

“Vaclav Smil’s latest
masterpiece.”
—BILL GATES

**VACLAV
SMIL**

GROWTH

FROM MICROORGANISMS TO MEGACITIES

[Book] Growth: From Microorganisms To Megacities (Mit Press)

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Growth-Vaclav Smil 2020-12 A systematic investigation of growth in nature and society, from tiny organisms to the trajectories of empires and civilizations. Growth has been both an unspoken and an explicit aim of our individual and collective striving. It governs the lives of microorganisms and galaxies; it shapes the capabilities of our extraordinarily large brains and the fortunes of our economies. Growth is manifested in annual increments of continental crust, a rising gross domestic product, a child's growth chart, the spread of cancerous cells. In this magisterial book, Vaclav Smil offers systematic investigation of growth in nature and society, from tiny organisms to the trajectories of empires and civilizations. Smil takes readers from bacterial invasions through animal metabolisms to megacities and the global economy. He begins with organisms whose mature sizes range from microscopic to enormous, looking at disease-causing microbes, the cultivation of staple crops, and human growth from infancy to adulthood. He examines the growth of energy conversions and man-made objects that enable economic activities--developments that have been essential to civilization. Finally, he looks at growth in complex systems, beginning with the growth of human populations and proceeding to the growth of cities. He considers the challenges of tracing the growth of empires and civilizations, explaining that we can chart the growth of organisms across individual and evolutionary time, but that the progress of societies and economies, not so linear, encompasses both decline and renewal. The trajectory of modern civilization, driven by competing imperatives of

material growth and biospheric limits, Smil tells us, remains uncertain.

Growth-Vaclav Smil 2019-09-24 A systematic investigation of growth in nature and society, from tiny organisms to the trajectories of empires and civilizations. Growth has been both an unspoken and an explicit aim of our individual and collective striving. It governs the lives of microorganisms and galaxies; it shapes the capabilities of our extraordinarily large brains and the fortunes of our economies. Growth is manifested in annual increments of continental crust, a rising gross domestic product, a child's growth chart, the spread of cancerous cells. In this magisterial book, Vaclav Smil offers systematic investigation of growth in nature and society, from tiny organisms to the trajectories of empires and civilizations. Smil takes readers from bacterial invasions through animal metabolisms to megacities and the global economy. He begins with organisms whose mature sizes range from microscopic to enormous, looking at disease-causing microbes, the cultivation of staple crops, and human growth from infancy to adulthood. He examines the growth of energy conversions and man-made objects that enable economic activities—developments that have been essential to civilization. Finally, he looks at growth in complex systems, beginning with the growth of human populations and proceeding to the growth of cities. He considers the challenges of tracing the growth of empires and civilizations, explaining that we can chart the growth of organisms across individual and evolutionary time, but that the progress of societies and economies, not so linear, encompasses both decline and renewal. The trajectory of modern

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Growth-Vaclav Smil 2019-10-01 A systematic investigation of growth in nature and society, from tiny organisms to the trajectories of empires and civilizations. Growth has been both an unspoken and an explicit aim of our individual and collective striving. It governs the lives of microorganisms and galaxies; it shapes the capabilities of our extraordinarily large brains and the fortunes of our economies. Growth is manifested in annual increments of continental crust, a rising gross domestic product, a child's growth chart, the spread of cancerous cells. In this magisterial book, Vaclav Smil offers systematic investigation of growth in nature and society, from tiny organisms to the trajectories of empires and civilizations. Smil takes readers from bacterial invasions through animal metabolisms to megacities and the global economy. He begins with organisms whose mature sizes range from microscopic to enormous, looking at disease-causing microbes, the cultivation of staple crops, and human growth from infancy to adulthood. He examines the growth of energy conversions and man-made objects that enable economic activities—developments that have been essential to civilization. Finally, he looks at growth in complex systems, beginning with the growth of human populations and proceeding to the growth of cities. He considers the challenges of tracing the growth of empires and civilizations, explaining that we can chart the growth of organisms across individual and evolutionary time, but that the progress of societies and economies, not so linear, encompasses both decline and renewal. The trajectory of modern civilization, driven by competing imperatives of material growth and biospheric limits, Smil tells us, remains uncertain.

