The Science of Energy: A Cultural History of Energy Physics in Victorian Britain (review)

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Technology and Culture, Volume 41, Number 2, April 2000, pp. 362-363 (Review)

Published by Johns Hopkins University Press
DOI: *https://doi.org/10.1353/tech.2000.0056*

The Science of Energy: A Cultural History of Energy Physics in Victorian Britain.

By Crosbie Smith. Chicago: University of Chicago Press, 1999. Pp. xi+404; figures, notes/references, bibliography, index. $60 (cloth); $25 (paper).

The contemporary reader, accustomed to the recurrent "energy crises" experienced in modern society, may be surprised to find that energy did not become an important concept in science until the mid-nineteenth century. Among the originators and advocates of the science of energy were William Thomson (Lord Kelvin) and William John Macquorn Rankine. Beginning in the early 1850s they began replacing the old language of mechanics, which was largely concerned with forces, with terms such as "actual" and "potential" energy. They were soon joined by others, including James Clerk Maxwell, Peter Guthrie Tait, Fleeming Jenkin, and James Prescott Joule. Together with James Thomson, William's elder brother, these men are at the heart of this major historical study.

Most scientific work in nineteenth-century Britain came out of London, Oxford, or Cambridge, all in the southern part of the country. The central theme of this book is that the group who developed the new science of energy did not come from the traditional centers of scientific work but were from the north of Britain. All were in fact Scottish except Jenkin, who was born in England but educated in Scotland, and Joule, who lived and worked in Manchester, in northern England. They were strongly influenced by the industrial, cultural, and religious situation in Scotland, hence the subtitle of this book. The major industry of the Glasgow district was shipbuilding. Both the shipbuilding industry and the rapidly developing railways were demanding larger and more efficient steam engines, and the

Thomson brothers, beginning their careers, took an early interest in the theory and practice of steam power. It was also in Glasgow that James Watt had earlier developed the separate condenser, a device that greatly increased the efficiency of steam engines by eliminating the need to cool and reheat the cylinder during each cycle.

Crosbie Smith is director of the Centre for History and Cultural Studies of Science at the University of Kent. As coauthor of *Energy and Empire* (Cambridge: Cambridge University Press, 1989), the recent study of Lord Kelvin, he is steeped in the work of the men who are central to this new book. He argues that Watt was strongly influenced by his Church of Scotland (Presbyterian) background; the kirk frowned on avoidable waste, and Watt sought to avoid wasting energy. Church influence was also strong in the Scottish universities, where many students, whatever their subject of undergraduate study, were intending to become clergymen. The Church of Scotland, in marked contrast to the Church of England, was going through a period of change that made it easier for new ideas to be accepted in the universities.

The ideas arising from work in industry and universities were developed in discussion and correspondence, much of which is cited in this book. Papers such as Rankine's "Outlines of the Science of Energetics" (1855) brought new ideas to a scientific audience, first in Scotland and later, through the British Association, to the wider scientific community. Smith takes the reader through the life and thought of each of his "energy" group. He wastes few words, even in almost four hundred pages of rather small print. This is not a quick read, but anyone who wishes to understand the history of the science of energy could do no better.

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