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Risks from electric vehicles

Tracking the changes in risks from automobile insurance

MAKING AN IMPACT THAT MATTERS since 1845

Contents

1. Introduction

Climate action is a pressing issue for the entire globe, and a transition away from fossil fuels is urgent. Transport accounts for more than a third of CO2 emissions from end-use sectors,[1] and vehicles will need to switch to non-gasoline fuels. Countries around the world are implementing measures to switch to electric vehicles (EVs), providing various subsidies and tax exemptions. In addition, rising oil prices have spurred a shift to EVs, which have seen rapid sales growth in Europe and China.[2] In Japan, hybrid vehicles have become mainstream, but a further shift to EVs is expected in the future.

EVs differ from gasoline-fueled vehicles in their body structure and function, and also in the risks related to their ownership, use, and/or maintenance. There have been attempts to pass on these risks through automobile insurance, but what accidents occur and the nature of the damages incurred may change. We must wait until a sufficient amount of insurance data has been accumulated to quantify these changes, however, empirical verification of EV safety is being carried out by various people/institutes in concern.

In this paper, we examine the risks from EVs, which are rapidly expanding in use, from an insurance point of view.

[1] International Energy Agency, “Transport, Why is transport important?” <https://www.iea.org/energy-system/transport> (visited on Oct. 3, 2023)

[2] International Energy Agency, “Global EV Outlook 2023, Catching up with climate ambitions,” CC BY 4.0, Apr. 2023.

2. Rapidly Increasing Number of Electric Vehicles (EVs)

Global market

New EV sales are growing rapidly, exceeding 10 million globally in 2022 and accounting for 14% of new vehicle sales. In 2023, the number of new vehicles is expected to continue to grow significantly to 14 million (see Exhibit 1), with 18% of new vehicles assumed to be EVs.[3] While the major markets for EVs are China, Europe, and the U.S., sales growth was also seen in Asian countries such as India, Thailand, and Indonesia in 2022.[4]

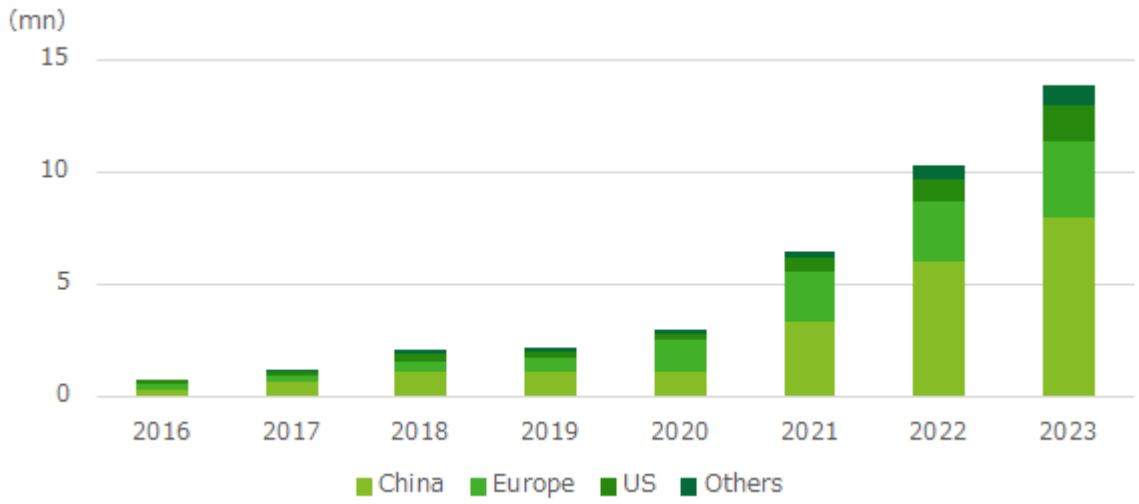
The growth of EVs has been supported in part by government subsidies, but in 2023, the UK stopped subsidizing EVs and turned to building charging facilities.[5] In addition, the UK government postponed banning the sale of new gasoline and diesel vehicles from 2030 to 2035.[6] Germany has also proposed a reduction in subsidies.[7] The impact of such governments' moves on the EV market is noteworthy.