Energy and Civilization-Vaclav Smil 2018-09-13 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 terraforming 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.

Making the Modern World: Materials and Dematerialization-Vaclav Smil 2016-12-04 How much further should the affluent world push its material consumption? Does relative dematerialization lead to absolute decline in demand for materials? These and many other questions are discussed and answered in *Making the Modern World: Materials and Dematerialization*. Over the course of time, the modern world has become dependent on unprecedented flows of materials. Now even the most efficient production processes and the highest practical rates of recycling may not be enough to result in dematerialization rates that would be high enough to negate the rising demand for materials generated by continuing population growth and rising standards of living. This book explores the costs of this dependence

and the potential for substantial dematerialization of modern economies. Making the Modern World: Materials and Dematerialization considers the principal materials used throughout history, from wood and stone, through to metals, alloys, plastics and silicon, describing their extraction and production.

Feeding the World-Vaclav Smil 2001 A realistic yet encouraging look at how society can change in ways that will allow us to feed an expanding global population. This book addresses the question of how we can best feed the ten billion or so people who will likely inhabit the Earth by the middle of the twenty-first century. He asks whether human ingenuity can produce enough food to support healthy and vigorous lives for all these people without irreparably damaging the integrity of the biosphere. What makes this book different from other books on the world food situation is its consideration of the complete food cycle, from agriculture to post-harvest losses and processing to eating and discarding. Taking a scientific approach, Smil espouses neither the catastrophic view that widespread starvation is imminent nor the cornucopian view that welcomes large population increases as the source of endless human inventiveness. He shows how we can make more effective use of current resources and suggests that if we increase farming efficiency, reduce waste, and transform our diets, future needs may not be as great as we anticipate. Smil's message is that the prospects may not be as bright as we would like, but the outlook is hardly disheartening. Although inaction, late action, or misplaced emphasis may bring future troubles, we have the tools to steer a more efficient course. There are no insurmountable biophysical reasons we cannot feed humanity in the decades to come while easing the burden that modern agriculture puts on the biosphere.

Prepared-Diane Tavenner 2019 "Diane Tavenner, founder of Summit Public Schools, offers a blueprint for a better way to educate our children, based on the revolutionary lessons, insights, and methodology she and her faculty developed over 15 years at their famously successful charter schools in California and Washington, which she is now introducing to public school systems across the country that Summit is partnering with to transform

education and better prepare our children to lead fulfilled and successful lives. Diane Tavenner founded the first Summit charter school in 2003, developing and perfecting a personalized, project-based curriculum that puts students in charge of their own learning. The school developed a learning plan for every student. They engaged the students by appealing to them with interdisciplinary, real-world projects, rather than passively learning and memorizing in a classroom environment. They created mentorship groups, where students would talk through their goals and help each other solve problems, as well as meet one-on-one with their mentor, weekly. By internalizing a sense of purpose, self-direction, self-sufficiency, and collaboration, students learn the cognitive and life skills needed to navigate the next phases of their lives. Virtually 100% of Summit's original 400 students went on to attend four year colleges"--

