

Power Density A Key To Understanding Energy Sources And Uses

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Specific power is a characteristic of the battery chemistry and packaging. It determines the battery weight required to achieve a given performance target. □ Energy Density (Wh/L) □ The nominal battery energy per unit volume, sometimes referred to as the volumetric energy density. Specific energy is a characteristic of the

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increased by adding storage tanks without negatively affecting power rating. The following table summarises a few of the key benefits and challenges of each chemistry. Type Maturity Efficiency Benefits Challenges Lead acid Deployed 50-90% - Established - Inexpensive - Low energy and power density - Depth of discharge Li-ion Deployed and

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A comprehensive account of how energy has shaped society throughout history, from pre-agricultural foraging societies through today's fossil fuel|driven civilization. "I wait for new Smil books the way some people wait for the next 'Star Wars' movie. In his latest book, Energy and Civilization: A History, he goes deep and broad to explain how innovations in humans' ability to turn energy into heat, light, and motion have been a driving force behind our cultural and economic progress over the past 10,000 years. |Bill Gates, Gates Notes, Best Books of the Year Energy is the only universal currency: it is necessary for getting anything done. The conversion of energy on Earth ranges from terra-forming forces of plate tectonics to cumulative erosive effects of raindrops. Life on Earth depends on the photosynthetic conversion of solar energy into plant biomass. Humans have come to rely on many more energy flows|ranging from fossil fuels to photovoltaic generation of electricity|for their civilized existence. In this monumental history, Vaclav Smil provides a comprehensive account of how energy has shaped society, from pre-agricultural foraging societies through today's fossil fuel|driven civilization. Humans are the only species that can systematically harness energies outside their bodies, using the power of their intellect and an enormous variety of artifacts|from the simplest tools to internal combustion engines and nuclear reactors. The epochal transition to fossil fuels affected everything: agriculture, industry, transportation, weapons, communication, economics, urbanization, quality of life, politics, and the environment. Smil describes humanity's energy eras in panoramic and interdisciplinary fashion, offering readers a magisterial overview. This book is an extensively updated and expanded version of Smil's Energy in World History (1994). Smil has incorporated an enormous amount of new material, reflecting the dramatic developments in energy studies over the last two decades and his own research over that time.

Reality: Comprehensive energy transitions take several generations. --

This book provides a detailed, global examination of energy transitions, supplying a long-term historical perspective, an up-to-date assessment of recent and near-term advances in energy production technology and implementation, and an explanation of why efforts to limit global warming and to shift away from fossil fuels have been gradual. □ Presents historical coverage of energy production, energy use, and key technical and economic factors that affect the currently unfolding transitions □ Offers insightful analysis of energy transitions on both the national and global scale to explain the possibilities and limitations of the process □ Supplies a critical appraisal of new renewable conversions that makes clear their advantages and potential benefits as well as their inherent unavoidable limitations □ Enables general readers to gain an in-depth understanding of energy transitions from the perspective of an acclaimed scientist with expertise in the fields of energy, environmental and population change, technical innovation, and public policy

An examination of the transformation of the Japanese diet from subsistence to abundance and an assessment of the consequences for health, longevity, and the environment. In a little more than a century, the Japanese diet has undergone a dramatic transformation. In 1900, a plant-based, near-subsistence diet was prevalent, with virtually no consumption of animal protein. By the beginning of the twenty-first century, Japan's consumption of meat, fish, and dairy had increased markedly (although it remained below that of high-income Western countries). This dietary transition was a key aspect of the modernization that made Japan the world's second largest economic power by the end of the twentieth century, and it has helped Japan achieve an enviable demographic primacy, with the world's highest life expectancy and a population that is generally healthier (and thinner) than that of other modern affluent countries. In this book, Vaclav Smil and Kazuhiko Kobayashi examine Japan's gradual but profound dietary change and investigate its consequences for health, longevity, and the environment. Smil and Kobayashi point out that the gains in the quality of Japan's diet have exacted a price in terms of land use changes, water requirements, and marine resource depletion; and because Japan imports so much of its food, this price is paid globally as well as domestically. The book's systematic analysis of these diverse consequences offers the most detailed account of Japan's dietary transition available in English.

Materials for Supercapacitor Applications provides a snapshot of the present status of this rapidly growing field. It covers motivations, innovations, ongoing breakthroughs in research and development, innovative materials, impacts, and perspectives, as well as the challenges and technical barriers to identifying an ideal material for practical applications. This comprehensive reference by electro-chemists explains concepts in materials selection and their unique applications based on their electro-chemical properties. Chemists, chemical and electrical engineers, material scientists, and research scholars and students interested in energy will benefit from this overview of many important reference points in understanding the materials used in supercapacitors. Provides an overview of the formulation for new materials and how to characterize them for supercapacitor applications Describes all the information on the available materials for supercapacitor applications Outlines potential material characterization methods Discusses perspectives and future directions of the field

An investigation of the America-Rome analogy that goes deeper than the facile comparisons made on talk shows and in glossy magazine articles. America's post-Cold War strategic dominance and its pre-recession affluence inspired pundits to make celebratory comparisons to ancient Rome at its most powerful. Now, with America no longer perceived as invulnerable, engaged in protracted fighting in Iraq and Afghanistan, and suffering the worst economic downturn since the Great Depression, comparisons are to the bloated, decadent, ineffectual later Empire. In *Why America Is Not a New Rome*, Vaclav Smil looks at these comparisons in detail, going deeper than the facile analogy-making of talk shows and glossy magazine articles. He finds profound differences. Smil, a scientist and a lifelong student of Roman history, focuses on several fundamental concerns: the very meaning of empire; the actual extent and nature of Roman and American power; the role of knowledge and innovation; and demographic and economic basics/population dynamics, illness, death, wealth, and misery. America is not a latter-day Rome, Smil finds, and we need to understand this in order to look ahead without the burden of counterproductive analogies. Superficial similarities do not imply long-term political, demographic, or economic outcomes identical to Rome's.

Although the last two generations have seen an enormous amount of attention paid to advances in electronics, the fact remains that high-income, high-energy societies could thrive without microchips, etc., but, by contrast, could not exist without steel. Because of the importance of this material to contemporary civilization, a comprehensive resource is needed for metallurgists, non-metallurgists, and anyone with a background in environmental studies, industry, manufacturing, and history, seeking a broader understanding of the history of iron and steel and its current and future impact on society. Given its coverage of the history of iron and steel from its genesis to slow pre-industrial progress, revolutionary advances during the 19th century, magnification of 19th century advances during the past five generations, patterns of modern steel production, the ubiquitous uses of the material, potential substitutions, advances in relative dematerialization, and appraisal of steel's possible futures, *Still the Iron Age: Iron and Steel in the Modern World* by world-renowned author Vaclav Smil meets that need. Incorporates an interdisciplinary discussion of the history and evolution of the iron- and steel-making industry and its impact on the development of the modern world Serves as a valuable contribution because of its unique perspective that compares steel to technological advances in other materials, perceived to be important Discusses how we can manufacture smarter rather than deny demand Explores future opportunities and new efforts for sustainable development in the industry

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