

THE PHYSICS OF ENERGY



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This magnificent book provides an astonishingly comprehensive, yet deep and accurate, coverage of the physics of energy. It also introduces much of the engineering, and some of the chemistry and biology. As well as being a superb text for those who are new to the subject, it will be an invaluable reference for experienced researchers seeking to refresh, deepen or broaden their knowledge and understanding.

Professor Sir Chris Llewellyn Smith FRS, Director of Energy Research, Oxford University; Director General of CERN 1994-98

Jaffe and Taylor have produced a masterpiece that lays out the scientific foundations of energy sources, uses and systems – from fossil fuels to geothermal, engines to wind turbines, electric grid to climate change. I can only wish that *The Physics of Energy* had been available twenty years earlier when I first had responsibility for the U.S. Department of Energy science and energy programs without the benefit of this extraordinary resource!

Ernest J. Moniz, MIT Cecil and Ida Green Professor of Physics and Engineering Systems (emeritus), 13th U.S. Secretary of Energy

If your task was to jump-start civilization, but had access to only one book, then *The Physics of Energy* would be your choice. Professors Taylor and Jaffe have written a comprehensive, thorough, and relevant treatise. It's an energizing read as a stand-alone book, but it should also be a course, offered at every college, lest we mismanage our collective role as shepherds of our energy-hungry, energy-dependent civilization.

Neil deGrasse Tyson, The Frederick P. Rose Director of the Hayden Planetarium at the American Museum of Natural History

What energy sources can be used to power human activity in future years? How can these sources be harnessed and what are their advantages and disadvantages? At a more fundamental level, what exactly is energy? And why are some forms of energy so much more useful than others? *The Physics of Energy* addresses these questions and more in a comprehensive, unified, and systematic introduction to the scientific principles that govern energy sources, uses, and systems. This definitive textbook will enable the reader to:

- Understand the fundamental physical principles underlying the full range of energy sources, including nuclear, solar, wind, geothermal, and water power, as well as bio and fossil fuels.
- Explore the flow of energy through Earth's interior, oceans, and atmosphere to human end uses, and related issues such as energy storage, electric grids, climate impact, efficiency, and conservation.
- Estimate effectively the resources available and efficiency of extraction and conversion in a wide range of energy contexts.
- Analyze energy systems using quantitative methods that draw from a broad range of physical theories and practical science and engineering tools.

This book will be an essential resource for any student, scientist, engineer, energy industry professional, or concerned citizen who has some mathematical and scientific background and an interest in understanding energy systems and issues quantitatively. Its comprehensive but modular form makes it an ideal text for a broad range of courses on energy science.

Robert L. Jaffe, Morningstar Professor of Physics, MIT

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