

Conover is refreshingly evenhanded and realistic about the ways uses of roads are shaped by local cultures and circumstances. In Peru, for example, he explains that a thriving system of commercial drivers paying off police to look the other way at illegal passengers emerged because the underpaid police need money just as people need transport. On the other hand, in a book that strives for a global scope, discussions of the symbolism and cultural significance of roads are sometimes culturally limited; often, the assumed “we” is Americans. This is understandable in that the book’s presumed audience is primarily American, but disappointing in that Conover misses an opportunity to drive home a more global message about the significance of roads.

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Prime Movers of Globalization: The History and Impact of Diesel Engines and Gas Turbines.

By Vaclav Smil. Cambridge, Mass.: MIT Press, 2010.
Pp vi+261. \$29.95.

In his new book *Prime Movers of Globalization*, well-published energy specialist Vaclav Smil focuses on what he regards as the true motors of globalization: gas turbines and diesel engines. Smil points out that globalization—defined as a process of information links, economic exchanges, and flows of social and political influences—has been studied from many angles, but a focus on the enabling technologies is often missing. Therefore these two deserve and require historical scrutiny and scholarly attention.

Smil provides this historical analysis in seven chapters. After a brief introduction, he explains the limits of gasoline-fueled engines. Then he dedicates two extensive chapters to the diesel engine and the gas turbine. These two chapters are *Prime Movers* at its best; they excel in providing detailed historical accounts of innovation processes while keeping an eye open for the human agents in the stories. Chapters 5 and 6 vividly describe the enormous growth of diesel-powered vessels—in terms of loading volume and energy capacity—and the increasing efficiency and speed of turbofan engines, and their respective positive and negative consequences.

In addition to this history of two important technologies, the author wanted to make a holder and broader claim and thereby contribute to the globalization debate. Although “impact” is in the subtitle of the book, Smil clearly distances himself from “simplistic technodeterminism” (p. 19). What then is the relation between the two “movers” and globalization? Smil does not systematically explore this relationship. In chapter 6, “Cost and

Benefit," he relies on statistical evidence to illustrate how containership size grew alongside international trade, and how the range of planes and air travel increased in the "jet age." Surely Smil is right; these prime movers indeed enable the global economy as we know it, or at least to a very large extent. It is their range and efficiency that make them "here to stay," as Smil illustrates in chapter 7.

However, I would like to have seen a more critical review of the connection between these technologies and the globalizing economy. Two specific questions come to mind. First, are there other technologies that can claim the role of *primae inter pares* that Smil now assigns to the prime movers (p. 156)? Communication and information technologies, for example, are clearly also vital agents of globalization. Their role has been described elsewhere, for example in Peter Hugill's *Global Communications since 1844* (1999), and they are relevant here as well: modern shipping companies and airlines rely on modern means of communications, but this dependency is not discussed.

Second, what would the world economy look like without the gas turbine and diesel-powered engine? Smil claims that both have no "capable substitutes" (p. 19). Yet an alternative answer peeks out in chapter 2, where Smil explains the limits of gasoline-fueled spark-ignition engines and reciprocating aero-engines. The latter—the predecessor of the gas turbine—were less comfortable due to constant vibrations, less rapid, and more expensive due to higher fuel costs. The former—overtaken by diesel-powered engines—were less suitable for industrial applications, and less durable. Relying on these "sub-prime" movers, globalization would be less intensively connected, would have less velocity, and would be less extensive yet more expensive—to use the framework developed by David Held et al. in *Global Transformations* (1999). But would that greater expense and lesser speed make for a fundamentally different world?

Despite these critical remarks on Smil's claim about globalization, *Prime Movers* remains a very insightful and entertaining book, with many functional illustrations, including some useful maps and close-ups of engines and turbines. Smil is an enthusiastic writer who is fascinated by his objects of study. While including a fair amount of technical details, he is very readable. One other aspect of Smil's engaging style is that he is not afraid to point out the negative consequences of innovations. *Prime Movers* caters to both the student of innovation and the more general technology enthusiast.

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