China's breakthrough

According to China's Ministry of Public Security, 13.1 million out of 319 million vehicles the Chinese people hold are new energy vehicles,[8] which accounts for 4.1% of all vehicles in China.[9] This is attributed to preferential treatment such as exemption from taxes on the acquisition of new energy vehicles and subsidies for manufacturers of those types of vehicles. In addition, among manufacturers, companies that have worked to improve their technology and introduced models at lower prices have increased their sales.[10] Automotive exports from China, led by new energy vehicles, have increased, raising Chinese auto exports to the world's second largest after Japan in 2022.[11]

In response to China's rise, the EU has taken issue with Beijing's subsidies and said it would launch an investigation with a view to adding countervailing duties, prompting China to express "strong concerns and intense frustration."[12]

(Exhibit 1) Trends in global EV sales



Data source: International Energy Agency, "Electric Vehicles, Electric car sales break new records with momentum expected to continue through 2023," IEA. License: CC BY 4.0. <https://www.iea.org/energy-system/transport/electric-vehicles> (visited on Oct. 3, 2023)

[3] Same as in previous footnote 2.
[4] Ibid.
[5] JETRO, "UK ends subsidies to buy plug-in cars, focuses on more charging facilities," Jun. 22, 2022.
[6] Hanna Ziady, CNN, "The UK is delaying the switch to electric cars. Automakers are furious," Sep. 20, 2023.
[7] JETRO, "Official announcement on reduction of electric vehicle purchase subsidies and elimination of PHEV subsidies," December 12, 2022.
[8] EVs and fuel cell vehicles (FCVs).
[9] JETRO, Business Report, "China owns 13.1 million new energy vehicles at the end of 2022, helped by the acquisition of tax exemptions," Jan. 18, 2023.
[10] Akane Yamanoi, "Achievement of China's New Energy Vehicle Policy and Future Prospects," Mitsubishi UFJ Research & Consulting, Sep. 12, 2022.
[11] JETRO, Regional and Analysis Report, "China's auto exports surge, led by new energy vehicles," Mar. 16, 2023.
[12] JETRO, Business Report, "China complains about EU's EV survey of Chinese EVs, calls for fair, non-discriminatory, and predictable market conditions," Sep. 19, 2023.

Japanese market

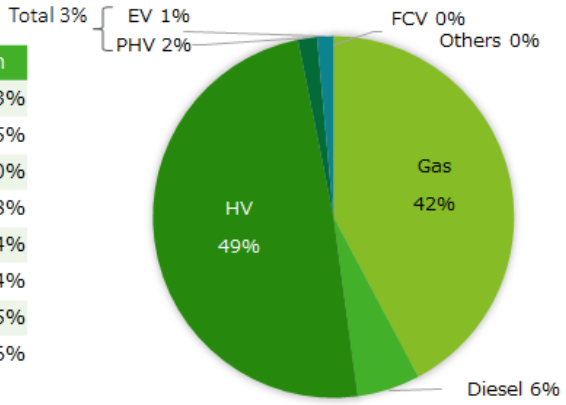
In Japan, the EV market has not expanded as much as in Europe and Asia. The Japanese market is dominated by hybrid vehicles because of the following reasons: (1) EV vehicle prices are high, (2) there are concerns about range of travel, (3) there is a lack of charging infrastructure, (4) such vehicles are not suited for condominiums, and (5) automakers are committed to hybrid vehicles.[13]

Nevertheless, in 2022, the total sales of new EV vehicles, including both ordinary and light passenger cars, was about 60,000, which was an increase of 2.7 times from the previous year. Including plug-in hybrid vehicles, EVs account for about 3% of new vehicle sales. (See Exhibit 2)

Japanese automakers have led the global market in hybrid vehicles, but in recent years have announced an increase in the proportion of EVs.[14] Japanese manufacturers have introduced low-cost light EVs, and in September 2023, a Chinese manufacturer announced the launch of a low-cost model for the Japanese market.[15] Subsidies were increased in 2022,[16] and charging facilities are being installed in new condominiums and office buildings, highway service areas, and convenience stores.[17] In Japan, various measures have been taken to achieve the goal of "all new passenger car sales being EVs by 2035."

