Aiming for net zero CO_2 emissions from vehicles

Tokyo ZEV Promotion Strategy

Emission Zero Vehicle Shift

Zero
Emission
Vehicle

Zero Emission Vehicle Shift

Introduction

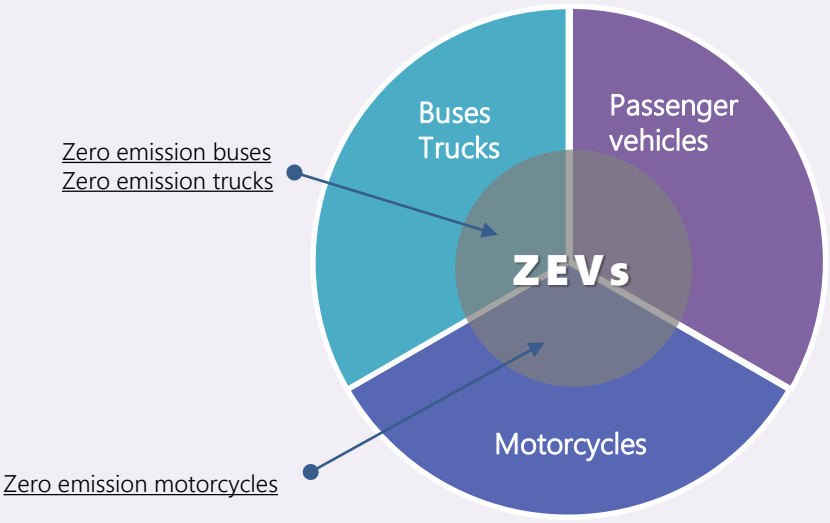
Pursuing efforts to limit the global average temperature increase to 1.5ºC, which entails a lower risk, the Tokyo Metropolitan Government (TMG) has formulated the Zero Emission Tokyo Strategy (hereinafter referred to as "Strategy") to realize a Zero Emission Tokyo that will contribute to achieving net zero CO_2 emissions worldwide by 2050. The promotion of the spread of zero emission vehicles (hereinafter referred to as "ZEVs") is positioned as one of the pillars, or areas of specific focus, of the Strategy, for which visions to aim for by 2050 and specific efforts and roadmap are provided.

To promote the spread of ZEVs in a comprehensive manner, this ZEV Promotion Strategy has set 2030 targets which are milestones for moving ahead toward the visions to aim for by 2050 and prescribed more specific efforts to achieve the targets.

This ZEV Promotion Strategy categorizes ZEVs as shown below, and summarizes the status quo, challenges, and development of initiatives to help Tokyo residents easily understand ZEVs.

What are ZEVs?

- ZEVs include Electric vehicles (EVs), plug-in hybrid vehicles (PHVs) (in EV mode), and fuel cell vehicles (FCVs) that do not emit CO_2 or other exhaust gases during driving.
- To distinguish them from passenger vehicles, TMG calls EV, PHV, and FCV buses and cargo vehicles "zero emission buses" and "zero emission trucks." We also refer to electric vehicle (EV) and fuel cell (FC) motorcycles as "zero emission motorcycles."



01

CHAPTER

CHAPTER 01

Aiming for Net Zero CO_2 Emissions from Vehicles

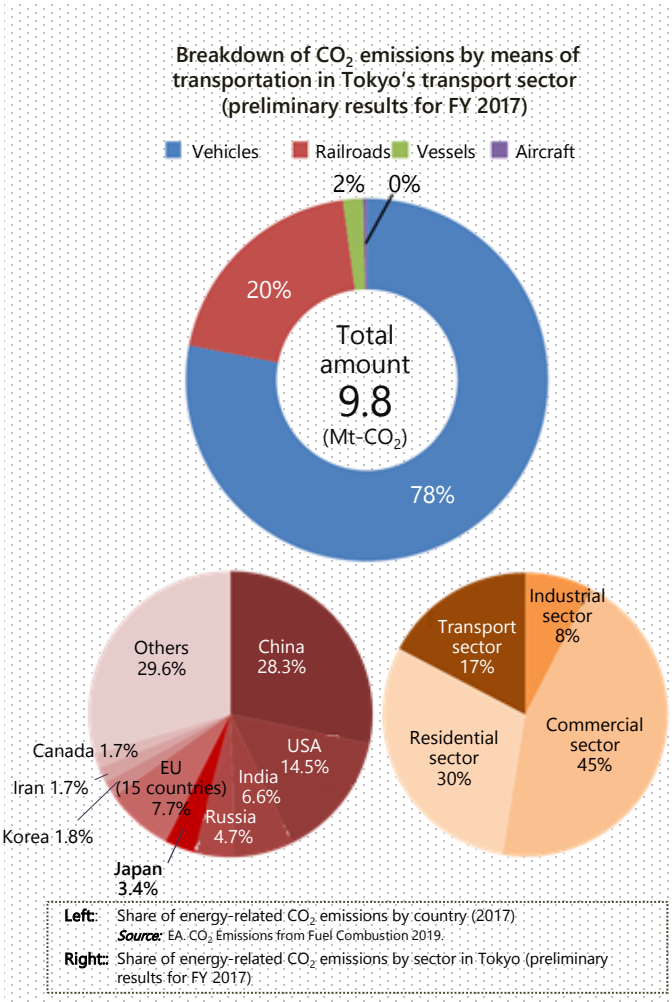
Making Vehicles Zero Emission is a Common Duty of Large Cities around the World

Reasons for making the shift to ZEVs

CO_2 emissions in Japan rank fifth behind those of China, the United States, India, and Russia, accounting for 3.4% of total CO_2 emissions in the world. Tokyo's CO_2 emissions account for 5.3% of those in Japan, or put into perspective, are equivalent to the emissions of an entire country such as Austria or Greece.

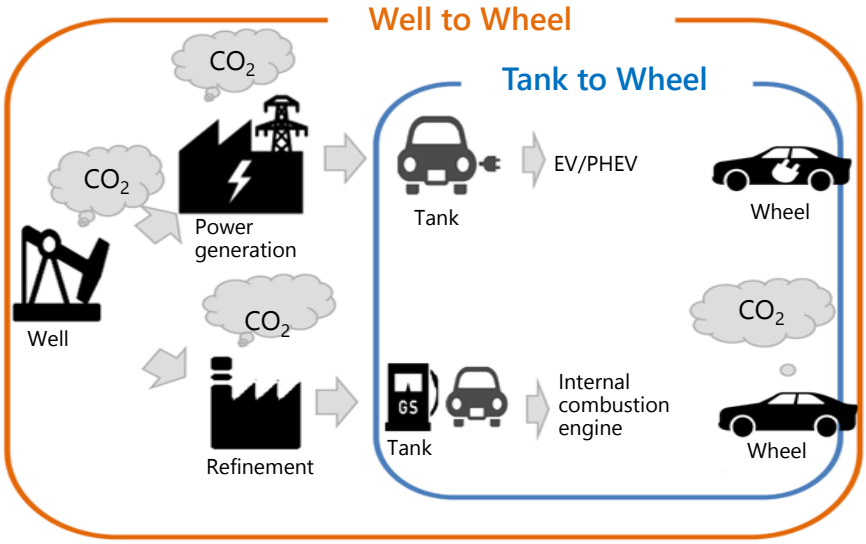
Transportation facilities including vehicles and railways are an important urban component that supports business activities and people's lives in the metropolis of Tokyo. The transport sector accounts for approximately 20% of CO_2 emissions in Tokyo, approximately 80% of which originate from vehicles. To achieve zero emissions in the transport sector, we have to change our behaviors to those that do not emit CO_2, for example using public transportation instead of one's own car, and walking and using bicycles instead of relying on vehicles. We also need to decarbonize the vehicles we use from the perspective of well-to-wheel*. A determining factor of this approach is the shift to zero emission vehicles or ZEVs that are rapidly spreading around the world.

