



EVALUATION OF ACCIDENT  
STATISTICS ON ELECTRIC VEHICLES  
REGARDING TO  
THE CAUSE OF THE ACCIDENT  
Work Package 2.2

ALBERO Project

## ALBERO – WP 2.2 Estimation of the probability of occurrence of possible hazards during transport or during charging processes of battery-powered vehicles on ferries.

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### Evaluation of accident statistics of electric vehicles in relation to the cause of the accident (if still determinable).

Within WP 2.2, accidents with electric vehicles from 2014 to September 2020 were investigated. For this purpose, an extensive internet search was carried out. During this period, 87 accidents with electric vehicles were identified and documented with sources (see table). It can be assumed that more cases occurred, but mainly in China or Asia, since a comparatively large number of electric vehicles are already on the road there. Research on this is generally difficult due to Chinese characters and Chinese media policy. One source [1] lists that 40 accidents involving electric vehicles occurred alone at in China in 2018. However, more details were not provided, so this source was not included in the statistics. On the other hand, the behavior of electric cars is currently being monitored very closely and incidents in the European and American regions are being evaluated in great detail by the media. Hence it can be assumed that the research is relatively complete, at least for these areas.

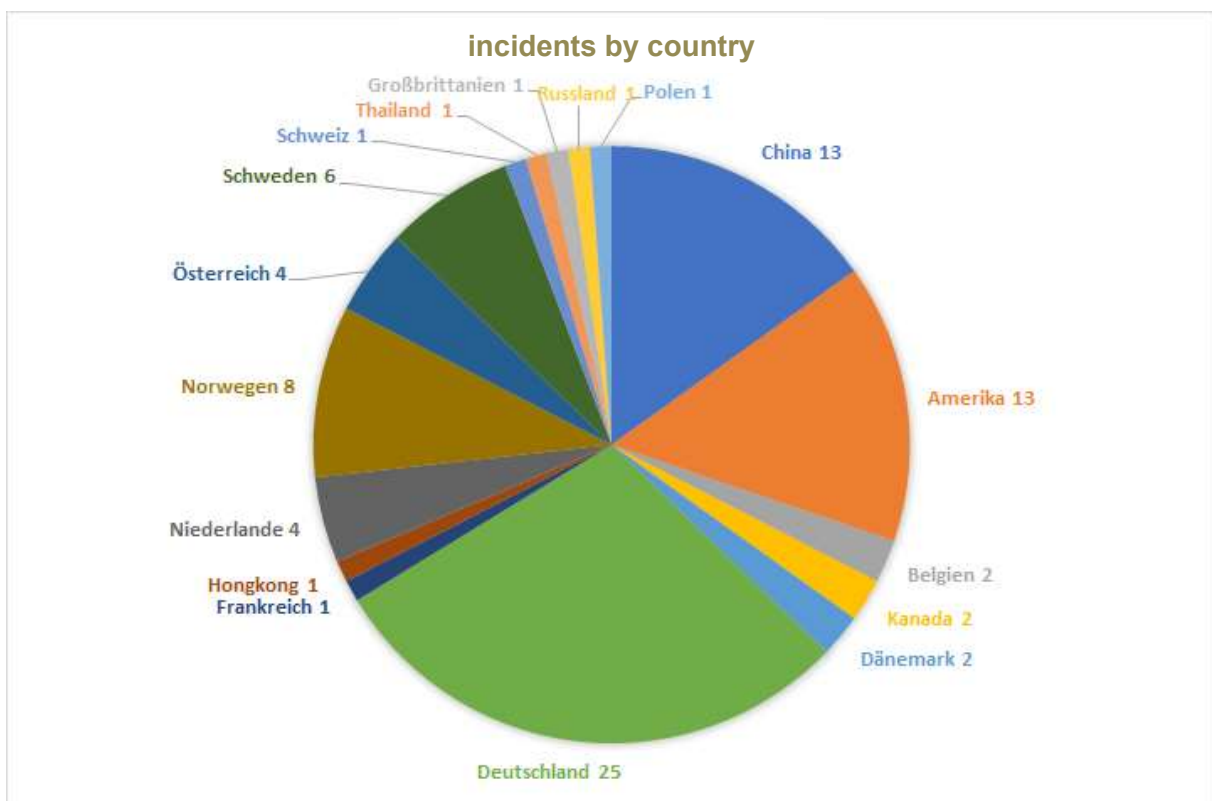