(Exhibit 2) Sales volume of new vehicles by fuel types in Japan (ordinary passenger cars)

	2021	2022	Growth
Gasoline-fueled Vehicles	1,183,129	938,750	79.3%
Diesel Vehicles	143,088	125,200	87.5%
Hybrid Vehicles (HV)	1,027,104	1,089,077	106.0%
Plug-in Hybrid Vehicles (PHV)	22,777	37,772	165.8%
Electric Vehicles	21,139	31,592	149.4%
Fuel Cell Vehicles (FCV)	2,464	848	34.4%
Other vehicles (LPG etc.)	162	64	39.5%
Total	2,399,863	2,223,303	92.6%



Source: Japan Automobile Dealers Association, "Number of vehicles sold by fuel types (passenger car)," <http://www.jada.or.jp/data/month/m-fuel-hanbai/> (visited on Oct. 3, 2023)

[13] Tokyo Century News, "Japan's penetration rate is less than 1%?! Electric Vehicles in Japan and Around the World: What are the Tokyo Century Group's efforts to promote electric vehicles?" Jun. 15, 2022.
[14] Agency for Natural Resources and Energy, the Ministry of Economy, Trade and Industry, "Decarbonization of Automobiles (Part 2) - Purchase Subsidies will be Increased! Expanding Support for Electric Vehicles," Nov. 17, 2022.
[15] Nihon Keizai Shimbun, "BYD Substantially Launches 2.98 Million Yen EV Small Mass Model in Japan, Challenging Awareness and Quality," Sep. 21, 2023.
[16] Same as in footnote 14.
[17] Yomiuri Shimbun, "Study: Japan's EV Strategy," Yomiuri Quarterly Summer 2023, Aug. 9, 2023.

3. EV risks

Damage rate for EVs involved in accidents

While EVs are equipped with the latest safety equipment, differences in body structure and function can make them different from traditional vehicles in terms of risk.

EVs are equipped with a high-capacity battery using lithium and other chemicals. The cost of replacing a battery damaged in an accident is high. Repairability is limited by the way the battery pack is installed, and damage to the battery tends to result in the vehicle being scrapped.[18]

According to a report by an automotive repair software company in the U.S., 10.31% of EVs involved in an accident were classified as non-drivable in Q2 2023, which is lower than the 13.11% of ICE vehicles.[19] EVs have relatively few moving parts and are less likely to sustain damage to their powertrain during an accident. However, electric motors and other powertrain components are in the rear of the vehicle, with the likelihood of these components being considered non-drivable after a rear-end impact being 10.87% for EVs, which is higher than the 9.72% for ICE vehicles.[20]

Battery fire risk

As the number of EVs has increased, there have been media reports indicating a risk of vehicles catching fire.[21] [22] Exhibit 3 shows the classification of causes of EV battery fires. There are some documents that have made comparisons between the frequency at which EV and gasoline-fueled vehicles catch fire. One such document is from an American insurer, which says for every 100,000 vehicles sold, there are 3,474.5 fires in hybrids, 1,529.9 fires in gasoline-fueled vehicles, and 25.1 fires in EVs.[23] An automaker reports that for every 1 billion miles driven, about 5 of their own vehicles catch fire, whereas in total 53 vehicles in the U.S. catch fire, which means that their EVs are 11 times less likely to catch fire than ICE vehicles.[24]

The main failure concerns for EV lithium batteries are heat dissipation, thermal runaway events, low-temperature charging conditions, clash/shock consequences, the effects of cell stress, and aging in the vehicle environment.[25]

In a 2017 report, the US National Highway Traffic Safety Administration concluded that "the propensity and severity of fires and explosions from the accidental ignition of flammable electrolytic solvents used in Li-ion battery systems are anticipated to be somewhat comparable to or perhaps slightly less than those for gasoline or diesel vehicular fuels."[26]

(Exhibit 3) EV Battery Fire Cause Classifications

EV in stationary	Extreme temperatures, high humidity, internal cell failure, and abuse of a LIB at some prior time
During charging	Overcharging or problems with the charging stations or cables
After a traffic crash or other abuse	Sufficient damage to cause ignition during or immediately after the crash
After an initial fire has been handled	LIB reignites
External factors	Arson or other fires (wildland, structure, or other vehicles) nearby

Source: Marty Ahrens, "Vehicle Fires", National Fire Protection Association, Mar. 2020.

