Electric vehicle charging station risks and controls

Growth in the number of electric vehicle (EV) charging stations across the Asia Pacific region is causing insurers to review their exposures to, and terms for, the risks that accompany them.

Introduction

The Asia-Pacific electric vehicle (EV) charging station market was valued at approximately USD 800 million in 2021 and is expected to reach a value of USD 115 billion approximately by the year 2029.[1] Government initiatives driving the adoption of EV's, the rising demand for EV fast-charging infrastructure, and the increasing deployment of EV's by shared mobility scheme operators are all key factors that are driving the growth of the electric vehicle charging stations market in the Asia-Pacific.[2]

This article, which is based on a representative literature review, explores the risks associated with the operation of EV charging stations. It further highlights risk control measures and insurance considerations to mitigate these risks.

EV charging station categories, installation locations and developers

There are three categories of charging stations currently available. In 2020, level 2 charges dominated the market, however level 3 charges are expected to grow at a higher rate moving forward.[1] (See *Figure 1.*)

Figure 1. **Three categories of charging stations**

Level 1 Charging (120 Volts)

This is an AC (alternate current) charging system that is the slowest charging method. It is sufficient for overnight charging, and a daily travel range of 48-64 kilometers. Charging cables are usually provided with the vehicle and can be plugged into a standard wall socket with no equipment installation required. It takes 17 hours on average to charge a 24 kWh battery pack.[5]

Level 2 Charging (220/240 Volts)

Most are AC charging systems, although some level 2 DC (direct current) chargers are available in the market. They require the installation of electric vehicle supply equipment (EVSE) with a dedicated 208 volt or 240 volt electric circuit. AC chargers use the same standard connector as Level 1. They can be used at home , however 240 volts and a 200-amp home electrical panel are required. They are more common in public charging stations and take eight hours on average to charge a 24 kWh battery pack.[5]

Level 3 Charging (480 Volts)

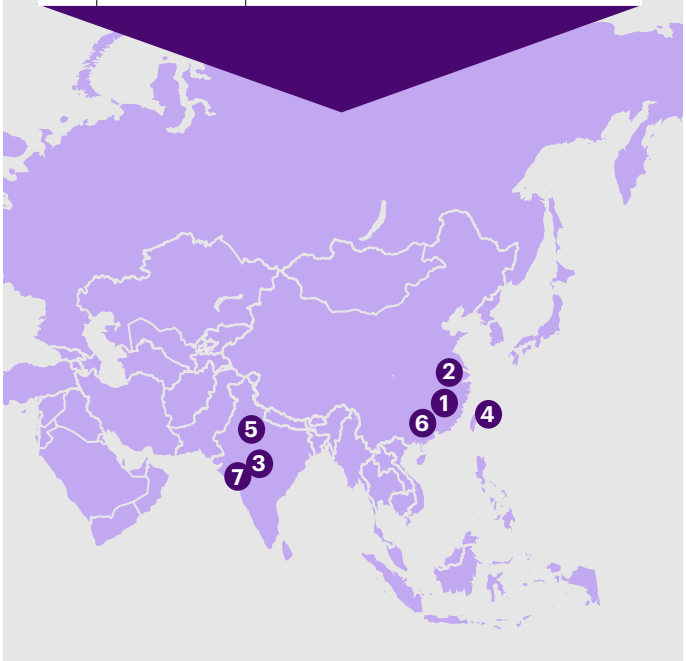
This is a DC fast charging system. It requires a 480 volt connection which is generally considered unsuitable for home use and it may not be possible to charge some EV models using a level 3 charging system. The average charging time for a 24 kWh battery back is 30 minutes.[5]

Installation locations:
EV charging stations may be located in individual houses, parking facilities including those for apartment, office or retail buildings, purpose built charging stations (similar to gas/petrol stations), and individual curb-side stations. In 2020, the individual house segment accounted for the largest share in installation type, as most EV owners prefer to charge their vehicles at home.[1]