Figure 1: Allocation of incidents by country

Across Europe, the most cases were identified in Germany and Norway. The documented accidents must be put into relation with the electric vehicles registered in the respective countries. Here, it can indeed be seen that in terms of numbers, Norway and Germany currently have the most electric cars registered in Europe, although the percentage of electric vehicles in Norway is much higher than in Germany, as there are many more cars on the road in Germany in total.

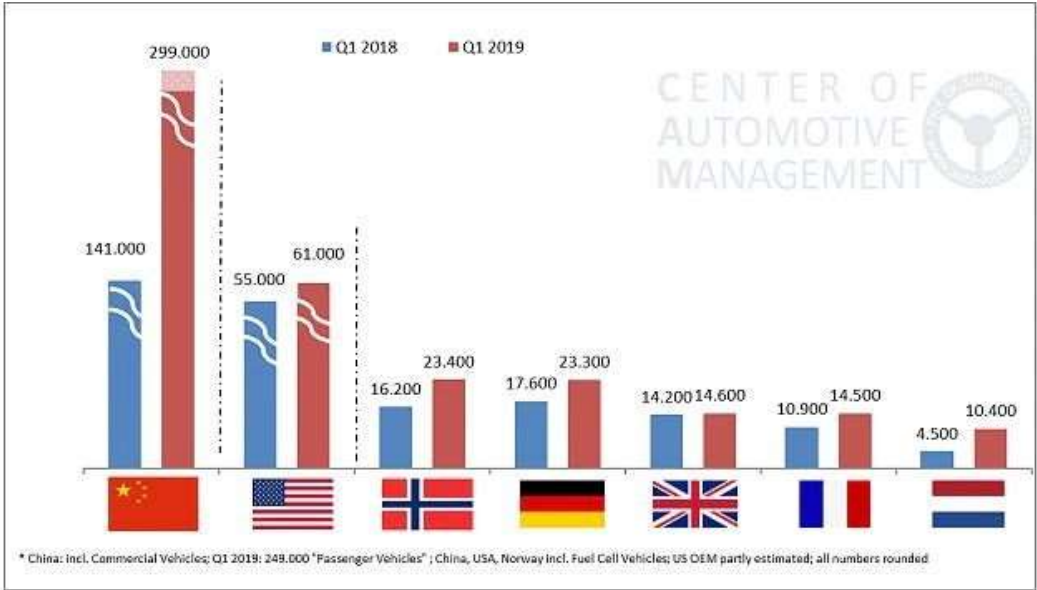


Figure 2: Sales trends of electric cars (BEV, PHEV) in various countries 2019-Q1 (2018-Q1)

Source: [https://www.focus.de/auto/elektroauto/automarkt-europa-zwischen-totalabsturz-und-hoffnungsschimmer\\_id\\_10424974.html](https://www.focus.de/auto/elektroauto/automarkt-europa-zwischen-totalabsturz-und-hoffnungsschimmer_id_10424974.html)

The fact that there are still comparatively few documented accidents involving electric cars in America, even though there are significantly more electric vehicles on the road there in terms of numbers, is possibly due to the fact that in America the electric vehicles are almost exclusively Teslas. 10 of the 13 incidents documented in America took place with Tesla vehicles, while the 45 cases researched in Europe were spread across 19 different vehicle manufacturers. Here, one could conclude that Tesla's safety technology is already more mature than that of other manufacturers due to its development lead.

