International Journal of Traffic and Transportation Engineering 2022, 11(1): 8-10
DOI: 10.5923/j.ijtte.20221101.02

The Need for Preparedness to Deal with Potential Risk Exposures & Road Accidents with Electric Vehicles in Kuwait

Jasem Alrajhi[1,*], Fahad Almaskari[1], Mohsen Alardhi[1], Khaled Alhaifi[1], N. Alhaifi[1], Mohammad Albannaq[2]

[1]Automotive & Marine Engineering Technology, College of Technological Studies, PAAET
[2]Mechanical Power & Refrigeration Technology, College of Technological Studies, PAAET

Abstract Owing to consumer demand and government initiatives focused on combating climate change the electric vehicles adoption is expanding around the globe. In 2030, more than 100 million such vehicles are expected to be on the road, compared to about seven million currently. There is obviously an electric future in transport, as a result there will be a natural increase of accidents involving electric vehicles & various risks associated with these vehicles. Currently there are not many cases of accidents therefore the rescue services & preparedness to deal with such accidents are still partially open point for discussion. This paper presents the potential risk exposures and need for preparedness to deal with these risks & road accidents related to Electric vehicles in Kuwait.

Keywords Electric Vehicles, Accidents, Risk Exposures, Preparedness

1. Introduction

The number of electric vehicles on the road in 2018 (BEVs 3,29 million of which represented) increased significantly throughout the past ten years with around five million electric passenger vehicles double that of last year, according to the International Energy Agency (IEA) [1]. A study by Bloomberg NEF shows that the global size and acceptance of electric vehicles will expand in future. The analysis estimates that currently only 3% of worldwide automotive sales is generated by electric cars (EVs), with EVs reaching 10% of worldwide passenger car sales by 2025, growing to 28% in 2030 and 58% by 2040, EV sales in China rose by a tremendous 66% over the first half of 2019. On the other hand, Europe is still retained by tight, 35% growth-rate inventories, while the expansion rate in the US was around 22%, 58% of Norway's most recent automobile sales were charged electrically in the middle of 2019. With 18%, Iceland is second, & Sweden is third with 11% EV market share.

The following table covers the 2015-2019 global plug-in sales. Other countries in Africa, America, Asia/Oceania and the Middle East are categorized as 'other.'

	2015 (Units)	2016 (Units)	2017 (Units)	2018 H1 (Units)	2019 H1 (Units)
China	190,000	351,000	606,000	388,000	645,000
Japan	25,000	22,000	56,000	27,000	23,000
Europe	196,000	222,000	308,000	194,000	261,000
USA	115,000	157,000	200,00	122,000	149,000
Other	20,000	23,000	55,000	44,000	55,000

As their costs are declining and new models produced, EVs are becoming more enticing to consumers. The adoption of EVs is no doubt one of the best solutions for a greener environment, due to their low emissions of Greenhouse gases (GHGs) relative to internal combustion engine (ICE) vehicles. (energies) [2]. Population increases are accompanied by an increase in road users, causing roads to become more complex to accommodate more vehicles necessarily [3]. Nevertheless, there is always the potential for unintended consequences whenever a new technology is introduced. If such consequences are to be minimized, then it is important that vehicle safety regulations keep pace with new technology [5]. This increase in number of electric vehicles will bring accidents differing from those involving conventional combustion engines, and news coverage has reported on fires in EVs. Information on how such new technologies can be handled in the event of mishaps is needed. This involves the community more than the individual vehicle users [6]. Around 2030 most of the vehicles will be of autonomous type, autonomous vehicles are self-guided vehicles that overcome obstacles without any

* Corresponding author:
ajasem@gmail.com (Jasem Alrajhi)
Received: Feb. 16, 2022; Accepted: Apr. 11, 2022; Published: Apr. 21, 2022
Published online at http://journal.sapub.org/ijtte

help of a human, autonomous vehicles are expected to be safer than vehicle driven by human drivers but there is need to check the potential risk exposures with autonomous electric vehicles. [7].

Kuwait has an extremely high rate of vehicle ownership, and a superbly modern highway system, yet it has a very bad record of traffic accidents. In Kuwait 428 road-related deaths, 10305 severe injuries, and a whopping 71161 accidents were documented in 2017. (https://www.moi.gov.kw/gdt/Statistics2.htm#). Kuwait is already well-equipped to deal with incidents involving internal combustion engine vehicles and provide the greatest rescue services, but to pave the way for integrating e-cars in modern transport systems, road safety issues and the need to modernize the emergency services must be considered.