* A concept that indicates the environmental load generated from the stage of obtaining automobile fuel (well) to the stage of actual driving (wheel)



Left: Share of energy-related CO_2 emissions by country (2017)
Source: EA. CO_2 Emissions from Fuel Combustion 2019.

Right: Share of energy-related CO_2 emissions by sector in Tokyo (preliminary results for FY 2017)



Source: Website of the Agency for Natural Resources and Energy

Conceptual diagram of well-to-wheel

Trends in ZEV Promotion in Japan and Overseas

To contribute to solving global issues as global vehicle sales are expected to increase in the future, countries and large cities around the world need to take the initiative in promoting the spread of ZEVs, developing advanced initiatives, and providing information on such initiatives.

Following the Paris Agreement, which came into effect in 2016, countries and cities across the globe have set goals for ZEV introduction and set forth restrictions on the sale of gasoline vehicles.

At the national level, China, where electric vehicles have rapidly spread, has set a goal of introducing a total of 5 million ZEVs in 2020. Norway has set a goal of turning all new vehicles sold into ZEVs by 2025 and the Netherlands has set the same goal with a deadline of 2030.

At the local government level, California, in the United States, is aiming to introduce a total of 5 million ZEVs by 2030, and New York City is aiming to increase the share of ZEVs to 20% of new vehicle sales by 2025.

The spread of ZEVs is being aggressively promoted to achieve these goals. For example, the UK and France have announced that they will ban the sale of gasoline and diesel vehicles by 2040. China, Europe, and California require, under the CAFE regulations*, automotive manufacturers to ensure that a certain percent of their vehicle sales are ZEVs.

In Japan, the national government has set a goal of increasing the percentage of EVs and PHVs in passenger car sales to 20-30% and that of FCVs up to 3% by 2030.

To realize a Zero Emission Tokyo, Tokyo must set high goals and develop effective efforts to fulfill its role in leading the world.

* Corporate Average Fuel Efficiency.
These are fuel efficiency requirements for regulating vehicles, which calculate the production-weighted harmonic mean fuel economy, taking into account the number of vehicles shipped by a manufacturer, regardless of vehicle model. CAFE was adopted in Japan as FY 2020 fuel efficiency standards.

Encouraging Changes toward the Realization of a ZEV Society

The market share of ZEVs in FY 2018 was 1.6% of new passenger car sales in Tokyo. Since it takes quite a while to develop ZEVs, as well as the requisite charging and fueling infrastructure, TMG will continue with the full-scale promotion of ZEVs by cooperating with various actors, including businesses, Tokyo residents, and the national government, promoting the development and diversification of vehicle model lineups through the creation of initial demand, developing and expanding chargers and hydrogen stations, and encouraging the fostering of momentum.

Through the promotion of ZEVs, TMG will support the advancement of energy management at home and in communities utilizing the power storage and supply functions of ZEVs and the spread of new mobility services, such as MaaS*.

* Mobility as a Service.
A service that shows the optimal route for users from the point of departure to destination, and collectively provides multiple means of transportation and other services.

Vehicle to home (V2H)

© Nissan Motor Co., Ltd.

Bus-capable Hydrogen Station

© Iwatani Corporation

Tokyo's Visions for 2050 and 2030 Policy Targets

205
Visio

- All cars driven in Tokyo to be ZEVs
- Expanded use of renewable energy, reali

Promotion of ZEVs – 2030 targets

▶ Market share of ZEVs in new passenger car sales

50%

▶ Introduction of zero emission buses

300+

▶ New small route buses* for sale

Limited to ZEVs in principle

* Route buses with a capacity of approx. 30 passengers

Passenger cars and service vehicles, including buses, taxis, and cargo vehicles, registered as new vehicles to be ZEVs

2030

Promotion of ZEVs

Status quo

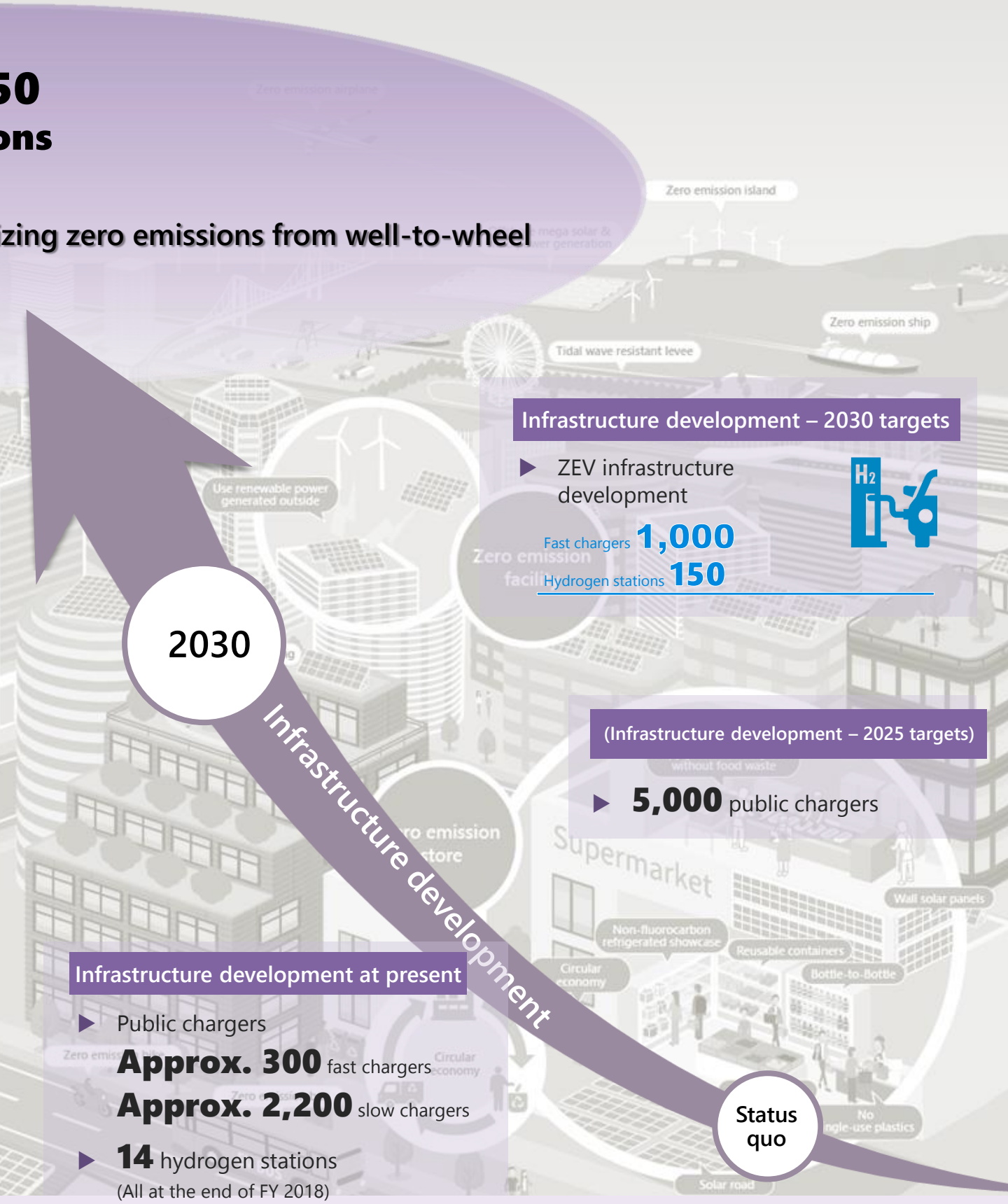
Spread of ZEVs at present

▶ Market share of ZEVs in new passenger car sales

1.6% (in FY 2018)

50
ons

izing zero emissions from well-to-wheel



Infrastructure development – 2030 targets

- ZEV infrastructure development

Fast chargers **1,000**
Hydrogen stations **150**

(Infrastructure development – 2025 targets)

- **5,000** public chargers

Infrastructure development at present

- Public chargers

Approx. 300 fast chargers
Approx. 2,200 slow chargers

- **14** hydrogen stations

(All at the end of FY 2018)

Column 1

ZEV Regulations in Overseas Local Governments

Countries and local governments that promote the spread of ZEVs are aiming to achieve policy targets, such as the number of ZEVs introduced, through regulations and incentives for manufacturers, dealers, and purchasers.

