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Review: Energy and Civilization: A History

By Vaclav Smil.

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Smil, Vaclav. *Energy and Civilization: A History*. The MIT Press, 2017; vii, 552 pp.

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Energy and Civilization: A History combines science, technology, and social issues to examine energy use from the prehistoric to the current period. Technical parameters of energy, for example, power, speed, motion, and standardization, are applied to animate power, human muscle, fossil fuels, electricity, and other. Prime movers are a key to the evolution of energy and many examples are provided, such as steam engines replacing windmills, or fossil fuels replacing wood and charcoal. In 1700 oxen were prime movers; today large diesel tractors are prime movers. While many gains for a better life have been possible as new energies were put into operation, negative outcomes from energy power appear as well. Among the consequences are high-energy weapons, casualties of modern wars, and widespread environmental degradation. The book clearly creates an understanding of the enormity of energy. This can be found in a few dominant facts, for example, "All matter is energy at rest" (p. 3), "Energy is the only universal currency" (p.1), "Civilization's advances can be seen as a quest for higher energy use..." (p. 389).

The text is supplemented with an abundance of figures and graphs, for example, drawings of early tools and machines, portraits of significant figures, and related photos. Additional subject detail is provided in offset boxes, for example, calculating the energy cost of human labor, determining the efficiency of household heating, the persistence of animate power, and greenhouse gases and rising tropospheric temperature. There are three addenda: 1) translating basic measures, symbols, prefixes, and abbreviations used in the text, 2) a chronology of energy-related development, and 3) power in history from a candle to global civilization. The latter addendum includes the maximum power of prime movers and the average consumption of primary energy. The addenda can assist readers with names, symbols, prefixes and abbreviations for scientific units, which are used throughout the text. Bibliographical notes, references, name index and subject index finish out the book.

Energy and Civilization is a magnum opus of energy development and use throughout history. The book is a major update of Smil's *Energy in World History* (1994). The new title is some 60 percent longer than the original. Piecing together the component parts of energy's impact on civilization and civilization's impact on energy is a seemingly formidable task, and in this case is

well done. Academic, large public, and private technical libraries would do well to add this book to their collection. Highly recommended.

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