[18] Nick Carey, Paul Lienert and Sarah Mcfarlane, "Insight: Scratched EV battery? Your insurer may have to junk the whole car," Reuters, Mar. 20, 2023.
[19] A vehicle powered by a gasoline or diesel engine.
[20] Ryan Mandell, Mitchell, "Plugged-In: EV Collision Insights Q2 2023," Aug. 10, 2023.
[21] Yahoo! News, "Fire again after five days!? What are the fears surrounding EV fires and what measures could be considered too novel?" Jul. 10, 2023.
[22] Best Car Web, "Are hot summers a big risk for EVs? The reason why we expect more EV fires in the future," Jul. 26, 2023.
[23] Rachel Bodine, AutoinsuranceEZ, "Gas vs. Electric Car Fires [2023 Findings]," Nov. 11, 2022.
[24] Tesla, Impact Report 2021.
[25] National Highway Traffic Safety Administration, "Lithium-ion Battery Safety Issues for Electric and Plug-in Hybrid Vehicles," DOT HS 812 418, Oct. 2017.
[26] Ibid.

Meanwhile, the National Transportation Safety Board in the U.S. has cited the dangers of EV lithium batteries to first responders. EV fires pose an electrical shock risk due to high-voltage components being damaged in lithium-ion batteries. In addition, the board said that damaged cells in the battery can cause uncontrolled temperature and pressure rises (thermal runaway), which can lead to hazards such as reignition of the battery.[27]

The number of vehicle fires in Japan is quite low (3,512 fires in 2021)[28].[29] Among the individual fire incidents that could be confirmed in the information on automobile accidents and fires[30] published by the Ministry of Land, Infrastructure, Transport and Tourism, 5 out of 859 fire cases involving passenger and light passenger cars that occurred during the three years from April 2020 to March 2023 could be identified as EV or PHEV based on the vehicle name and type.

Risks from EV freight transportation

EVs have the potential to change risks not just while in use, but across the supply chain.

Fire accidents during the freight transportation of EVs are attracting attention. A Japanese car-carrying vessel loaded with more than 3,000 EVs caught fire while sailing off the coast of the Netherlands in July 2023, and it took five days to extinguish the blaze before it could be towed away.[31] It has been pointed out that the risk posed by lithium batteries in freight transportation has not been sufficiently addressed due to this accident.[32]

Impact of vehicle weight

An EV weighs more due to its heavy battery,[33] weighing about 200–300 kilograms more than a comparable gasoline-fueled vehicle (see Exhibit 4).

When comparing large and heavy vehicles with small and light vehicles, large and heavy vehicles are more resistant to collisions. Heavy vehicles tend to keep moving forward in collisions with lighter vehicles and other obstacles, resulting in the humans within these vehicles experiencing less force. On the other hand, light vehicles are always at a disadvantage when colliding with heavy vehicles. While the weight of an EV increases the safety of its passengers, there are concerns that this could increase the threat to objects that could collide with it, such as lighter vehicles, pedestrians, and motorcycles.[34]

In recent years, automakers have improved their vehicles' energy-absorbing structures to reduce the threat from heavy vehicles.[35] In addition, the weight of EVs is being reduced through improvements to vehicle body materials, while heavier batteries with larger capacities are being mounted in order to extend their range of travel.[36]

(Exhibit 4) Comparison of EVs and gasoline-fueled vehicle weights

Model	EV	Gas
A. Luxury car	1,800 kg	1,470 kg
B. SUV	1,650 kg	1,460 kg
C. Light passenger car	1,060 kg	850 kg

Note: This comparison was carried out using specification information on the manufacturers' and sellers' website for models in which equivalent vehicles were sold both as EV and gasoline-fueled vehicles.

Risks from charging equipment

To meet user needs for EVs with increased range of travel, the development of EVs equipped with large-capacity batteries is under way. It will be necessary to raise the voltage and current values for fast-charging facilities in order to achieve shorter charging times for batteries with larger capacities. In response to the risks associated with these changes, the Fire and Disaster Management Agency in Japan has held a review committee on safety measures and is assessing the hazards posed by fast-charging facilities. (See Exhibit 5)

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[27] National Transportation Safety Board, "Safety Risks to Emergency Responders from Lithium-Ion Battery Fires in Electric Vehicles," Nov. 13, 2020.

[28] Fire and Disaster Management Agency, the Ministry of Internal Affairs and Communications, White Paper on Fire and Disaster Management in 2022.

[29] In 2020, 173,000 vehicle fires were reported across the U.S. (Same as in footnote 24.)

[30] The Ministry of Land, Infrastructure, Transport and Tourism, Automobile Recall and Malfunction, Accidents and Fires Information Database. <https://www.mlit.go.jp/jidosha/carinf/rcl/cgi-bin/accidentsearch.cgi> (visited on Oct. 3, 2023)

[31] Sankei Shimbun, "Start of towing of the carrier owned by Shoei Kisen, which caught fire off the coast of the Netherlands," Jul. 31, 2023.