2. Risk Exposures & Various Hazards in Electric Vehicles

The combustion engine has been the primary source of vehicle power for than 150 years, during this time vehicle design, manufacture, reliability, and safety have all improved. From a product liability standpoint, EVs provide a wide range of technical, environmental, and operational hazards as compared to traditional vehicles' well-established technology and production methods. EVs have a similar appearance to conventional automobiles, and they share much of the same technology and design. They do, however, mix technologies from other industries and put them to new purposes, thus increasing the risk of faults or performance concerns. Many EV-related fire incidents have made news in recent years despite the absence of any data to support the notion that electric vehicles offer a larger fire risk than conventional cars. It is important to note that certain technologies come with unknown risks. However, the damage caused by EVs today is, on average, more expensive than for conventional cars. Data, sensors, and software, including artificial intelligence, are likely to become more important as EVs grow. It's also possible that a growth in connectivity would raise cyber risks, such as malicious assaults and system disruptions which could make significant changes to a vehicle, adding new capabilities or adjusting existing systems. A possible presumption of a first responder in the event of an EV accident is that the electric car is hazardous and harmful to touch because high voltage (HV) components are incorporated in the vehicle. Where an EV is on fire, whether the battery participates in the fire or not should be distinguished. When an electric vehicle (EV) catches fire, it's critical to determine whether the battery is implicated. The battery's self-reinforcing exothermic activities can result in harmful compounds being released. If no breathing masks are utilized, the potential emission of hydrocarbons (HC), carbon monoxide (CO), and notably hydrogen fluoride (HF) might result in suffocation for vehicle occupants and rescue personnel. Currently, the rescue team has the greatest problem by estimating the high voltage battery status in the accident site. The distribution of electric cars in Kuwait presents new challenges, as they will burden electric cars with power and so raises the question of how far Kuwait is prepared for such a transformation and to what extent plans have been put in place to accommodate the expected large energy charge resulting from the charging of domestic vehicles .Kuwait's hot and arid climate can present certain obstacles to electric cars incorporation in the country's road transportation networks for example: high temperatures' impact on battery degradation and charging infrastructure. Pedestrians have also had trouble recognizing the approach of electric vehicles, which is consistent with the findings of numerous studies, and hence the danger associated with this hazard must be properly addressed to avoid any road accidents. The rise in popularity of electric cars (EVs) has sparked interest in technology related to them, such as batteries and charging methods. Furthermore, current breakthroughs in autonomous vehicles enable the integration and provision of comprehensive applications by enabling technology. To this end, one critical necessity for EVs is to have an effective, secure, and adaptable infrastructure for charging, and evaluating. Be that as it may, the current manual charging frameworks for EVs may not be relevant to the autonomous vehicles that request new, programmed, secure, effective, and adaptable charging and evaluating component.

3. Preparedness to Deal with Electric Cars Road Accidents in Kuwait

National and international authorities have already outlined procedures for type approval of new electric and hybrid cars. However, because their major content only establishes the essential state of the vehicle after the incident to acquire approval to sell them on markets, these regulations do not cover the technique for working safely on the crash side to avoid accidents. In Kuwait, Ministry of Interior are responsible for emergency assistance within their geographical areas for road accidents. Even though emergency services are already well-equipped to deal with accidents & aid but there is less awareness regarding electric cars in modern transport systems as there are still some uncertainties in the handling of crashed electric vehicles for emergency agencies. Important information, such as data sheets or rescue sheets for all electric cars, as well as the technique for properly deactivating the drive train, must be accessible to the rescue services. There is a large gap for acquiring right decision strategies when it comes to analyzing wrecked EVs, in addition to the uncertainties that occur from not knowing the technical facts: To safely break open an EV, emergency responders must understand how to turn off the energy in all car models. The emergency teams must be able to recognize the several types of fluids that can leak from batteries and how to deal with them. The rescue teams should understand how to put out fires in electric vehicles and what gases can form in these fires, as well as

the risks associated with electricity if an EV encounters salt water and whether this risk will persist after the rescue operation. It is of importance to explore the working situation and context for the rescue service in relation to their preparedness. The responsibility for communication of preparedness for EVs and their charging stations should be made clear among rescue teams. The appropriate knowledge & training should be disseminated to firefighters. Another aspect is to deal with accidents in autonomous electric vehicles, fire fighters & rescue teams be trained and well equipped with the knowledge of how to deal accidents.

