his most politically disruptive and seditious. Recommended.

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Prime Movers of Globalization: The History and Impact of Diesel Engines and Gas Turbines. By Vaclav Smil (Cambridge, MA: MIT Press, 2010), 261pp. $29.95/£22.95 cloth.

Vaclav Smil's latest monograph offers a careful and well-detailed look at the origins, development, and essential impact the diesel engine and gas turbine have had on globalisation and humanity's progress. His main reason for doing so, as he states at the beginning and end of the book, is to demonstrate the ubiquitous presence and universal importance of these two inventions within the modern world. As Smil himself puts it, when individuals are questioned about what have been the paramount inventions that helped globalisation develop to its present state, they reply with answers such as "computer chips" or the "internet," while completely overlooking our ultimate dependence upon diesel engines and gas turbines.

Smil's research on the historical development of the diesel engine and the gas turbine is meticulously thorough, giving the reader great insight into the different figures and periods responsible for these prime movers' widespread use. The book gives a broad overview of the progressive developments of humankind throughout the past half millennium, including the significant expansion of intercontinental trade. Smil traces the technological historicity of global trade and the apparatuses that have emerged from it, with such examples as the expansive propensity for sea innovation, culminating in the monstrous ULCCs crude-oil shipment vessels that can carry in excess of 500,000 deadweight tons (dwt), and which claim a third of the total dwt on the waters (116).

Smil gives an informative account of speed and carrying capacity progressions, from wind powered sea transport to the early developments of steam engines, right up to the use of diesel powered engines and gas turbines. He illustrates how these advances have enabled globalisation to grow, and how humankind's burning desire for better standards of living, for wealth and dominance have essentially fuelled the invention of many of our technological wonders, such as the diesel engine and gas turbine. Smil also conveys the political and social backdrop to the progression of these prime movers, their contribution to such monumentally historic events as WWII, and to economic pinnacles, such as OPEC's oil-price increase in the 1970s, which forced greater efficiency out of engine production (127).

However, Smil's anthropocentric analysis of the negative impacts is focused primarily upon economic effects, job losses due to new technological innovations, and so forth, and does not adequately address the continually rising pollution levels and environmental damage caused by our use of these fossil-fuelled machines. While there has been a phenomenal increase in technological advancements—with the largest engine of today being almost six thousand times more efficient than Diesel's third prototype a little over a century ago—it still does not fully account for how these giants of the air, land, and sea, will be able to go on burning fossil fuels at the same rate in the face of increasing global toxic emissions and depleting fuel resources. Smil instead concentrates on how technology is constantly improving, getting cheaper, and becoming more efficient with less pollution per machine and safer methods than previously (200–201).

Smil's book provides an extremely thorough and informative analysis of the historical development of the diesel engine and gas turbine, but his limited environmental assessment of their negative impacts somewhat detracts from the book's overall effectiveness. While I do not disagree that there have been phenomenal benefits from these prime movers, I do disagree with the minimal analysis he gives to their negative effects. It is somewhat disconcerting that this environmental scientist concludes his work by claiming that they are here to stay (216), that fossil-fuel-using alternatives are in the distant future,

and that because it is not necessary to build bigger marine diesels, we will not (221)—a disheartening and naive conclusion to a very interesting and informative book.

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The Simple Science of Flight: From Insects to Jumbo Jets. By Henk Tennekes (Cambridge, MA: MIT Press, 2009), xii + 201 pp. $22.05/£15.95 paper.

Kudos to MIT Press for publishing the revitalized and rejuvenated (*cf.* xii) edition of *The Simple Science of Flight*, and compliments to Henk Tennekes for incorporating facts "about twice as good as professionals have thought" (77), providing data "quite different from those in the first edition" (125), and making other "radical revisions" (129). At the same time, Tennekes has remained true to his original emphasis on flight performance and continues "to make science accessible" (x).

Tennekes's pedagogy is irresistible. Even the most casual reader will notice that the beautiful pen-and-inks of birds, insects, and planes dotting the text have captions with the same three symbols, *W*, *S*, and *b*. Tennekes rewards the curious by progressively fleshing out symbols with clear definitions and then using his nomenclature unthreateningly in equations and graphs "loaded with information" (16). Consequently, new symbols are all the more easily accepted, and the reader can deal with equations and their consequences all the more comfortably. For example, Tennekes writes that, "$w = 0.45V$. . . explains why hummingbirds, wasps, bees, and beetles have computed cruising speeds of roughly 7 meters per second" without confusing or discouraging readers. And when he employs "['the vortex theory of lift and drag'] to explain the strange behavior of drag" (115), the reader goes along for the ride.

But, the payoff for the reader is not using equations as playthings. Rather, the payoff comes in Chapter 5, "Flying Playthings," where readers learn how to experiment with paper airplanes, and in Chapter 6, "The Heritage of the 747," where readers use "straightforward engineering logic" (170) virtually to design jet aircrafts themselves!

Tennekes uses figures brilliantly to condense and compare data. For example, Figure 2, "The Great Flight Diagram," includes virtually every class of flying thing (with the exception of bats) from the fruit fly to Airbus A380, and Figure 15, "The Great Gliding Diagram," includes varieties of insects, human-powered aircraft, and the Boeing 777–400. And while Tennekes doesn't hesitate to complain about careless usage of terms in the classroom and literature (e.g., "We have made a terrible mess of simple physical concepts in ordinary life" [39]), he takes full advantage of the familiar to demystify, for example, by comparing ice skaters to flapping birds, parakeet, seagull, albatross, and aircraft (Figs. 11–14). He works on observations anyone can make (e.g., "Whenever they can, birds and airplanes take off and land into the wind" [82]) until they are accessible and understandable, and he tells charming stories (e.g., "a mature herring gull teaching his fledgling son … [how to make] a smooth landing" [89]).

Tennekes's only faults lie in using biology's language metaphorically and ignoring pollution. For example, the phrase "A clear case of evolutionary convergence as aircraft engines improve" (20) confuses changes in engine design with biological evolution and improvements with adaptation. Regrettably, Tennekes's usage provides material for creationists determined to find evidence for design in features of animals. Stratospheric pollution also deserves consideration, but, hopefully, Tennekes will address these lapses in the next edition.

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