[32] Charlotte Van Campenhout, Rishabh Jaiswal, Reuters, "Ship carrying nearly 3,000 cars ablaze off Dutch coast, crew member dead," Jul. 27, 2023.

[33] Blake Shaffer, et.al., "Make electric vehicles lighter to maximize climate and safety benefits," Nature Vol 598, Oct. 12, 2021.

[34] Raul Arbelaez, Insurance Institute of Highway Safety, "As heavy EVs proliferate, their weight may be a drag on safety," Mar. 9, 2023.

[35] Insurance Institute of Highway Safety, "Vehicle Size and Weight," updated Jun. 2023.

[36] Asahi Kasei, AUTOMOTIVE vol. 03 "Special Feature Theme: Extending the Range of Travel, Increasing the Range of Travel for Vehicles through 'Weight Reduction' & 'Thermal Management'," May 7, 2021.

(Exhibit 5) Hazards from fast charging facilities and hazard assessments before the implementation of safety measures

Probable hazard		Hazard classification	Magnitude of damage caused by hazard	Probability of occurrence
Manufacturing defects in batteries	The storage battery (single battery) ignites due to an internal short circuit caused by a manufacturing defect in said battery.	A2	2	b
Low-temperature charging	Charging the storage battery at a low temperature results in an internal short circuit, causing the battery to heat up or become unusable.	A3	3	b
Overcharge	Overcharging the storage battery results in, for example, the electrolyte decomposing, causing heat generation and ignition.	A2	2	b
Temperature rises	Excessive temperature rises in the storage battery result in, for example, the separator of the battery becoming broken, leading to an internal short circuit and ignition.	A2	2	b
Impact	An internal/external short circuit is generated by an impact from the outside, causing ignition/heat generation.	A1	1	c
External short circuit	A large current flow is experienced due to an external short circuit of the storage battery, resulting in heat generation.	A3	3	b
Overcurrent	Heat is generated due to excessive charge and discharge currents flowing through the storage battery.	A3	3	b
Over discharge	The storage battery becomes unusable due to over discharge of the battery.	A4	4	b
Use of reusable battery	The storage battery ignites due to the use of reusable components.	A2	2	c
Ignition, heat generation, and failure of BMS and other related components	Failure of the voltage, temperature sensor, or BMS causes overcharging and overheating of the storage battery, resulting in ignition.	A2	2	b
Submergence	An electric shock occurs when the storage battery system is submerged due to, for example, river flooding.	B	1	b

Source: Study Group on Safety Measures for Rapid Charging Facilities for Electric Vehicles with Total Output exceeding 50 kW, Fire and Disaster Management Agency, the Ministry of Internal Affairs and Communications, "Hazard Evaluation Table for Rapid Charging Facilities with Built-in Storage Batteries with Total Output Exceeding 50 kW," the 3rd meeting, Document no.3, Mar. 18, 2020.

<Hazard event classification and magnitude of damage>

Hazard classification	Hazard event	Magnitude of damage
A1	Fire may spread outside the fast-charging facility	1: Extremely affects people, goods, etc. around it.
A2	There is a possibility of fire damage in the fast-charging facility.	2: Severely affects people, goods, etc. around it.
A3	No ignition, but unexpected heat may occur	3: Mildly affects people, goods, etc. around it.
A4	Other than the above, there is a possibility that, for example, only the fast-charging facility will fail.	4: Rarely affects people, goods, etc. around it.
B	Electric shock	1: Extremely affects people, goods, etc. around it.
C	Other failures	3: Mildly affects people, goods, etc. around it.

<Probability of occurrence>

a	It is unthinkable, so it will never happen. (This will not occur during the useful life of multiple units.)
b	Unlikely but possible during the battery's useful life. (This could occur about once during the useful life of multiple units.)
c	Can sometimes occur during the battery's useful life. (This could occur about once during the useful life of a unit.)

Source: Research and Review Committee on Safety Measures for Rapid Charging Facilities for Electric Vehicles, Fire and Disaster Management Agency, the Ministry of Internal Affairs and Communications, "Approach to Hazard Evaluation Table for Rapid Charging Facilities and Draft Hazard Evaluation Table," the 3rd meeting, Document no.2-5, Sep. 28, 2011.