Power Density-Vaclav Smil 2015-06-05 The first systematic, quantitative appraisal of power density, offering detailed reviews of power densities of renewable energy flows, fossil fuels, and all common energy uses. "There's no author whose books I look forward to more than Vaclav Smil." —Bill Gates In this book, Vaclav Smil argues that power density is a key determinant of the nature and dynamics of energy systems. Any understanding of complex energy systems must rely on quantitative measures of many fundamental variables. Power density—the rate of energy flux per unit of area—is an important but largely overlooked measure. Smil provides the first systematic, quantitative appraisal of power density, offering detailed reviews of the power densities of renewable energy flows, fossil fuels, thermal electricity generation, and all common energy uses. Smil shows that careful quantification, critical appraisals, and revealing comparisons of power densities make possible a deeper understanding of the ways we harness, convert, and use energies. Conscientious assessment of power densities, he argues, proves particularly revealing when contrasting the fossil fuel-based energy system with renewable energy conversions. Smil explains that modern civilization has evolved as a direct expression of the high power densities of fossil fuel extraction. He argues that our inevitable (and desirable) move to new energy arrangements involving conversions of lower-density renewable energy sources will require our society—currently dominated by megacities and concentrated

industrial production—to undergo a profound spatial restructuring of its energy system.

Energy-Vaclav Smil 2017-01-05 With one famous equation, $E=mc^2$, Einstein proved all matter can be described as energy. It is everywhere and it is everything. In this newly updated and engaging introduction, renowned scientist Vaclav Smil explores energy in all its facets - from the inner workings of the human body to what we eat, the car we drive and the race for more efficient and eco-friendly fuels. *Energy: A Beginner's Guide* highlights the importance of energy in both past and present societies, by shedding light on the science behind global warming and efforts to prevent it, and by revealing how our daily decisions affect energy consumption. Whether you're looking for dinner table conversation or to further your own understanding, this book will amaze and inform, uncovering the truths and exposing the myths behind one of the most important concepts in our universe.

Harvesting the Biosphere-Vaclav Smil 2015-08-21 An interdisciplinary and quantitative account of human claims on the biosphere's stores of living matter, from prehistoric hunting to modern energy production. The biosphere--the Earth's thin layer of life--dates from nearly four billion years ago, when the first simple organisms appeared. Many species have exerted enormous influence on the biosphere's character and productivity, but none has transformed the Earth in so many ways and on such a scale as *Homo sapiens*. In *Harvesting the Biosphere*, Vaclav Smil offers an interdisciplinary and quantitative account of human claims on the biosphere's stores of living matter, from prehistory to the present day. Smil examines all harvests--from prehistoric man's hunting of megafauna to modern crop production--and all uses of harvested biomass, including energy, food, and raw materials. Without harvesting of the biomass, Smil points out, there would be no story of human evolution and advancing civilization; but at the same time, the increasing extent and intensity of present-day biomass harvests are changing the very foundations of civilization's well-being. In his detailed and comprehensive account, Smil presents the best possible quantifications of past and current global losses in order to assess the evolution and extent of biomass harvests. Drawing on the latest work in disciplines ranging from anthropology to

environmental science, Smil offers a valuable long-term, planet-wide perspective on human-caused environmental change.

Global Catastrophes and Trends-Vaclav Smil 2012-09-21 A wide-ranging, interdisciplinary look at global changes that may occur over the next fifty years—whether sudden and cataclysmic world-changing events or gradually unfolding trends. Fundamental change occurs most often in one of two ways: as a “fatal discontinuity,” a sudden catastrophic event that is potentially world changing, or as a persistent, gradual trend. Global catastrophes include volcanic eruptions, viral pandemics, wars, and large-scale terrorist attacks; trends are demographic, environmental, economic, and political shifts that unfold over time. In this provocative book, scientist Vaclav Smil takes a wide-ranging, interdisciplinary look at the catastrophes and trends the next fifty years may bring. Smil first looks at rare but cataclysmic events, both natural and human-produced, then at trends of global importance, including the transition from fossil fuels to other energy sources and growing economic and social inequality. He also considers environmental change—in some ways an amalgam of sudden discontinuities and gradual change—and assesses the often misunderstood complexities of global warming. *Global Catastrophes and Trends* does not come down on the side of either doom-and-gloom scenarios or techno-euphoria. Instead, Smil argues that understanding change will help us reverse negative trends and minimize the risk of catastrophe.