Electric vehicle charging station developers and operators in Asia:
As at May 2022, the top seven EV charging station companies in Asia are all located in China, India and Taiwan (see *Figure 2* below):[2]

Figure 2. **The top 7 EV charging station companies in Asia**

Ref	Geography	Developer/operator
1	China	Hangzhou AoNeng Power Supply Equipment Company Ltd.
2	China	Wam Xingxing Charging Technology Company Ltd., Changzhou
3	India	Magenta Power Private Ltd., Koparkhairne
4	Taiwan	Delta Electronics Incorporated, Taipei
5	India	EV Motors India Private Ltd., Noida
6	China	Xpeng Motors, Guangzhou
7	India	Tata Power Company Ltd., Mumbai



EV charging station risks

The main risks associated with EV charging stations are:

Fire hazard:
Fire is the number one hazard when it comes to EVSE installations. The most common cause related to the installations themselves is outdated electrical wiring and power supplies within the building or structure where the charger is installed.[6] Additionally, the lithium-ion batteries within EV vehicles may also be a potential source of high-voltage fires.

Electric shock:
Regardless of the installation location, the high voltages (120-480V) required to charge EVs leaves users potentially vulnerable to electrocution when charging their vehicles. Damage to cables and charging equipment, through wear and tear, accidental damage, vandalism, theft or otherwise, can increase the risk of electric shock.[7] Another potential source of electric shock is ground fault circuit interrupter (GFCI) failure.[6]

Cybersecurity:
Identified cyber risks associated with EV charge stations range from loss of personal identifiable, billing or financial information to the compromise of partner networks, damage to battery or other EV components, compromise of life safety systems, malfunctioning of EVSE, and bulk power system frequency increase.[8]

Associated risks:
Other risks which may be associated with one or more of the above, include charger siting location and layout risks, safe maintenance, inspection and repair, firefighting and emergency response, planned and unplanned disconnection and reconnection to primary power sources, and unauthorized access to high voltage electrical equipment, connections and cabinets.

Risk management and controls

Compliance with International Standards and Certification
The 2023 edition of NFPA 88A (Standard for Parking Structures) provides guidance on the installation and labelling of EV charging stations and equipment in Chapter 7 of the Standard (Special Hazard Protection). In addition, Article 625 of the National Electric Code, provides further information in relation to the general scope of EV power transfer systems, requirements for voltages, listing of electrical equipment, equipment construction including cords and cables, installation of charging equipment including equipment connection, disconnection means and overcurrent protection, loss of primary power source, interactive systems, location of EV supply equipment and ventilation, as well as wireless power transfer equipment requirements.[4]

The Institute of Engineering and Technology (IET) has also issued a Code of Practice (4th Edition) for EV charging equipment installation.[9] The Code applies to the installation of dedicated conductive charging equipment for the charging of pure electric and plug-in electric road vehicles, including extended range EVs. However, the installation of wireless power transfer charging equipment is not currently covered, nor are socket-outlets provided for general power, or local authority planning and building regulations.

Certification by Nationally Recognized Testing Laboratories (NRTL)
Intertek and Underwriter's Laboratory (UL) are the most common NRTLs to provide testing and certification of EVSE's in North America.[3] Both organizations are approved NRTL's by the U.S. Occupational Safety and Health Administration (OSHA) and provide third-party safety tests for a range of technologies including EV chargers.

Fire risk assessment and safety management
In the U.K., the RISCAuthority and the Fire Protection Association (FPA) have published recommendations for fire safety when charging electric vehicles.[10] The recommendations are intended to provide guidance to insurers and their clients on fire hazards and control measures associated with the charging of EVs, bicycles and similar devices. However, the charging of pallet trucks, fork lift trucks and similar equipment which are not designed as modes of passenger transport, are outside the scope of these recommendations.