4. EV insurance

EV insurance

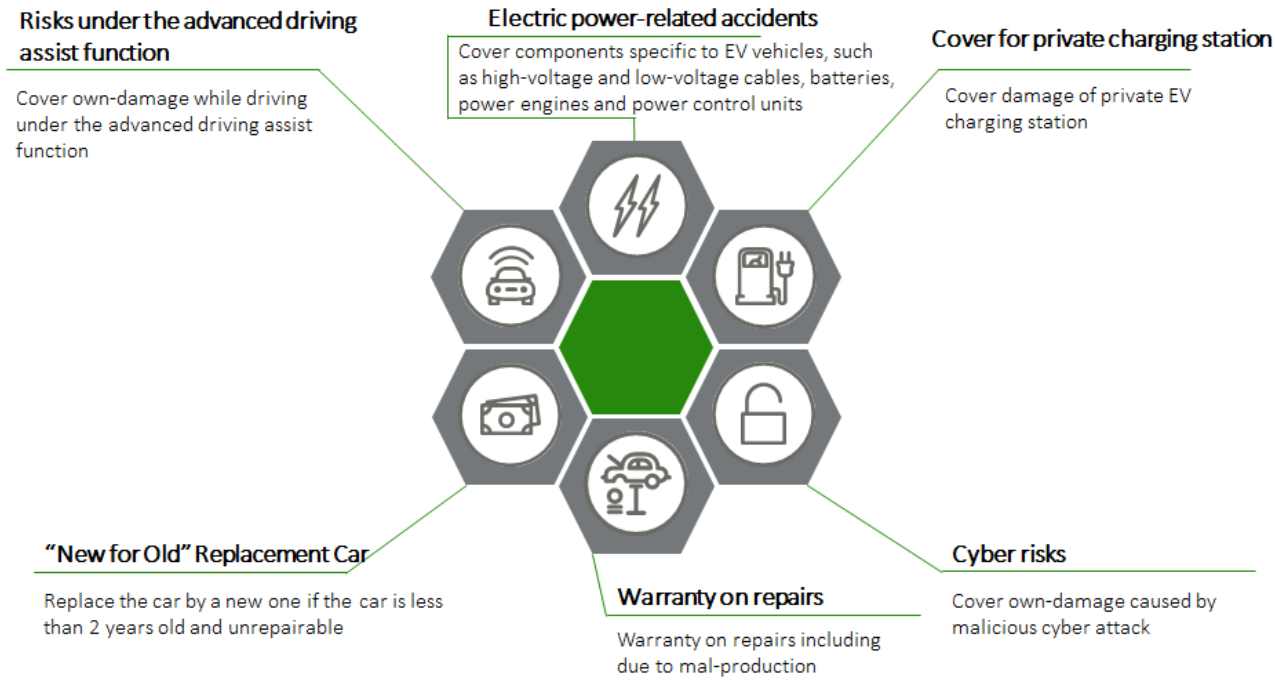
EV insurance policies are available that feature coverage for battery and power-related risks in line with EV risk characteristics. In addition, some insurance products provide coverage for advanced driving assist functions using the latest technology and allowances for cyber risks (see Exhibit 6).[37] In addition, there are also examples of some policies advertising enhanced roadside assistance, such as transporting customers to the nearest charging point when they run out of power on the go.[38]

Insurance for charging equipment

Coverage is also available for EV charging equipment.[39] Accidents related to electric power machinery may be exempted as electrical and mechanical accidents, and it may be possible to provide terms and conditions and special provisions that make it clear that charging facilities are included under this coverage.[40] In Japan, there have been cases where insurance has covered the cost for restoring charging equipment installed in places such as houses or garages if damaged by a contracted automobile with own-damage coverage.[41] In addition to property insurance for charging equipment, there is also liability insurance for power-related accidents such as cable failures.[42]

When arranging insurance for charging equipment, the owners of the vehicle and the charging equipment may be different, making it necessary to examine where the insurable interests are located. In addition, factors such as aging of charging cables and incorrect use may lead to accidents, making it necessary to check whether the assumed accident is covered by the policy.