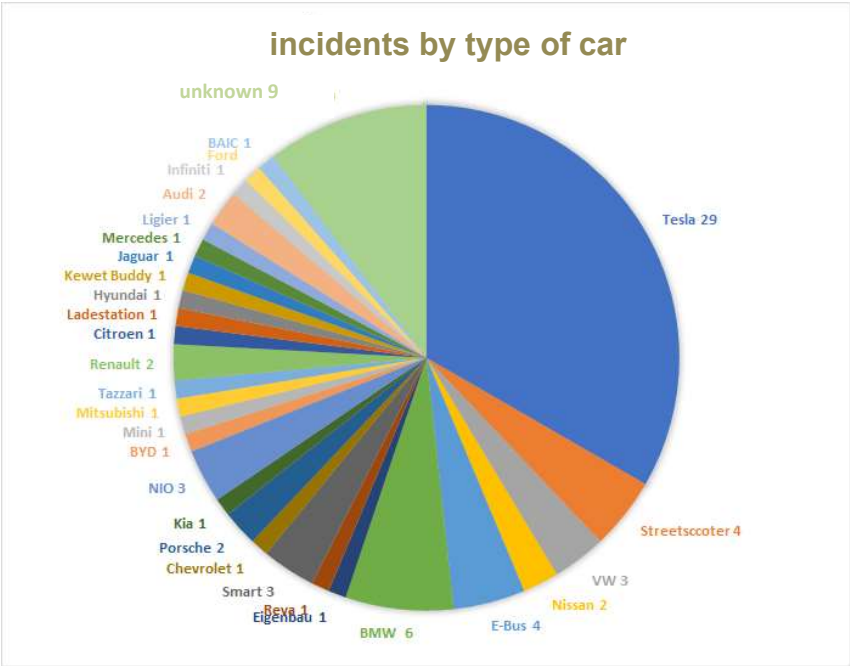


Figure 3: Allocation of identified incidents by vehicle type

Even though the data situation is currently low and there are still few electric cars on the road worldwide, it has now reached a level that allows the following statement [2], [3], [4], [11]:

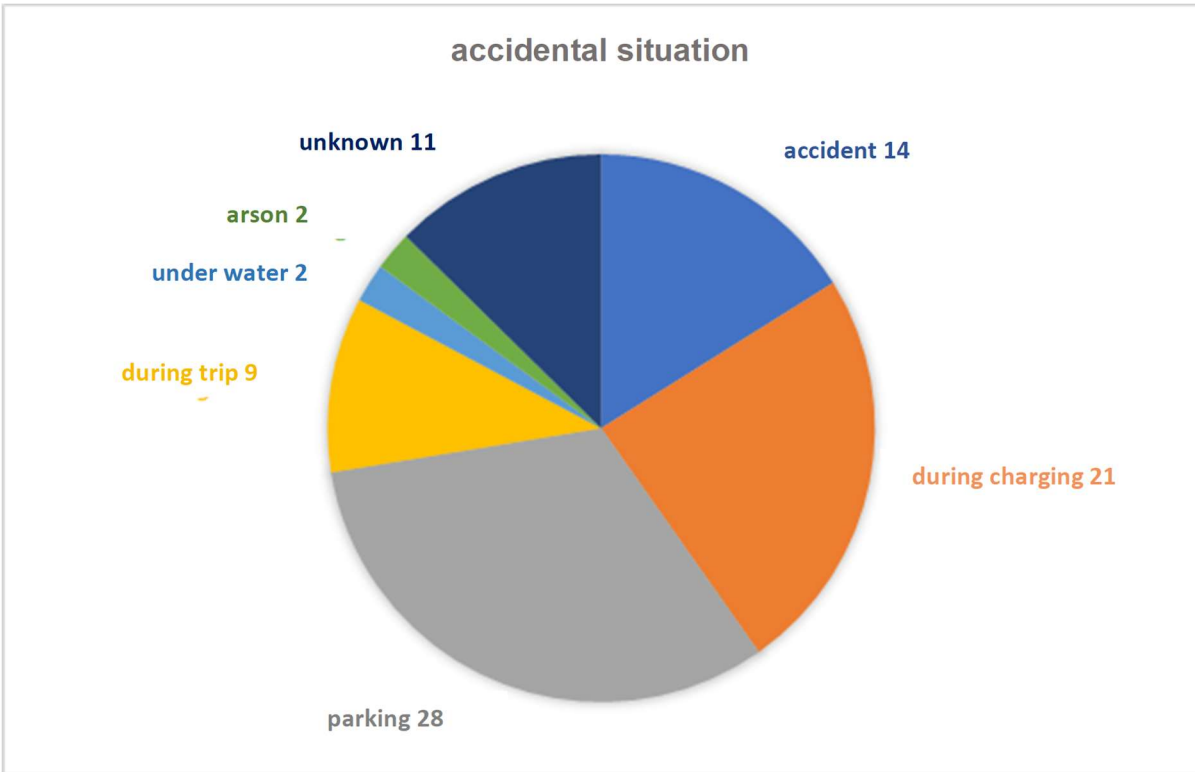
**The risk of fire coming on an electric vehicle is no greater than the risk of fire on a gasoline or diesel vehicle. In fact, it appears to be less.**

