

communications would have missed the dozens of misinterpretations in Hurdeman's chapter on the subject.

While badly flawed, the book is still a useful, but unreliable, reference and delightful to read. Hurdeman's

reliance on previous surveys left him particularly vulnerable. One hopes that Hurdeman or his publisher will find a historian co-author and produce a revised version of this ambitious work.

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## BOOK REVIEW

DAVID K. NERGAARD

# The Electric Vehicle, Technology and Expectations in the Automobile Age

By Gijs Mom. Baltimore, MD: John Hopkins University Press (English translation), 2004.

At 300 pages, this is a long and complete history of the electric automobile from its nineteenth century introduction up to, but not including, the re-introduction of gasoline-electric hybrids in the twenty-first century. As an engineer, I found the book rather heavy going. This was probably due to my technical background, which leads me to prefer concise statements in what I read. It is also likely that the author's style of writing lost much of its smoothness and fluidity in translation from the original language: Dutch.

While he did describe many of the technical problems facing the makers of electric cars, and some of the solutions found for them, his primary vantage point was that of a historian. The book, therefore, concentrates on the business and sociological problems confronting the marketer of the new cars. In doing so, the author illuminates an area that I would hardly have considered at all.

He makes the valid point that, in most cases, the buyer's perception of the properties of an automobile dominates his decision to purchase. Thus the glamour and racing pedigree of the gasoline engine car greatly influenced sales of personal automobiles in the early years that shaped the market for the rest of the twentieth century. But he also points out that the maker's and marketer's misperception of the market for the electric car often led to poor judgment in looking for suitable markets.

The battery electric car made economic sense only

if it were heavily used and well maintained. This often meant daily charging of the batteries, even when they were not being used, as the early cells had significant self discharge rates. Thus taxicabs and delivery vehicles were commercially viable, even profitable, in the first half of the twentieth century. This success was often limited by the failure of makers, users, and power companies to reach reasonable agreements for commercial operations. However, the author mentions successful taxi operations in several European cities where batteries and tires were paid for on a per mile basis, thus making the quality of those items the maker's responsibility. The batteries were exchanged when discharged, the cabs and the garages being especially set up to do it quickly. This meant the cab could work as many shifts as could show a profit and the batteries could be charged at the moderate rate that maximized life. Between two and three batteries were kept for each active cab.

As the limited energy capacity of the battery was always a problem, every possible way to reduce the power required to drive the car was investigated. Until I read this book, I did not know that the cord reinforced tire was invented as a special electric car tire. Cord tires had considerably less internal friction than the canvas reinforced tires of that time. Once these tires were available, their longer life at high speeds due to their cooler running made them the tire of choice for all vehicles.

The privately owned electric car, which was seldom driven and even less often maintained as it should have

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been, proved an expensive toy, one quickly discarded for a vehicle that appeared to be cheaper to run. The electric power companies often made private ownership of a suitable charging system difficult and expensive, which did not help. Had they then offered the special night rates that made electric water heaters viable in the 1950s, the electric car might have enjoyed a wider popularity.

By the end of WWII, road speeds, even in central cities, and the density of traffic had both increased to the point of seriously reducing the range of electric vehicles. Thus, fleets of electric trucks were generally replaced with internal combustion powered vehicles. As most major stores left the central city for the suburban shopping malls, delivery of purchased items ceased being a part of normal marketing policy. This accelerated the decline in delivery truck utility, so many aging electric fleets were simply scrapped even before the condition of the vehicles would have otherwise justified it.

The author points out that such electric delivery vehicles survived much longer in Europe than in the United States, due partly to different marketing policies

and the relatively high cost of automotive fuels. Even there however, the only common survivors of electric cars are industrial vehicles with very high duty cycles such as fork lifts and luggage carts. These machines are often used so intensively that daily battery charging is inadequate, boosting during meals and other breaks being resorted to.

The author almost completely ignored the third automobile technology, steam engines, in spite of its much wider success. This was probably due to his European view point; steamers were much more popular in the United States than in Europe, outselling electrics by nearly two to one. Steam commercial vehicles, however, were much more widely used in Europe than in the U.S. and probably deserved more attention from the author.

On the whole, the book is an interesting study of road based transportation in the early years, with a good deal of insight into the electric car market through most of the century. It remains to be seen whether continuing concerns about pollution and petroleum consumption might alter the market in the near future.

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