At the local government level, the following cities apply regulations and incentives:

Country	State/city	Target	Start year	Initiative name	Enforcement agency	Program outline
USA 	California	Manufacturers	1990	Zero Emission Vehicle Program (ZEV regulations)	California Air Resources Board (CARB)	• Manufacturers that sell a number of vehicles over a certain threshold in the state are required to ensure that a certain percent of the total sales are ZEVs. • Manufacturers can obtain credits according to quantities and models of vehicles sold. • Similar programs have been introduced in nine states since 2013: Connecticut, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island, and Vermont.
Canada 	Quebec	Manufacturers	2018	ZEV Act (ZEV standards law)	Quebec Government	• A target value for credits that can be received based on ZEV sales is set for manufacturers that sell more than 4,500 new vehicles a year.
France 	Paris	Dealers	2024	A ban on diesel and gasoline vehicles	Paris	• Diesel and gasoline vehicles will be banned from 2024 and 2030 respectively.
UK 	London	Purchasers	2019	Ultra Low Emission Zone (ULEZ)	Transport for London	• Since April 2019, an additional congestion tax of 12.5 pounds per day has been included for vehicles not compliant with the EU environmental regulations.
China 	Beijing	Purchasers	2008	Traffic regulation targeting the last digit on license plates	Beijing Traffic Management Bureau	• Due to serious air pollution, traffic regulation is implemented according to the last digit on license plates. • NEVs (EVs/PHVs/FCVs) are not subject to this regulation.

02

CHAPTER

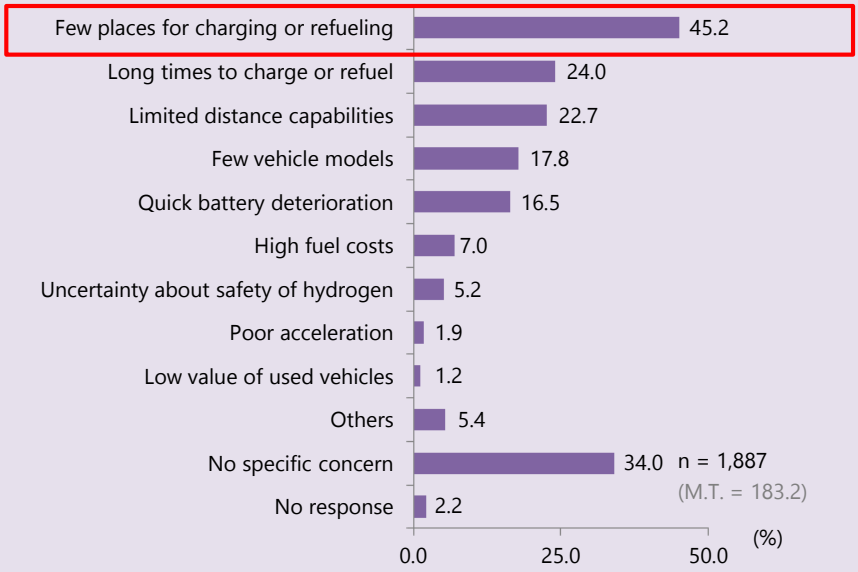
CHAPTER 02

Developing Initiatives for Promoting ZEVs toward 2030—Three Pillars

Ensuring infrastructure to support the promotion of ZEVs

1 Infrastructure development

- Chargers and hydrogen stations essential for the spread of ZEVs have been developed, but further promotion is needed to achieve the targets
- In the public opinion poll of Tokyo residents concerning ZEVs*, the largest share of 45% of respondents cited insufficient infrastructure for charging and refueling as a matter of concern



Public Opinion Poll on Vehicle Use to Realize a Zero Emission Tokyo
(Concerns about electric vehicles (ZEVs))

* Conducted between November 3-18/December 6-17, 2018 (Response rate: 62.6% (effectively collected 1,877 samples/3,000 samples)

■ Public chargers* for EVs/PHVs

- TMG estimates the number of public chargers in Tokyo as of the end of FY 2018 to be approximately 2,500 in total, consisting of approximately 300 fast chargers and approximately 2,200 slow chargers.
- The number of chargers installed in commercial facilities and coin parking lots is far less than the number of facilities.
- In the public opinion poll of Tokyo residents concerning ZEVs, a top concern about ZEVs was "few places for charging or refueling."
- For the full scale promotion of ZEVs, it is essential to introduce more chargers as social infrastructure.

* Public chargers:
Used at public places, including public facilities, commercial facilities, and hourly parking lots.

Private chargers* for EVs/PHVs

- For the accelerated promotion of ZEVs, an effective solution is to install chargers at multi-family housing in which approximately 60% of Tokyo residents live. However, the adoption rate has been low so far. In particular, at existing buildings where the consensus of a residents' association is needed for introduction, there are high hurdles such as cost burdens and other issues.
- In order to replace service vehicles, buses, and cargo vehicles with ZEVs, an effective approach is to install chargers at offices and stations/stops. However, installation costs are often high, which prevents the spread of chargers.

Example of EV charger installed at multi-family housing

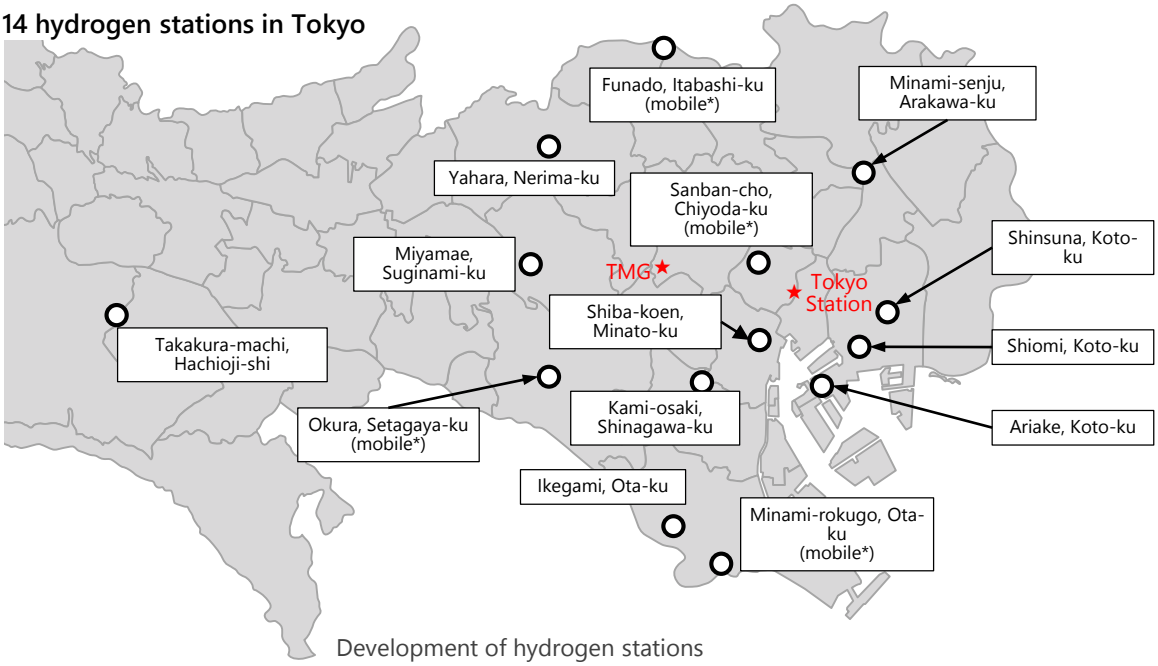
* Private chargers:
Used at private properties, including single-family residences, condominiums, and buildings.