Manufacturer and installer guidelines for emergency response
Most EVSE manufacturers and installers (e.g. Tesla), have also publish emergency response guidelines for certified emergency rescuers and first responders. The guides are intended to provide specific information required to understand and safely handle equipment in an emergency situation, with the assumption that users already have an understanding of how safety systems work and have completed appropriate training and certification required to safely handle rescue situations.[11]

Cyber risk management
There are two key elements of cybersecurity: (i) implementation and management controls, and (ii) governance.[8] Cybersecurity management controls may include controls over access, authentication, configuration, incident response and network communication in a multi-stakeholder environment. They may also include compliance with relevant cybersecurity standards, including those published by the National Institute of Standards and Technology (NIST).

Insurance considerations

EV charging station operators should confirm with their insurers that relevant property damage, general liability, work injury and cybersecurity policies sufficiently cover these exposures. Other potential insurance implications that should be considered include:

Business interruption (BI):
EV charging stations within commercial, retail or residential properties may put additional strain on limited electrical resources. The risk of a power outage is potentially higher with the installation of an EV charging station within these premises.[12]

Theft/vandalism:
Theft of charging cables that can be stripped for copper wiring and resold at high profit margins is a potential loss exposure, particularly in public or shared EV charging facilities. Similarly, protection against vandalism of EV charging equipment is an additional insurance consideration for public charging station facilities that do not have 24 hour security or supervision.[13]

Third party personal injury:
EV charging station cabling needs to be of sufficient length to facilitate connectivity to vehicles. However, cabling should be used and stored in a manner that does not present any additional trip and fall hazard to third parties using or visiting public charging stations.[12]

Product liability warranties:
In situations where charging equipment or cabling is manufactured by a third party, rather than the vehicle manufacture or the EV charging station operator, the question of whether a manufacturer's warranty extends all the way through the retail chain needs to be considered.[14] Manufacturer or supplier contracts may need reviewing to ensure that charging station service providers are appropriately indemnified and insured against product related failures and liability.

WTW risk engineering services

With the expected growth in the development of EV charging stations within the Asia Pacific over the next five to 10 years, insurers are increasingly re-examining their exposure to this market and requiring tighter management controls, particularly relating to fire, electric shock and cybersecurity risks. In this context, WTW is well positioned to work with both our insurance partners and regional clients, in the development and implementation of effective property, BI, contractual, cyber and liability risk solutions to address the challenges associated with these evolving EV charging risk control obligations.

Further information

For more information please contact your WTW consultant or:

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References

[1]*Asia-Pacific Electric Vehicle Charging Stations Market – Industry Trends and Forecast to 2029*, Data Bridge Market Research, 2022.

[2]*Top 7 Companies in Asia-Pacific Electric Vehicle Charging Stations Market*, Meticulous Research, 2022.

[3]*Electric Vehicle Charging Stations*, GNY Insurance, 2022

[4]*Electric Vehicle Power Transfer Systems*, Article 625, National Electrical Code, U.S.A., 2022.

[5]*Electric Car Charging Overview*, DriveClean, California Air Resource Board, 2021.

[6]*Why safety matters when it comes to EV charging stations*, Charged Electric Vehicles Magazine, 2021.

[7]*5 Common Risks for Electric Vehicle Users at Charging Stations – and How to Reduce Them*, MS Amlin Insurance, 2022.

[8]*Electric Vehicle (EV) Charging Station Cybersecurity and Risk Management*, ResiliAnt, 2022.

[9]*Electric Vehicle Charging Equipment Installation – Code of Practice (4th Edition)*, The Institute of Engineering Technology, U.K., 2020.

[10]*RC59: Recommendations for fire safety when charging electric vehicles*, RISCAuthority and Fire Protection Association (FPA), UK, 2021.

[11]*Supercharger Emergency Response Guide*, Revision 1.0, Tesla, 2020.

[12]*Electric Vehicle Charging Station Insurance (For EV Cars)*, EK Insurance, USA.

[13]*EV charging station insurance – when are you protected*, Signature Electric, 2014.

[14]*Understanding legal, insurance risks of electric vehicle chargers*, J. Reive, Miller Thomson's Transportation & Logistics Group, 2021.

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