Should We Eat Meat?-Vaclav Smil 2013-03-18 Meat eating is often a contentious subject, whether considering the technical, ethical, environmental, political, or health-related aspects of production and consumption. This book is a wide-ranging and interdisciplinary examination and critique of meat consumption by humans, throughout their evolution and around the world. Setting the scene with a chapter on meat's role in human evolution and its growing influence during the development of agricultural practices, the book goes on to examine modern production systems, their efficiencies, outputs, and impacts. The major global trends of meat consumption are described in order to find out what part its consumption plays in changing modern diets in countries around the world. The heart of the book addresses the consequences of

the "massive carnivory" of western diets, looking at the inefficiencies of production and at the huge impacts on land, water, and the atmosphere. Health impacts are also covered, both positive and negative. In conclusion, the author looks forward at his vision of "rational meat eating", where environmental and health impacts are reduced, animals are treated more humanely, and alternative sources of protein make a higher contribution. Should We Eat Meat? is not an ideological tract for or against carnivorousness but rather a careful evaluation of meat's roles in human diets and the environmental and health consequences of its production and consumption. It will be of interest to a wide readership including professionals and academics in food and agricultural production, human health and nutrition, environmental science, and regulatory and policy making bodies around the world.

Made in the USA-Vaclav Smil 2015-08-21 An argument that America's economy needs a strong and innovative manufacturing sector and the jobs it creates. "There's no author whose books I look forward to more than Vaclav Smil." —Bill Gates In *Made in the USA*, Vaclav Smil powerfully rebuts the notion that manufacturing is a relic of predigital history and that the loss of American manufacturing is a desirable evolutionary step toward a pure service economy. Smil argues that no advanced economy can prosper without a strong, innovative manufacturing sector and the jobs it creates. Smil explains how manufacturing became a fundamental force behind America's economic, strategic, and social dominance. He describes American manufacturing's rapid rise at the end of the nineteenth century, its consolidation and modernization between the two world wars, its role as an enabler of mass consumption after 1945, and its recent decline. Some economists argue that shipping low-value jobs overseas matters little because the high-value work remains in the United States. But, asks Smil, do we want a society that consists of a small population of workers doing high-value-added work and masses of unemployed? Smil assesses various suggestions for solving America's manufacturing crisis, including lowering corporate tax rates, promoting research and development, and improving public education. Will America act to preserve and reinvigorate its manufacturing? It is crucial to our social and economic well-being; but, Smil warns, the odds are no better than even.

Energy Transitions-Vaclav Smil 2010 This bold and controversial argument shows why energy transitions are inherently complex and prolonged affairs, and how ignoring this fact raises unrealistic expectations that the United States and other global economies can be weaned quickly from a primary dependency on fossil fuels. * Includes case studies of energy transitions in eight nations * Presents graphs of energy transitions on global and national scales, showing both common features and idiosyncratic patterns * Features photographs of the containment vessel of America's first nuclear reactor and of a stationary gas turbine * Provides a thorough bibliography

More from Less-Andrew McAfee 2020-10-13 From the coauthor of the New York Times bestseller *The Second Machine Age*, a paradigm-shifting argument "full of fascinating information and provocative insights" (Publishers Weekly, starred review)—demonstrating that we are increasing prosperity while using fewer natural resources. Throughout history, the only way for humanity to grow was by degrading the Earth: chopping down forests, polluting the air and water, and endlessly using up resources. Since the first Earth Day in 1970, the focus has been on radically changing course: reducing our consumption, tightening our belts, and learning to share and reuse. Is that argument correct? Absolutely not. In *More from Less*, McAfee argues that to solve our ecological problems we should do the opposite of what a decade of conventional wisdom suggests. Rather than reduce and conserve, we should rely on the cost-consciousness built into capitalism and the streamlining miracles of technology to create a more efficient world. America—a large, high-tech country that accounts for about 25% of the global economy—is now generally using less of most resources year after year, even as its economy and population continue to grow. What's more, the US is polluting the air and water less, emitting fewer greenhouse gases, and replenishing endangered animal populations. And, as McAfee shows, America is not alone. Other countries are also transforming themselves in fundamental ways. What has made this turnabout possible? One thing, primarily: the collaboration between technology and capitalism, although good governance and public awareness have also been critical. McAfee does warn of