Hydrogen stations for FCVs

- Hydrogen stations started operation in Tokyo in 2014 and are operated at 14 locations as of November 2019.

  In some areas, such as the Tama area, where the development of hydrogen stations has not progressed, further development is needed to improve the convenience of FCV users.
- Obstacles to a significant increase in the number of locations include development and operation costs higher than those of gas stations (hereinafter referred to as "GSs") and a larger area required compared to GSs, resulting in difficulties in obtaining appropriate sites.
- Since only two hydrogen stations currently accept FC buses at any given time, it is necessary to develop more hydrogen stations for buses toward the expanded introduction of FC buses.

○ **14 hydrogen stations in Tokyo**



Development of hydrogen stations

* Mobile:
A type of hydrogen station which has hydrogen fueling equipment on the back of a special truck and moves to various locations to sell hydrogen.

2 2030 Policy Targets

▶ **1,000 public fast chargers (5,000 public chargers by 2025)**

TMG will eliminate Tokyo residents' anxiety about ZEVs and support the spread of EVs and PHVs by installing the necessary and sufficient number of chargers as social infrastructure.

▶ **150 hydrogen stations**

By building one hydrogen station within approximately 7 minutes of any given location, TMG will improve its convenience and respond to the increasing demand for hydrogen with the spread of FCV and FC buses.

3 Developing Initiatives toward 2030

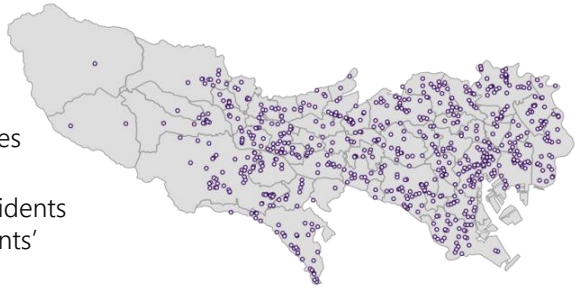
Chargers	**Support installation by businesses and municipalities and establish a mechanism to encourage installation**
Hydrogen stations	**Support self-sustaining management of businesses and work on the utilization of TMG-owned land**

Subsidization and Support

▶ **Provide support for development costs etc. to enhance chargers and hydrogen stations as social infrastructure prior to the introduction of ZEVs**

■ Public chargers

- TMG will double the number of public chargers by intensively subsidizing installation costs for those set up at commercial and municipal facilities used by many Tokyo residents.
- TMG will improve the convenience for Tokyo residents who use the facilities and eliminate Tokyo residents' anxiety about charging infrastructure.



Public chargers in Tokyo indicated by circles

■ Private chargers

- TMG will increase the number of private chargers by subsidizing installation costs for those set up at multi-family housing in which approximately 60% of Tokyo residents live to ease the cost burden that may hinder a consensus on installation.
- TMG will encourage the replacement of service vehicles, buses, and cargo vehicles with ZEVs by subsidizing installation costs for chargers set up at offices and stations/stops to facilitate installation.

■ Hydrogen stations

- Hydrogen stations do not allow for self-sustainable operation at present as development and operation costs are still higher than those of GSs, although the costs have decreased since the initial stage of introduction, and FCVs have not yet widely spread causing insufficient demand for hydrogen stations.
- To promote the development of hydrogen stations ahead of the spread of FCVs, TMG will implement a subsidy project for development and operation costs. For subsidization, we will provide assistance for land rent and building of walls, taking into account circumstances specific to Tokyo, such as high land prices and the difficulty in acquiring large sites.
- Adding hydrogen stations to GSs helps solve the difficulty in acquiring sites. TMG will support the examination of such addition by distributing a leaflet on the issue and providing a help desk and workshops for small and medium GSs.

Program and Mechanism

▶ Encourage the installation of chargers by taking advantage of large building construction and urban development

- To encourage the installation of chargers as part of environmental considerations by owners of large buildings, TMG will add new criteria for evaluating the installation of chargers upon revising the Tokyo Green Building Program, and review the utilization policy for the Urban Redevelopment Systems.
- For the purpose of encouraging the installation of chargers at large buildings, TMG will examine the possibility of application in parking lot regulations.

▶ Request that the national government ease restrictions on hydrogen stations

- In order to reduce development and operation costs of hydrogen stations, we requested that the national government ease restrictions. Furthermore, we realized a reduction in the distance from public roads, which has enabled development on smaller sites. We will continue to request necessary deregulation on the premise of ensuring safety.

TMG's Initiatives for its Own Sustainability

▶ Proactively use TMG facilities

- TMG will proactively install public chargers in its facilities, such as government buildings and parks visited by many Tokyo residents, improve the convenience for users visiting TMG facilities, and support the spread of EVs and PHVs.
- TMG will install chargers at 10 locations by the end of FY 2019, and encourage efforts of the private sector by introducing them more aggressively from FY 2020 through FY 2022.
- To promote the development of hydrogen stations, TMG is making good use of TMG-owned land and TMG-related sites. We will continue working on the effective use of TMG-owned land etc.

Public EV charger at TMG-owned facility (Tachikawa Joint Government Building)

Hydrogen station utilizing a TMG-related site (Dr. Drive Self Shiomi Park SS)

Encouraging Replacement of Existing Vehicles, including Passenger Cars, Buses, and Motorcycles, with ZEVs

1 Spread of ZEVs

- ▶ The spread of ZEVs has been stagnant, with sluggish reduction in vehicle prices and insufficient diversification of lineup
- ▶ Further development of initiatives is needed to stimulate initial demand

■ Passenger vehicles (EVs, PHVs, FCVs)

- The sales percentages of EVs, PHVs, and FCVs in Tokyo has been gradually increasing, but are less than 2% on average.

Market share of ZEVs in new passenger car sales in Tokyo

Fuel type	FY 2014		FY 2015		FY 2016		FY 2017		FY 2018	
	Quantity	Percentage	Quantity	Percentage	Quantity	Percentage	Quantity	Percentage	Quantity	Percentage
Total	217,281	100%	218,420	100%	230,753	100%	230,142	100%	226,630	100%
ZEVs	2,720	1.3%	2,890	1.3%	2,737	1.2%	4,965	2.2%	3,713	1.6%
EVs	947	0.4%	876	0.4%	849	0.4%	1,637	0.7%	1,458	0.6%
PHVs	1,752	0.8%	1,898	0.9%	1,670	0.7%	3,186	1.4%	2,004	0.9%
FCVs	21	0.0%	116	0.1%	218	0.1%	142	0.1%	251	0.1%

Source: Japan Automobile Dealers Association. *Automobile Registration Statistics* (Japanese).

© Nissan Motor Co., Ltd.