(Exhibit 6) Examples of distinctive EV insurance coverage and services



Source: Overseas insurance company websites

[37] Allianz Singapore, "Allianz Electric Motor Protect." <https://www.allianz.sg/individual-solutions/allianz-electric-motor-protect.html>, AXA, "AXA Electric" <https://www.axa.co.uk/car-insurance/electric-car-insurance/>, Admiral, "Electric Car Insurance." <https://www.admiral.com/car-insurance/electric>, LV=, "We're Which? Recommended for electric car insurance 2023." <https://www.lv.com/car-insurance/electric-car-insurance> and others (visited on Oct. 3, 2023)

[38] Marsh Japan, <https://www.sbisonpo.co.jp/cha/insuremytesla/> (visited on Oct. 3, 2023)

[39] Lemonade, "Wall Charger Coverage." <https://www.lemonade.com/car/explained/wall-charger-coverage/> (visited on Oct. 3, 2023)

[40] The Straits Times, "Motor insurance rolls out policy to address risks linked to charging EVs at home," Sep. 5, 2023.

[41] Same as in footnote 38.

[42] Park Insurance, "Electric Vehicle Charging Station Insurance." <https://parkinsurance.co.uk/services/commercial-insurance/electric-vehicle-charging-station-insurance/> (visited on Oct. 3, 2023)

EV insurance premiums

In Japan, the premiums for automobile insurance are determined by the use and type of vehicle. Therefore, it cannot be said that the insurance premiums will be higher just because the vehicle is an EV. However, EVs are relatively expensive, and insurance premiums tend to be higher when said insurance covers own-damage. In overseas countries, EV insurance premiums are said to be higher due to the following reasons.[43] (See Exhibit 7)

1. Parts are expensive.
2. Battery replacement costs are high.
3. Mechanics' fees are high.

While EVs tend to have higher insurance premiums, some companies overseas offer favorable insurance premiums and driving advice based on driving behavior data collected from connected cars.[44]

Limited availability of body shops and repair costs

EVs require different technology than gasoline-fueled vehicles when they are repaired. A limited number of body shops with mechanics trained to repair EVs could lead to higher repair costs. [45]

According to a survey conducted by a Japanese automotive maintenance contract management company, only 45% of body shops said they could handle EV breakdowns, including hybrid vehicles.[46]

In addition, EVs carry expensive parts and equipment, such as high-capacity batteries and high-performance safety equipment, which can be expensive to repair if damaged.

Lightweight technology and repairability

New vehicle materials such as carbon fiber for weight reduction [47] and integrated vehicle body molding technology[48] make repairs difficult.

Parts of the vehicle body molded by the integral molding technique are a kind of casting, meaning that deformations to these parts cannot be reshaped by sheet metal work, as is the case with parts molded using a conventional sheet metal press. In the case of a minor collision, the impact is absorbed by the outer parts such as the bumper and does not affect the integrally molded parts. However, if the base of the vehicle, which is an integral part of the body, is damaged due to infrequent but severe impacts, this could result in the total loss of the vehicle.[49]

(Exhibit 7) Comparison of insurance premiums for EVs and gasoline vehicles in the U.S.

Make	Model	Average annual premium		
		EV	Gas	Proportion
C	SUV	$1,986	$1,891	1.05
F	Small	$2,041	$1,865	1.09
	Small SUV	$1,831	$1,663	1.10
H	Middle	$1,888	$1,988	0.95
	Middle SUV	$1,831	$1,574	1.16
T	Middle luxuary	$1,970	$1,899	1.04
	Small	$1,823	$1,909	0.95
	SUV	$1,904	$1,757	1.08
	Compact SUV	$1,776	$1,704	1.04
S	Compact SUV	$1,843	$1,606	1.15
Average		$1,889	$1,786	1.06

Source: Jason Metz, Michelle Megna, "Electric Car Insurance: Why It Costs More," Forbes Advisor, Jan. 4, 2023.

[43] Jason Metz, Michelle Megna, "Electric Car Insurance: Why It Costs More," Forbes Advisor, Jan. 4, 2023.
[44] Tesla, "Insurance." <https://www.tesla.com/insurance>(visited on Oct. 3, 2023)
[45] Progressive, "Is insurance more expensive for electric vehicles?" <https://www.progressive.com/answers/car-insurance-electric-vehicles/> (visited on Oct. 3, 2023)
[46] NAL Net Communications, "[Big data from the maintenance industry] How the automobile maintenance industry has responded in the era of CASE/MaaS, looking at the results of the survey on the maintenance factories partnered with NAL Net," Dec. 13, 2022.
[47] Ryan Mandell, Mitchell, "EV vs. ICE: The Impact on Collision Repair," Dec. 16, 2020.
[48] Sustainable Car Life, "Can TESLA's Mega Casting be repaired?," May 14, 2023. (in Japanese)
[49] Ibid.

