

The Electric Vehicle: Technology and Expectations in the Automobile Age. By Gijs Mom. Baltimore: Johns Hopkins University Press, 2004. xiii + 423 pp. Illustrations, photographs, figures, bibliography, notes, index. Cloth, \$54.95. ISBN: 0-801-87138-7.

Reviewed by Michael Brian Schiffer

Gijs Mom, who trained in Dutch literature, automobile engineering, and the history of technology, is well positioned to deliver the definitive work on the history of the electric vehicle (EV). And he does. As a bonus, *The Electric Vehicle* also furnishes historians with a general framework for studying technological change that, Mom suggests, can help to bridge the gap between the “two cultures” (p. ix). One of the framework’s core ideas is the need to scrutinize interactions among the three “fields” of any technology: cultural expectations, technical practice, and applications. *Electric Vehicles* demonstrates convincingly that use of this framework can lead to nuanced and integrative explanations of technological change that do embody both humanistic and scientific ways of knowing.

Aware that interest in commercializing EVs was reviving, several authors in the 1990s probed this technology’s early history, which had been obscured by a century of biased historiography that mainly rationalized the triumph of the gasoline automobile. The outpouring of new scholarship includes Ernest H. Wakefield’s volumes, which meticulously illuminate the technical side of early EVs: *History of the Electric Automobile: Battery-Only Powered Cars* (1994) and *History of the Electric Automobile: Hybrid Electric Cars* (1998). My book, *Taking Charge: The Electric Automobile in America* (1994; reprinted in 2003 with a new preface), challenged conventional historiography and also laid a foundation for contextualizing the competition between electric and gasoline passenger cars. Most recently, David A. Kirsch impressively overturned long-held misconceptions about America’s electric taxicabs in *The Electric Vehicle and the Burden of History* (2000).

Mom’s masterful synthesis, based on a revised doctoral dissertation originally published in Dutch in 1997, covers European and American EVs in detail. During three stages spanning a century, he examines the development of electric passenger cars, taxicabs, and industrial vehicles in relation to competing technologies and their

sociotechnical contexts. The book draws on a smorgasbord of sources, including company records, trade journals, popular culture, museum collections, and national, state, and local archives in five countries. Integrating these lines of evidence, Mom discerns, for example, the comings and goings of EV companies, sales figures in specific markets, the political policies that influenced commercialization, the activities of other businesses and trade organizations, changes in vehicle components, user-related factors that affected specific markets, and the cultural expectations that sometimes shifted the balance toward gasoline vehicles.

Mom, Kirsch, and I arrived at similar general conclusions about early EVs. For example, following an initial period of experimentation and commercialization that lasted until about 1905, the EV became a reliable, clean, quiet, convenient, and sometimes economical technology. In certain times and places—and for particular *urban* applications—the EV was a success on the streets and in the marketplace. Moreover, as specialized trucks for working in warehouses, docks, and so on, the EV never fell out of favor. Precisely *why* it did not survive in more visible applications is, of course, the killer question that motivated Mom (and me).

This beguilingly simple question, argues Mom, must be broken down into many questions with as many answers. For example, the electric passenger car in America lost its market for different reasons than the electric milk truck in England. Even in one nation, the historian has to disaggregate summary data by time, place, and application, because in such varying contexts different causal factors came into play. As a counterpoint to one-size-fits-all economic explanations and to quantitative diffusion studies that relentlessly homogenize contexts, Mom shows why many *local* explanations are required to explain the successes and failures of any technology that is commercialized in myriad varieties for diverse applications.

Mom also emphasizes that the historian has to understand the technical details of the competing technologies. After all, a technology's properties and performance characteristics establish constraints that mediate between cultural expectations and real-world applications. For example, despite clever arguments promoting tourism in electric passenger cars, their power source—lead-acid storage batteries having a low energy density—"allowed either high speed or a large range, but not both at the same time" (p.

54). Elaborating on discussions in *Taking Charge*, Mom pinpoints the cultural expectations that ordained danger-filled touring as the sine qua non of early automobilism (especially in the United States), and thereby determined the performance requirements for touring-capable cars. Efforts to promote more sedate and civilized touring, including the installation of 700 charging stations in France in 1901, failed to arouse enthusiasm. However, the EV's battery-based performance constraints did not for decades hinder its successful employment in other applications, such as taxicabs in Berlin (there were 574 in 1914) or package-delivery trucks in U.S. cities (New York, for example, had more than 4,000 in 1920).

The Electric Vehicle demonstrates that in providing local-scale explanations, the historian need not forsake the fashioning of cross-cutting generalizations. My favorite of Mom's generalizations is the playful "Pluto effect," named for the Disney cartoon dog renowned for chasing its tail. In a nutshell, the Pluto effect asserts that "competing technologies, in trying to be more attractive in the marketplace, tend to borrow (or steal) each other's properties and functions" (p. 5). Thus, gasoline cars overcame their reliability problems by adopting garages modeled on centralized maintenance facilities used by EVs. Likewise, the dynamic styling of gasoline cars at last appeared in passenger electrics. Mom argues, however, that the gasoline vehicle was the major beneficiary of these thefts; as the two technologies converged, "the advantages of electric propulsion in the city became increasingly smaller" (p. 298). Price then became the deciding factor, and gasoline vehicles eventually won out.

Mom offers the Pluto effect to interpret today's gasoline-electric hybrids. One interpretation is that hybrids are gasoline cars that have stolen an electric motor, deep-cycle batteries, energy-efficient tires, and other EV features in order to reduce emissions and improve gas mileage. Another interpretation is that hybrids, as electric cars, have purloined a gasoline engine in order to cut their tether to the power grid, thereby acquiring a range (on each refueling) comparable to that of a gasoline car. Despite its apparent attribution of motives to technologies, the Pluto effect may lead to interesting questions about other—especially *long-term*—technological competitions.

The Electric Vehicle is a stunning triumph of creative and sophisticated scholarship. Nonetheless, the book's high data density, intricate explanations not

reducible to sound bites, and wooden phraseology threaten to confine its audience to EV enthusiasts and historians of business and technology. Nonetheless, I recommend that this tome be read—or at least perused—by anyone interested in studying technological change, for Mom’s framework gives good guidance. Indeed, Dr. Mom’s prescription—that technological change be studied holistically—is a potent antidote to the poisonous extremes of technological, economic, and sociocultural determinism.

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