Electric vehicle (EV)

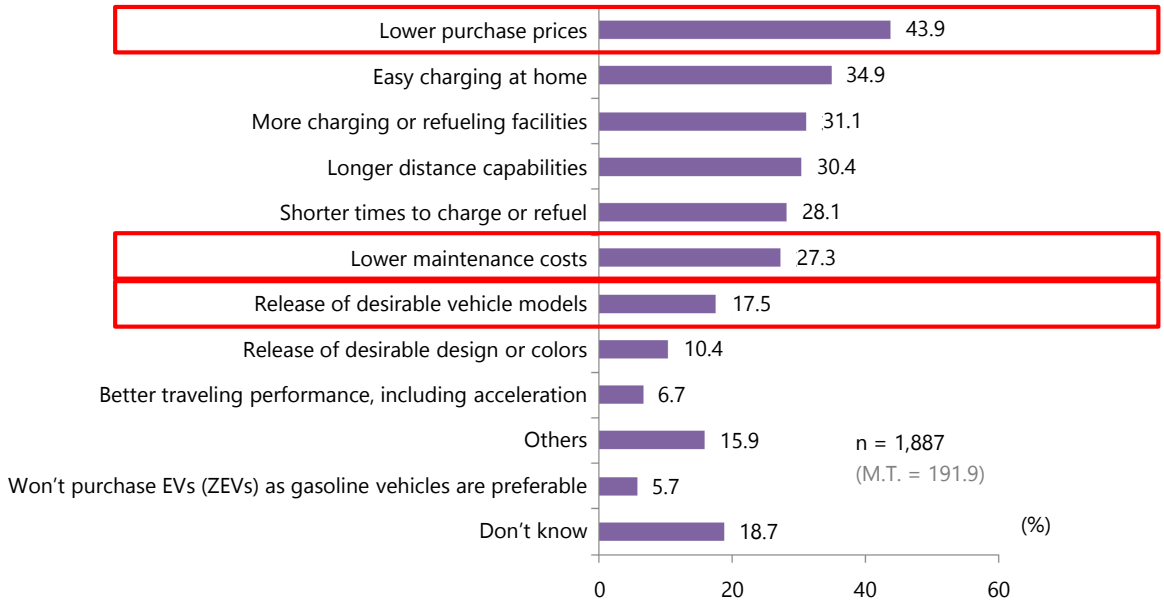
© Mitsubishi Motors Corporation

Plug-in hybrid vehicle (PHV)

© Toyota Motor Corporation

Fuel cell vehicle (FCV)

- The main causes hindering the spread include: ① higher vehicle purchase prices, ② undiversified lineup, and ③ poor publicization of competitive running cost.
- As motives for purchasing or considering a ZEV, the public opinion poll of Tokyo residents concerning ZEVs refers to "Lower purchase prices" (44%), "Lower maintenance costs" (27%), and "Release of desirable vehicle models"(18%).



Public Opinion Poll on Vehicle Use to Realize a Zero Emission Tokyo
(Motives for purchasing or considering an electric vehicle etc. (ZEV))

Buses, cargo vehicles (EVs, FCVs)

- As there are no EV buses mass-produced in Japan, only a few modified EV buses have been introduced in Tokyo.
- The sales of new EV cargo vehicles mass-produced in Japan were also extremely small with 159 vehicles owned (stocked) in Tokyo in FY 2018.
- Mass-produced FC buses were released in 2018 with 16 buses introduced in Tokyo as of the end of FY 2018. It is necessary to reduce vehicle prices and diversify lineup for expanded introduction in the future.
- FC cargo vehicles have started operation through a verification project.

© Hino Motors, Ltd.

EV bus

© TOKYO R&D Co., Ltd.

FC cargo vehicle

Motorcycles (EVs, FCVs)

- EV motorcycles have the advantages of zero emissions, low noise, and low running costs. However, they have not spread yet as they are more expensive than gasoline motorcycles, and the lineups including those of sizes, body types, and colors, have not been diversified.
- The development of FC motorcycles is also in progress.

© Yamaha Motor Co., Ltd. © Honda Motor Co., Ltd.

EV motorcycles

2 2030 Policy Targets

▶ **Market share of ZEVs increased to 50% of new passenger car sales in Tokyo**
TMG will drive the zero emissions trend in the transport sector by identifying global movement toward ZEVs and setting numerical targets exceeding those of the national government.

▶ **New small route buses for sale limited to ZEVs in principle**
TMG will foster the momentum toward the spread of ZEV buses by supporting the introduction of ZEVs into community-based buses, which are increasingly needed with the aging of the population.

▶ **Introduce 300 or more zero emission buses**
By steadily introducing zero-emission buses and creating initial demand, TMG will promote the expansion of vehicle model lineups, technological development, and cost reductions for the further spread of these buses.

3 Developing Initiatives toward 2030

▶ Create initial demand by developing initiatives, such as subsidization to reduce vehicle purchase prices

▶ Consider a mechanism to encourage the introduction of ZEVs, taking into account the spread of ZEVs

Subsidization and Support

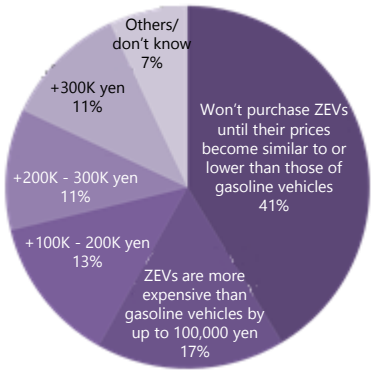
▶ **Make up the price difference from the same class vehicles to mitigate the impression of higher costs or heavier burden and inspire automotive manufacturers to promote ZEV development and diversify vehicle model lineups**

■ Passenger vehicles (EVs, PHVs, FCVs)

- To create initial demand and ensure mass production by automotive manufacturers, TMG will subsidize individuals and businesses.
- TMG aims to significantly increase the sales of new ZEVs through intensive subsidization.

■ Buses, cargo vehicles (EVs, FCVs)

- TMG will study and examine efforts to turn large buses and cargo vehicles, which are not mass-produced, into ZEVs.
- TMG will support the introduction of ZEVs into community-based buses increasingly needed with the aging of the population.
- Since the cost of introducing FC buses is higher than that of diesel buses, TMG will provide subsidies so that the former can be introduced at a cost similar to that of the latter.



Public Opinion Poll on Vehicle Use to Realize a Zero Emission Tokyo
(Price difference with gasoline vehicle to consider purchasing ZEV)

■ Service vehicles (EVs, FCVs)

- Replacing service vehicles for delivery or cleaning with ZEVs can contribute to CO_2 emissions reductions as they travel long distances and there is a relatively large number of them on the road.
- TMG will promote the spread of ZEVs by taking measures to support their utilization as service vehicles.

■ Motorcycles (EVs, FCVs)

- For the further promotion of EV motorcycles, TMG will subsidize individuals and businesses so that they can be introduced at a cost similar to that of their gasoline counterparts.

Program and Mechanism

▶ Consider a mechanism to encourage users, manufacturers, and dealers to introduce ZEVs

- In the Vehicle Emission Reduction Plan based on the Tokyo Metropolitan Environmental Security Ordinance and the Program for Introducing Low-emission, Fuel-efficient Vehicles, TMG will examine mechanisms to encourage the introduction of ZEVs, such as reporting of the number of ZEVs introduced.

Current program: Program for Introducing Low-emission, Fuel-efficient Vehicles

Targets:	Approximately 200 businesses with 200 or more vehicles
Obligation:	Achieve an introduction rate of 15% or more for low-emission and fuel-efficient vehicles designated by TMG by FY 2020
Penalty:	Recommendation for taking measures, publication

→ Mechanisms to encourage the introduction of ZEVs

- By referring to cases in California and cities in China that implement regulatory methods, TMG will study and examine new mechanisms to apply in Tokyo, taking into account the spread of ZEVs in the city.
- TMG will consider continuing tax exemption in the motor vehicle tax (category base) for ZEVs, taking into account the spread of ZEVs.
- With the aim of utilizing used ZEVs, which are expected to increase in the future in parallel with their spread, TMG will accumulate knowledge through awareness-raising activities in the islands and study market trends, taking into account examination by the national government.

TMG's Initiatives for its Own Sustainability

▶ Proactively incorporate ZEVs into TMG-owned vehicles

- TMG is introducing ZEVs by ensuring the replacement of TMG-owned vehicles with ZEVs, when updating, in principle.
- TMG is also promoting the use of ZEVs as Tokyo metropolitan buses. We will introduce FC buses, with a target of 70 buses by the Tokyo 2020 Games and a further target of 80 total buses by FY 2021.
- The Tokyo Fire Department introduced EVs, FCVs, and EV motorcycles by FY 2018, and will introduce EV ambulances, small EVs, and EV trikes* as the first emergency vehicles in FY 2019. The Metropolitan Police Department will also introduce EV motorcycles in FY 2019.
- TMG will continue replacing its vehicles with ZEVs including EV motorcycles.