According to the German Insurance Association (GDV), about 35,000 to 40,000 vehicle fires are registered in Germany each year, of which about 15,000 cases are actual fires, the rest being braising damage due to short circuits [3], [5]. On the other hand 15 fires found for electric cars within 5 years.

The following statement was found for Norway: *The fact is, however, that electric cars burn much less frequently. From 2013 to 2015, the share of electric cars in the passenger car portfolio increased from less than one percent to about three percent, while in the same period it accounted for only 0.4 percent of all passenger car fires.* [6]

In America, an average of 170,000 vehicle fires have been recorded annually over the last 5 years [7], [8]. In comparison to this the number of fires of electric vehicles registered in this period (13 in our research) is vanishingly small!

In ALL 87 cases found, a fire occurred. Looking to the causes of the fires investigated, the following picture emerges:



**Figure 4: Causes of electric car fires**

The diagram shows that in around 16% of cases, an accident was certainly the trigger for the fire. Most frequently (32%), the fire started "just like that" while parking in a garage or parking lot. In two of these cases, however, the battery pack was not affected by the fire. Among these cases are also some where it is not clear whether the car was charged or not.

However, some publications suggest that follow-up investigations of "just-so" fires did often find that the vehicles had previously been involved in an accident or may have been damaged in some other way. Thus mechanical damage to the battery is a very common cause of electric vehicle fires. Fires occurred during charging in 21 of the 87 cases studied (24%). In at least two cases, the car was charged at a normal household socket, contrary to the recommendations, and in two other cases, a car was charged that had subsequently been converted to an electric car. Hence unsuitable electrical systems are an important cause of accidents.

One case is documented in which the car accidentally drove into a salt water body. It ignited immediately after being pulled out of the water. In one case, a car was flooded during high water and later ignited in the workshop.

Thus it must be stated that of the 87 documented fires, 19 alone (14 x accident, 4 x incorrect loading, 1 x driving into water) were caused by owner/driver error and not by the car itself.

- [1] <https://www.bloomberg.com/news/articles/2019-05-16/tesla-fires-sound-alarms-about-safety-of-electric-car-batteries>
- [2] <https://money.cnn.com/2018/05/17/news/companies/electric-car-fire-risk/index.html>
- [3] <https://autorevue.at/ratgeber/statistik-brennen-elektroautos>
- [4] <https://www.wiwo.de/unternehmen/auto/brandgefahr-spontane-selbstentzuendung-nur-ein-mythos/24457024-3.html>
- [5] <https://www.dekra-solutions.com/2017/11/wenn-das-fahrzeug-feuer-faengt/>
- [6] <https://elbil.no/slik-vinner-du-elbildiskusjonen-6/>
- [7] <https://www.statista.com/statistics/377006/number-of-us-highway-vehicle-fires/>
- [8] <https://www.usfa.fema.gov/downloads/pdf/statistics/v19i2.pdf>