issues that haven't been solved, like global warming, overfishing, and communities left behind as capitalism and tech progress race forward. But overall, *More from Less* is a revelatory and "deeply engaging" (Booklist) account of how we've stumbled into an unexpectedly better balance with nature—one that holds out the promise of more abundant and greener centuries ahead.

These Truths: A History of the United States-

Jill Lepore 2018-09-18 New York Times Bestseller In the most ambitious one-volume American history in decades, award-winning historian and New Yorker writer Jill Lepore offers a magisterial account of the origins and rise of a divided nation, an urgently needed reckoning with the beauty and tragedy of American history. Written in elegiac prose, Lepore's groundbreaking investigation places truth itself—a devotion to facts, proof, and evidence—at the center of the nation's history. The American experiment rests on three ideas—"these truths," Jefferson called them—political equality, natural rights, and the sovereignty of the people. And it rests, too, on a fearless dedication to inquiry, Lepore argues, because self-government depends on it. But has the nation, and democracy itself, delivered on that promise? *These Truths* tells this uniquely American story, beginning in 1492, asking whether the course of events over more than five centuries has proven the nation's truths, or belied them. To answer that question, Lepore traces the intertwined histories of American politics, law, journalism, and technology, from the colonial town meeting to the nineteenth-century party machine, from talk radio to twenty-first-century Internet polls, from Magna Carta to the Patriot Act, from the printing press to Facebook News. Along the way, Lepore's sovereign chronicle is filled with arresting sketches of both well-known and lesser-known Americans, from a parade of presidents and a rogues' gallery of political mischief makers to the intrepid leaders of protest movements, including Frederick Douglass, the famed abolitionist orator; William Jennings Bryan, the three-time presidential candidate and ultimately tragic populist; Pauli Murray, the visionary civil rights strategist; and Phyllis Schlafly, the uncredited architect of modern conservatism. Americans are descended from slaves and slave owners, from conquerors and the conquered, from immigrants and from people who have fought to end

immigration. "A nation born in contradiction will fight forever over the meaning of its history," Lepore writes, but engaging in that struggle by studying the past is part of the work of citizenship. "The past is an inheritance, a gift and a burden," *These Truths* observes. "It can't be shirked. There's nothing for it but to get to know it."

China's Past, China's Future-Vaclav Smil

2004-03-01 China has a population of 1.3 billion people which puts strain on her natural resources. This volume, by one of the leading scholars on the earth's biosphere, is the result of a lifetime of study, and provides the fullest account yet of the environmental challenges that China faces. The author examines China's energy resources, their uses, impacts and prospects, from the 1970s oil crisis to the present day, before analysing the key question of how China can best produce enough food to feed its enormous population.

The Limits to Growth Revisited-Ugo Bardi

2011-05-27 "The Limits to Growth" (Meadows, 1972) generated unprecedented controversy with its predictions of the eventual collapse of the world's economies. First hailed as a great advance in science, "The Limits to Growth" was subsequently rejected and demonized. However, with many national economies now at risk and global peak oil apparently a reality, the methods, scenarios, and predictions of "The Limits to Growth" are in great need of reappraisal. In *The Limits to Growth Revisited*, Ugo Bardi examines both the science and the polemics surrounding this work, and in particular the reactions of economists that marginalized its methods and conclusions for more than 30 years. "The Limits to Growth" was a milestone in attempts to model the future of our society, and it is vital today for both scientists and policy makers to understand its scientific basis, current relevance, and the social and political mechanisms that led to its rejection. Bardi also addresses the all-important question of whether the methods and approaches of "The Limits to Growth" can contribute to an understanding of what happened to the global economy in the Great Recession and where we are headed from there.