* Trike: Tricycles and three-wheel motorcycles.

EV motorcycle
(photo courtesy of Tokyo Fire Department)

Column 2

● Using ZEVs as Energy Infrastructure ●

Effective Use of ZEVs in Case of a Disaster

ZEVs can supply power through an in-vehicle power outlet, portable vehicle-to-load system, and V2H* device. In the event of a disaster, with their mobility ZEVs can be moved to evacuation centers and other places to charge evacuees' electronic devices, including mobile phones.

TMG will promote the introduction of equipment necessary for utilizing ZEVs as an energy infrastructure, such as portable vehicle-to-load systems and V2H devices, through its subsidy project.

Portable vehicle-to-load system

© Honda Motor Co., Ltd.

V2H device

© Nichicon Corporation

* V2H: Vehicle-to-home. A function that enables the supplement of power from a battery in ZEVs to a home.

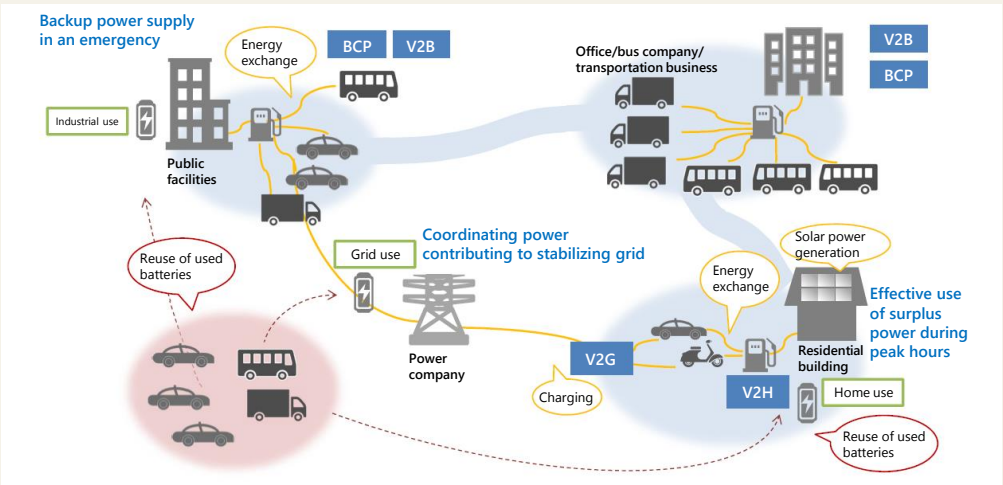
Examples of connectable devices:
Mobile phones, smartphones, electric fans, electric stoves, rice cookers, electric pots, etc.

Utilization at community center for smartphone charging

Photographed by Nissan Motor Co., Ltd.

Utilizing ZEVs for energy management

Combined with ICT technology, the power storage and supply functions of ZEVs are expected to be utilized as part of an energy infrastructure that will ensure power sources in emergencies (V2H, V2B*, etc.) and contribute to stabilizing the grid at a time of massive introduction of renewable power (V2G*).



Source: Data provided by the Secretariat of the Third Automotive New Era Strategy Meeting on April 8, 2019 at the Ministry of Economy, Trade and Industry.

ZEVs as energy infrastructure

* V2G/V2B: Vehicle-to-grid/vehicle-to-building. A function that enables the supplement of power from a battery in ZEVs to a grid or building.

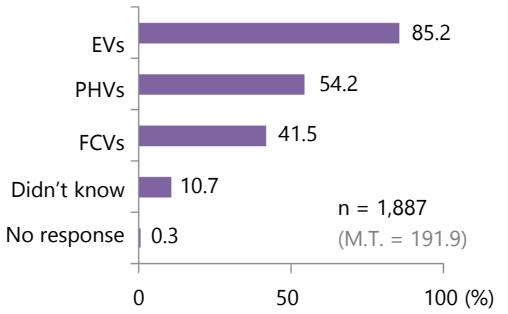
Fostering Momentum for Social Acceptance

1 Social Acceptance of ZEVs

- ▶ Awareness of ZEVs is low, their competitive running costs are not publicized well, and lack of appeal causes low demand
- ▶ A low demand for ZEVs inevitably results in rather inactive investment in ZEVs for technological development and expansion of vehicle model lineups

Tokyo residents' awareness of ZEVs

- The public opinion poll of Tokyo residents concerning ZEVs shows that EVs were relatively well recognized at 85%, but PHVs and FCVs did not gain much recognition at 54% and 42%, respectively.
- Accurate information needs to be provided as there are concerns about ZEVs, such as "high fuel costs," "uncertainty about safety of hydrogen," and "poor acceleration."



Public Opinion Poll on Vehicle Use to Realize a Zero Emission Tokyo (Awareness of electric vehicles (ZEVs))

2 Developing Initiatives

- ▶ Foster the momentum for the expansion of ZEVs through public-private partnerships by ensuring understanding of businesses and local governments, sharing information on advanced cases, and providing information in a collaborative manner

Promote Expansion through Public-private Partnerships

■ Efforts by the Tokyo Hydrogen Promotion Team to raise awareness of ZEVs

- Launched in collaboration with private businesses and local governments in Tokyo, the Tokyo Hydrogen Promotion Team will promote efforts to raise awareness of ZEVs, such as using stickers shared by all team members, to call attention to FCVs.

■ Efforts to expand the introduction of charging infrastructure and ZEVs

- TMG will aggressively encourage the introduction of public chargers to private facilities by calling on private businesses that are eager to install chargers and developing movements while disclosing the TMG's efforts to enhance the public charging infrastructure and sharing the status of businesses' initiatives.
- At the same time, TMG will promote the spread of ZEVs, inspiring automotive manufacturers to promote ZEV development and diversify vehicle model lineups.

Create Opportunities to Experience ZEVs

■ Experience learning at the Tokyo Hydrogen Museum

- Acting as a hub to provide information on hydrogen energy, the Tokyo Hydrogen Museum is a comprehensive learning facility where you can enjoy learning about invisible hydrogen, the future of a hydrogen society, and the mechanism and features of FCVs through sight, touch, and experience. Since its opening in July 2016, more than 50,000 people have visited the Tokyo Hydrogen Museum.

Tokyo Hydrogen Museum (photo courtesy of Tokyo Environmental Public Service Corporation)

Governor Koike and Tokyo Hydrogen Museum mascot Suison

■ Encouraging the introduction of ZEVs to rental car and car sharing services

- In the industries of rental car and car sharing services, TMG will implement a joint venture with businesses to provide opportunities to allow Tokyo residents to use ZEVs at affordable rates.

Project to promote the introduction of ZEVs to rental car and car sharing services

■ Promotion of raising public awareness of ZEVs in the islands

- In the islands, where there are few opportunities to interact with ZEVs, TMG will promote the spread of ZEVs by creating opportunities to experience EVs and zero emission motorcycles.

Tokyo Island Motor Show in Hachijojima

■ Exhibition at various events (exhibition of ZEVs, demonstration of vehicle-to-load system)

- TMG will hold an exhibition at various events in Tokyo to put ZEVs on display and give a demonstration of vehicle-to-load systems that supply power from ZEVs to various devices.
- TMG will stimulate consumer appetite by helping them experience the benefits and ease of use of ZEVs as well as their capability as an emergency power supply in the event of a disaster.

Demonstration of a vehicle-to-load system

■ PR activities with a sticker on TMG-owned vehicles

- TMG will apply a sticker to its ZEVs indicating that they are EVs or FCVs, letting people walking in the street know that ZEVs are being driven all around them.

Sticker for TMG-owned ZEVs (FCVs)

Column 3

Large-Scale Events for ZEV Promotion

To raise public awareness of ZEVs, it is effective to hold large-scale events which attract people, and various related events are being held both in Japan and overseas.

