to customer) For example Car2Go.
- Carpooling, sharing car travel.
- Ride Hailing, sharing travel in private vehicles through commercial ownership (Uber and Lyft)
- Micro Transit (such as the service offered by Via).



Electric Transportation

The component which is measured is the rate of electric vehicle sales (with full electric propulsion) out of total vehicle sales in the country per year. The maximum score (10) represents a situation in which 25% of car sales in the country per year are electric vehicle sales.



Disclaimer

This document was written by Future Mobility IL, an independent, non-profit public benefit organization established in 2018. The positions that appear in the document are those of its authors only and are based on research and analysis. Although every effort has been made to ensure the accuracy of the information in the document, Future Mobility IL will not be liable for any loss or damage caused as a result of its use. Future Mobility IL has made every effort to ensure the quality and accuracy of the data, but it should be said that the information and data, on which this document is based, may frequently change. Most sources are available to the public, and most of the document uses city-level data, although in some cases the information is based on national-level data.

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