4. Conclusions & Future Scope of Work

This research was not written to indicate that electric vehicles are inherently dangerous or that they represent greater hazards to the public than conventional automobiles. Rather, it is necessary to be prepared to deal with prospective risk exposures. Though the use of electric vehicles (EVs) is not yet widespread, there will be a need for more information as the number of EVs increases. EVs do have some characteristics that set them apart from conventional vehicles, such as a high-voltage system, a separate energy storage system, and a different dynamic drive train behavior. The implications for rescue services, particularly in the case of EV accidents, must be assessed and classified, as this is a new area of study. Additional knowledge, tools, and training surrounding EV are needed and should be made available to the various departments. When it comes to EV risks and how to address them, knowledge gaps must be bridged. It would be of interest to further investigate the responses of all stakeholders in electric vehicles domain & various emergency & rescue departments about their preparedness for EV risks and safety issues. It is necessary to investigate the adequacy of horizontal consultation between various stakeholder organizations, such as emergency services, municipalities, police, and ambulance services regarding electric vehicles in Kuwait. Finally, electric transportation should not only be a green alternative to present technology, but it should also be as safe and accessible as its competitors. To investigate the dangers connected with autonomous electric vehicles, a different kind of analysis may be required.

REFERENCES

[1] Bunsen, T., Cazzola, P., Léa d'Amore, Marine Gorner, Sacha Scheffer, Renske Schuitmaker, . . . Leonardo Paoli. (2019). *The Global EV Outlook.* Globally: IEA International Energy Agency

[2] Amith Khandakar 1, A. R. (2020). A Case Study to Identify the Hindrances to Widespread Adoption of Electric Vehicles in Qatar. *Energies MDPI,* 20.

[3] Abdulrahman Alkandari*1, S. M. (2018). Vehicle Accident Report Application for Solving Traffic Problems and Reduce the Ratio of Pollution using Case Study: Kuwait City. *Indonesian Journal of Electrical Engineering and Computer Science,* 13.

[4] Philippe Nitschea*, M. A. (2014). The impacts of electric cars on road safety: Insights from a real-world driving study. *Transport Research Arena* 2014, Paris TRA, 11.

[5] Visvikis 1, C. (2012). Safety considerations for electric vehicles and regulatory activities. EVS26 International Battery, *Hybrid and Fuel Cell Electric Vehicle Symposium.* United Kingdom: Costandinos Visvikis.

[6] Christina Stave1 & Annelie Carlson1, 2. (2017). A case study exploring firefighters' and municipal officials' preparedness for electrical vehicles. *Springer,* 10.

[7] Autonomous Vehicles Yair Wiseman https://orcid.org/0000-0002-4221-1549 Bar-Ilan University, Israel.

[8] Vesa Linja-aho (2020). Electrical accident risks in electric vehicle service and repair - accidents in Finland and a review on research. Research Gate.

[9] Katharina Wöhrl, Christian Geisbauer, Christoph Nebl, Susanne Lott and Hans-Georg Schweiger * (2021) Crashed Electric Vehicle Handling and Recommendations—State of the Art in Germany. *Energies MDPI,* 21.

[10] María Carmen Pardo-Ferreira, Juan Antonio García, Carlos de las Heras-Rosas and Juan Carlos Rubio-Romero (2020) New Risk Situations Related to Low Noise from Electric Vehicles: Perception of Workers as Pedestrians and Other Vehicle Drivers- International Journal of Environment Research and Public Health (MDPI).

[11] Kopentinsky, A. (2021, 08 12). *https://policyadvice.net/insurance/insights/electric-car-statistics/.* Retrieved from https://policyadvice.net/insurance/insights/electric-car-statistics/: https://policyadvice.net/insurance/insights/electric-car-statistics/.

[12] Parera, A. F. (2017). Safety Protocol for Crash Tests Involving Electric and Hybrid Vehicles. SAE International, 6.

[13] Christian Geisbauer, K. W. -G. (2021). Scenarios Involving Accident Damaged Electric Vehicles. *Science Direct,* 6.