Examples of large-scale events

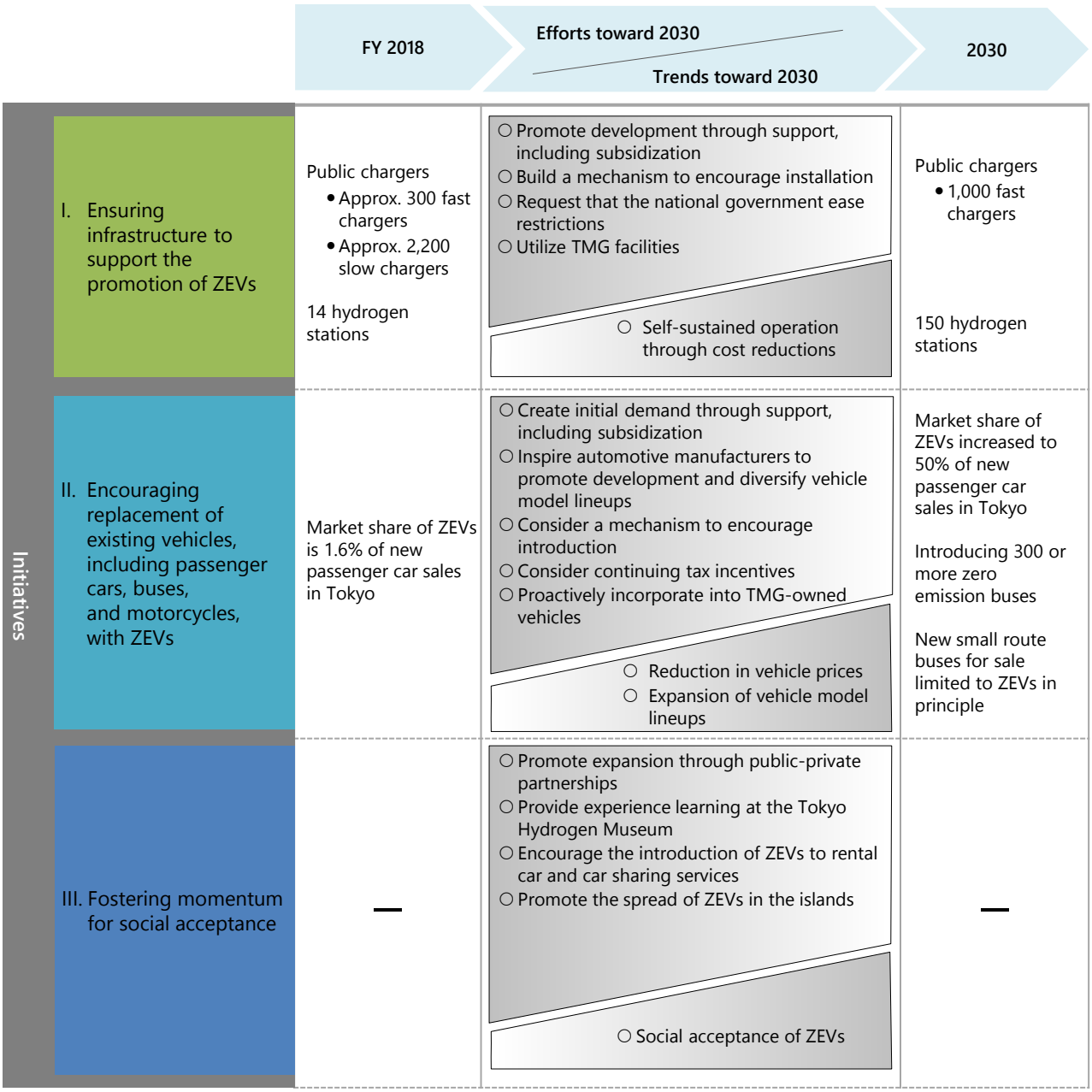
EcoPro 2019

Tokyo Motor Show 2019

Public road race by EVs (NYC, 2019)

Roadmap for 2030

- To achieve 2030 policy targets, TMG will develop initiatives taking into account ZEV-related trends in technological development and markets.



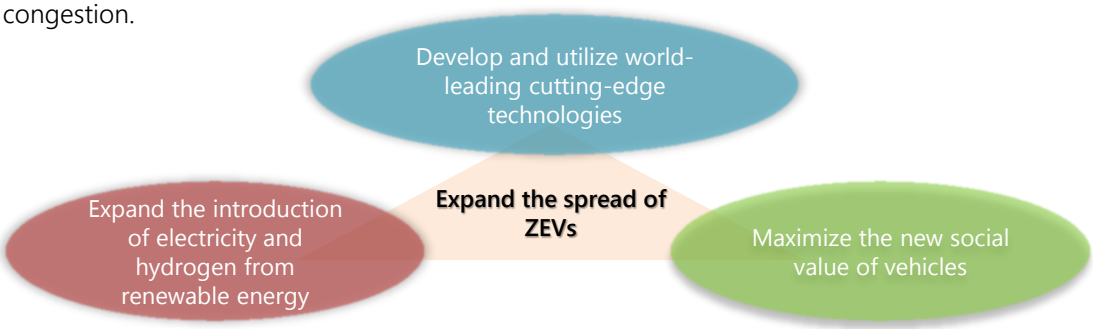
Challenges toward 2050

To replace all cars driven in Tokyo with ZEVs and realize zero emissions in a well-to-wheel manner by 2050, we will need to accelerate efforts toward achieving 2030 policy targets with an eye on the stage following the expansion of spread of ZEVs.

Conclusion

The stage following the expansion of spread of ZEVs

- **Promoting the development and use of cutting-edge technologies**
  - Following the expansion of the spread of ZEVs, TMG will promote and make the best use of: innovations in battery technologies, the spread of contactless chargers, and the development of a high-efficiency hydrogen supply system, etc.
- **Realizing a substantial shift to the elimination of fossil fuels by expanding the introduction of electricity and hydrogen from renewable energy**
  - By promoting the local production and consumption of energy and the expanded use of renewable energy, TMG will make electricity and hydrogen CO_2 free from the manufacturing stage to realize zero emissions from well-to-wheel.
- **Maximizing the new social value of vehicles**
  - TMG will advance energy management at home and in communities by expanding the use of ZEVs as an energy infrastructure, including V2H and V2G.
  - By supporting MaaS through the promotion of ZEVs, TMG will contribute to removing transportation difficulties faced by Tokyo residents and solving urban issues, such as traffic congestion.



TMG will contribute to the realization of a Zero Emission Tokyo with "Expand the spread of ZEVs" at the core and "Develop and utilize cutting-edge technologies," "Expand the introduction of electricity and hydrogen from renewable energy," and "Maximize the social value of vehicles" complementing each other.