Oil-Vaclav Smil 2017-11-02 World acclaimed scientist Vaclav Smil reveals everything there is

to know about nature's most sought-after resource Oil is the lifeblood of the modern world. Without it, there would be no planes, no plastic, no exotic produce, and a global political landscape few would recognise. Humanity's dependence upon oil looks set to continue for decades to come, but what is it? Fully updated and packed with fascinating facts to fuel dinner party debate, Professor Vaclav Smil's *Oil: A Beginner's Guide* explains all matters related to the 'black stuff', from its discovery in the earth right through to the controversy that surrounds it today.

Energy-Richard Rhodes 2019-06-11 A "meticulously researched" (The New York Times Book Review) examination of energy transitions over time and an exploration of the current challenges presented by global warming, a surging world population, and renewable energy—from Pulitzer Prize- and National Book Award-winning author Richard Rhodes. People have lived and died, businesses have prospered and failed, and nations have risen to world power and declined, all over energy challenges. Through an unforgettable cast of characters, Pulitzer Prize-winning author Richard Rhodes explains how wood gave way to coal and coal made room for oil, as we now turn to natural gas, nuclear power, and renewable energy. "Entertaining and informative...a powerful look at the importance of science" (NPR.org), Rhodes looks back on five centuries of progress, through such influential figures as Queen Elizabeth I, King James I, Benjamin Franklin, Herman Melville, John D. Rockefeller, and Henry Ford. In his "magisterial history...a tour de force of popular science" (Kirkus Reviews, starred review), Rhodes shows how breakthroughs in energy production occurred; from animal and waterpower to the steam engine, from internal-combustion to the electric motor. He looks at the current energy landscape, with a focus on how wind energy is competing for dominance with cast supplies of coal and natural gas. He also addresses the specter of global warming, and a population hurtling towards ten billion by 2100. Human beings have confronted the problem of how to draw energy from raw material since the beginning of time. Each invention, each discovery, each adaptation brought further challenges, and through such transformations, we arrived at where we are today. "A beautifully written, often inspiring saga of ingenuity and progress...Energy brings facts, context, and

clarity to a key, often contentious subject" (Booklist, starred review).

Ten Billion-Stephen Emmott 2013-09-10 Deforestation. Desertification. Species extinction. Global warming. Growing threats to food and water. The driving issues of our times are the result of one huge problem: Us. As the population continues to grow, our problems will increase. And this means that every way we look at it, a planet of ten billion people is likely to be a nightmare. Stephen Emmott, a scientist whose lab is at the forefront of research into complex natural systems, sounds the alarm. *TEN BILLION* is a snapshot of our planet, and our species, approaching a crisis, and a stark analysis of where this leaves us. *TEN BILLION* is not another climate book. *TEN BILLION* is a book about us.

Prosperity without Growth-Tim Jackson 2016-12-08 What can prosperity possibly mean in a world of environmental and social limits? The publication of *Prosperity without Growth* was a landmark in the sustainability debate. Tim Jackson's piercing challenge to conventional economics openly questioned the most highly prized goal of politicians and economists alike: the continued pursuit of exponential economic growth. Its findings provoked controversy, inspired debate and led to a new wave of research building on its arguments and conclusions. This substantially revised and re-written edition updates those arguments and considerably expands upon them. Jackson demonstrates that building a 'post-growth' economy is a precise, definable and meaningful task. Starting from clear first principles, he sets out the dimensions of that task: the nature of enterprise; the quality of our working lives; the structure of investment; and the role of the money supply. He shows how the economy of tomorrow may be transformed in ways that protect employment, facilitate social investment, reduce inequality and deliver both ecological and financial stability. Seven years after it was first published, *Prosperity without Growth* is no longer a radical narrative whispered by a marginal fringe, but an essential vision of social progress in a post-crisis world. Fulfilling that vision is simply the most urgent task of our times.