5. Addressing EV Risks

Risks from lithium batteries

It is the lithium battery that characterizes the risks from EVs. From an insurance point of view, the increased risk due to the characteristics of these batteries should be carefully monitored, not only in the case of automobile insurance for ownership, usage, and management, but also in the case of, for example, cargo insurance when these vehicles are being transported as a commodity or liability insurance related to the manufacture and sale of EVs.

The US National Highway Traffic Safety Administration said in its report that lithium battery technology is "still evolving such that there is not yet an industry consensus on system design and performance-based test methodologies."[50] It also noted that "In this stage of technology development, designs are evolving and highly proprietary, limiting the ability of industry members to publicly discuss their knowledge and insights."[51] At the same time, it suggests that "Li-ion battery safety can be managed effectively, although substantial research and development and codes and standards development is needed."[52]

Battery replacement and recycling

Insurance is embedded in the supply chain in that it is responsible for repair and replacement costs in the event of an accident. From a sustainability point of view, a mechanism with less environmental impact is required.

In order to promote the collection and recycling of lithium batteries, it will be important to establish and develop a system that includes a collection system for used batteries, and for EV manufacturers to understand their flow from production to disposal and share information.[53] In Europe, comprehensive regulations covering the entire battery life cycle have been passed,[54] and in Japan, the promotion of recycling and reuse of lithium batteries is being studied.[55]

Addressing risks arising from EV characteristics

Other EV characteristics, such as weight, quietness, propulsion, and sudden stops due to regenerative braking, can also affect risk. While these risks differ from those found in gasoline-fueled vehicles, research is also underway to make EVs safer. Measures are being taken to, for example, reduce weight and improve pedestrian protection in the event of a collision,[56] install acoustic vehicle alerting systems so that drivers know when a vehicle is approaching,[57] develop a rapid acceleration suppression device,[58] and include a mechanism to adjust the strength of regenerative braking.[59]

Addressing risks at insurance companies

While the use of EVs is likely to increase as a part of climate action, EV ownership may pose different risks than gasoline-fueled vehicles. However, this will take time for insurance data to accumulate before EV risks are reflected in insurance rates. At this stage when technology is rapidly developing, it will be necessary to work with automakers and research institutes to recognize what risks are changing.

EVs can be covered by traditional automobile insurance, but there still is room to consider insurance schemes that better capture the risk characteristics of EVs. This is not limited to extending coverage and ancillary services such as roadside assistance, but is expected to improve customer convenience by, for example, expanding the service network so that repairs can be made smoothly in case of an accident.

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[50] National Highway Traffic Safety Administration, "Lithium-ion Battery Safety Issues for Electric and Plug-in Hybrid Vehicles," DOT HS 812 418, Oct. 2017.
[51] ibid.
[52] ibid.
[53] Akemi Ori, "Surprising Pitfalls of Eco-Friendly Electric Vehicles and Solar Power Generation," Kokumin Seikatsu No. 111, Nov. 2021.
[54] JETRO, Business Report, "EU to adopt battery rules in 2024," Dec. 13, 2022.
[55] Expert Committee on Material Strategy, the Japanese Cabinet Office, "Review of LIB Recycling (Interim Report)," in the 7th Meeting, the Ministry of Economy, Trade and Industry Manufacturing Industry Bureau, Document no.2-4, Feb. 3, 2022.
[56] The National Agency for Automotive Safety & Victims' Aid carries out pedestrian head protection performance test and pedestrian leg protection performance test.
[57] The Ministry of Land, Infrastructure, Transport and Tourism, "Report on Measures Concerning Quietness in Hybrid Vehicles," Jan. 29, 2010.
[58] Nissan Motor Co., Ltd., "Nissan Motor launches retrofit rapid acceleration control assist," Mar. 29, 2023.
[59] TEPCO Energy Partner, "[Illustration] What is regenerative braking? From the mechanism of deceleration and power generation to the operation by EV type are explained," May 31, 2022.

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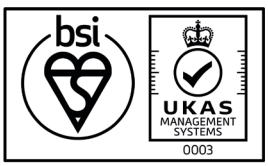

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