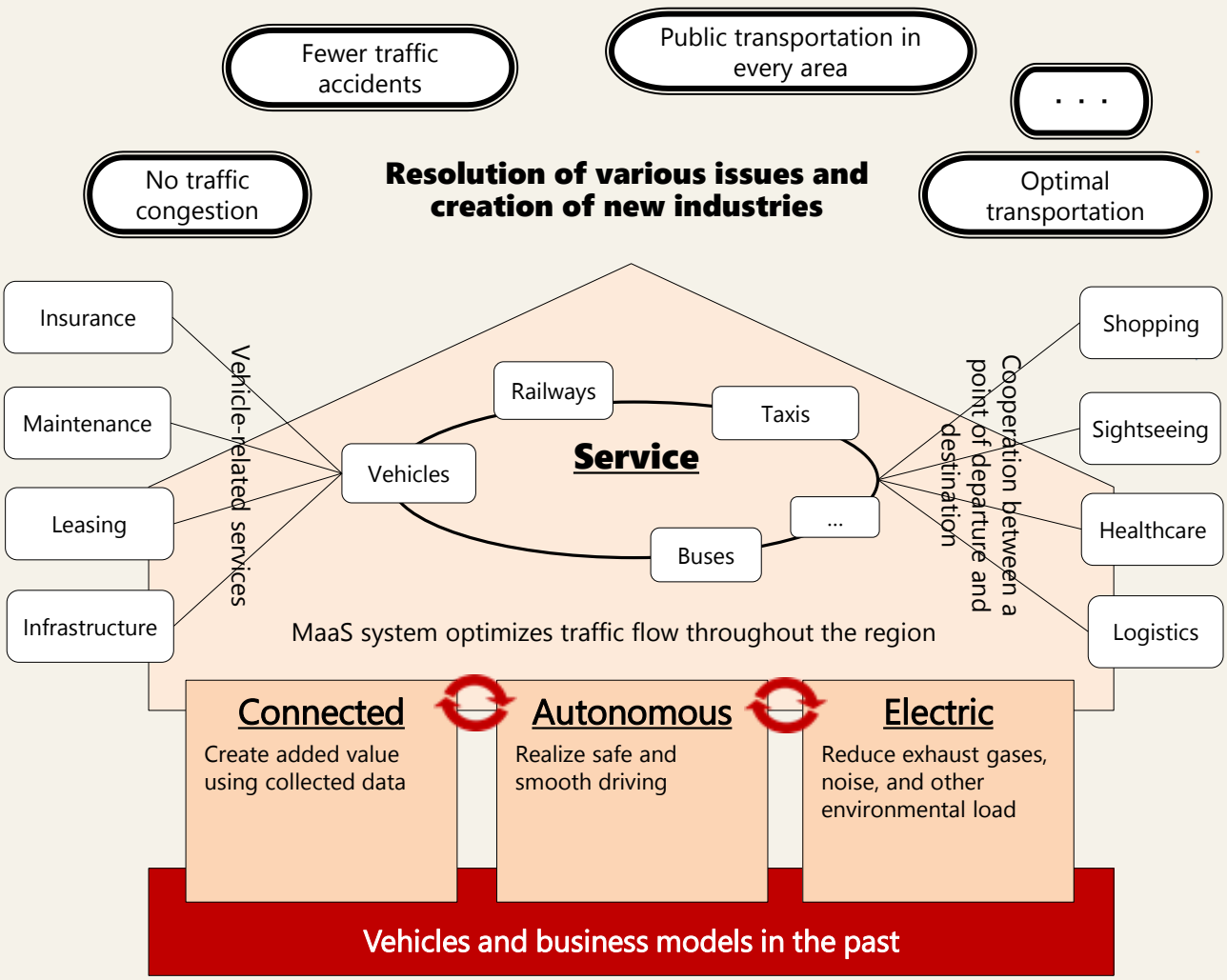
Column 4

Possibility of a New Mobility Society Brought About by the Spread of ZEVs

Approximately 130 years after Karl Benz developed the first three-wheeled gasoline vehicle in 1886, the recent environment surrounding vehicles is changing rapidly. In the vehicle industry, a major technological innovation called CASE has begun. This stands for Connected, Autonomous, Service, and Electric.

The use of IoT and AI as well as the mutual collaboration between Connected, Autonomous, and Electric have created a new mobility service called Mobility as a Service (MaaS), which is expected to contribute to the resolution of various social issues related to transportation and the creation of new industries.

The spread of ZEVs will support the broader use of CASE and bring comfort and affluence to people's lives.



Problem solving with CASE (created by TMG based on material of Accenture Japan Ltd.)

Reference materials and literature

Sources, publishers	Material names
IEA (International Energy Agency)	Global EV Outlook 2019 (Scaling-up the transition to electric mobility: May 2019)
IEA (International Energy Agency)	CO_2 Emissions from Fuel Combustion 2019
Cabinet Meeting on Renewable Energy and Hydrogen	Basic Hydrogen Strategy (December 26, 2017)
Ministry of the Environment	Basic Environment Plan (April 17, 2018)
Ministry of Economy, Trade and Industry	Basic Energy Plan (July 2018)
Public-Private Data Utilization Promotion Strategy Meeting at Advanced Information and Communication Network Society Promotion Strategy Headquarters (Japanese)	Public-Private ITS Initiatives/Roadmap 2019 (June 7, 2019) (Japanese)
Statistics Bureau, Ministry of Internal Affairs and Communications	The 2015 Population Census of Japan
Study Group on New Mobility Services Brought About by IoT and AI	Vitalization of New Mobility Service (April 8, 2019) (Japanese)
Ministry of Economy, Trade and Industry and Ministry of Land, Infrastructure, Transport and Tourism	Guidebook on Installation of Charging Equipment for EVs and PHVs (June 2017) (Japanese)
Ministry of Economy, Trade and Industry	Data provided by the Secretariat of the Third Automotive New Era Strategy Meeting (April 8, 2019)
Study Group on Next-Generation Automotive Strategy (Japanese)	Next-Generation Automotive Strategy 2010 (April 12, 2010)
Working Group on CO_2-Free Hydrogen under the Council for a Strategy for Hydrogen and Fuel Cells	Report from the Working Group on CO_2-Free Hydrogen (March 7, 2017)
Council for a Strategy for Hydrogen and Fuel Cells	Strategic Roadmap for Hydrogen and Fuel Cells (March 12, 2019)
Council for a Strategy for Hydrogen and Fuel Cells	Technological Development Strategy for Hydrogen and Fuel Cells (September 18, 2019) (Japanese)
GoGoEV (GOGO Labs, Inc.)	Information on Electric Vehicle (EV) Charging Stations (Japanese)
CHAdeMO Council	Charging Facility Location Information (October 17, 2019) (Japanese)
JETRO Toronto, Japan External Trade Organization (JETRO)	Report on Rulemaking in Canada (March 2017)
PwC Japan LLC	Report from PwC Japan LLC: "Automotive Insights: Future Trends in Automobiles: Can EVs Become Mainstream in the Future?" (Japanese)
Office of the Governor for Policy Planning, Tokyo Metropolitan Government	New Tokyo. New Tomorrow. (FY 2019) The Action Plan for 2020. (January 2019)
Bureau of Citizens and Cultural Affairs, Tokyo Metropolitan Government	Public Opinion Poll on Vehicle Use to Realize a Zero Emission Tokyo (March 2019) (Japanese)
Bureau of Urban Development, Tokyo Metropolitan Government	The Grand Design for Urban Development - Creating Tokyo's Future (September 2017)
Tokyo Strategic Conference to Realize Hydrogen-Based Society (Secretariat: Bureau of Environment, Tokyo Metropolitan Government)	Summary of FY 2014 Tokyo Strategic Conference to Realize Hydrogen-Based Society (February 2015)
Bureau of Environment, Tokyo Metropolitan Government	Tokyo Environmental Master Plan (March 2016)
Bureau of Environment, Tokyo Metropolitan Government	Final Energy Consumption and Greenhouse Gas Emissions in Tokyo (preliminary results for FY 2017)
Bureau of Environment, Tokyo Metropolitan Government	Final Report on Survey of ZEV Promotion (March 2019) (Japanese)
Bureau of Environment, Tokyo Metropolitan Government	Annual Report on the Environment of Tokyo 2019 (October 2019) (Japanese)
Bureau of Transportation, Tokyo Metropolitan Government	2019 Management Plan of Bureau of Transportation, Tokyo Metropolitan Government (January 2019) (Japanese)

ZEV Promotion Strategy

Edited and published by:

Next Generation Energy Promotion Section, Climate Change & Energy Division, Bureau of Environment, Tokyo Metropolitan Government

8-1 Nishi-Shinjuku 2-chome, Shinjuku-ku, Tokyo 163-8001

TEL (03)5388-3599

Automotive Environmental Control Section, Environmental Improvement Division, Bureau of Environment, Tokyo Metropolitan Government

8-1 Nishi-Shinjuku 2-chome, Shinjuku-ku, Tokyo 163-8001

TEL (03)5388-3462


TOKYO
METROPOLITAN
GOVERNMENT
Tokyo Tokyo
Old meets New