The Moral Consequences of Economic Growth-Benjamin M. Friedman 2010-11-03 From the author of *Day of Reckoning*, the acclaimed critique of Ronald Reagan's economic policy ("Every citizen should read it," said *The New York Times*): a persuasive, wide-ranging argument that economic growth provides far more than material benefits. In clear-cut prose, Benjamin M. Friedman examines the political and social histories of the large Western democracies—particularly of the United States since the Civil War—to demonstrate the fact that incomes on the rise lead to more open and democratic societies. He explains that growth, rather than simply a high standard of living, is key to effecting political and social liberalization in the third world, and shows that even the wealthiest of nations puts its democratic values at risk when income levels stand still. Merely being rich is no protection against a turn toward rigidity and intolerance when a country's citizens lose the sense that they are getting ahead. With concrete policy suggestions for pursuing growth at home and promoting worldwide economic expansion, this volume is a major contribution to the ongoing debate about the effects of economic growth and globalization.

Energy Transitions: Global and National Perspectives, 2nd Edition-Vaclav Smil 2016-12-05 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

The Next Fifty Years-John Brockman 2007-12-18 A brilliant ensemble of the world's most visionary scientists provides twenty-five original never-before-published essays about the advances in science and technology that we may see within our lifetimes. Theoretical physicist and bestselling author Paul Davies examines the likelihood that by the year 2050 we will be able to establish a continuing human presence on Mars. Psychologist Mihaly Csikszentmihalyi investigates the ramifications of engineering high-IQ, genetically happy babies. Psychiatrist Nancy Etcoff explains current research into the creation of emotion-sensing jewelry that could gauge our moods and tell us when to take an anti-depressant pill. And evolutionary biologist Richard Dawkins explores the probability that we will soon be able to obtain a genome printout that predicts our natural end for the same cost as a chest x-ray. (Will we want to read it? And will insurance companies and governments have access to it?) This fascinating and unprecedented book explores not only the practical possibilities of the near future, but also the social and political ramifications of the developments of the strange new world to come. Also includes original essays by: Lee Smolin Martin Rees Ian Stewart Brian Goodwin Marc D. Hauser Alison Gopnik Paul Bloom Geoffrey Miller Robert M. Sapolsky Steven Strogatz Stuart Kauffman John H. Holland Rodney Brooks Peter Atkins Roger C. Schank Jaron Lanier David Gelernter Joseph LeDoux Judith Rich Harris Samuel Barondes Paul W. Ewald

The Quest-Daniel Yergin 2012 Demonstrates how the competition to solve pressing energy problems has become an engine of political and economic change, and shares inside stories of current and developing energy sources from different world regions.

Energy at the Crossroads-Vaclav Smil 2005-02-11 An objective, comprehensive, and accessible examination of today's most crucial problem: preserving the environment in the face of society's insatiable demand for energy. In *Energy at the Crossroads*, Vaclav Smil considers the twenty-first century's crucial question: how to reconcile the modern world's unceasing demand for energy with the absolute necessity to preserve the integrity of the biosphere. With this book he offers a comprehensive, accessible guide to today's complex energy issues—how to think

clearly and logically about what is possible and what is desirable in our energy future. After a century of unprecedented production growth, technical innovation, and expanded consumption, the world faces a number of critical energy challenges arising from unequal resource distribution, changing demand patterns, and environmental limitations. The fundamental message of *Energy at the Crossroads* is that our dependence on fossil fuels must be reduced not because of any imminent resource shortages but because the widespread burning of oil, coal, and natural gas damages the biosphere and presents increasing economic and security problems as the world relies on more expensive supplies and Middle Eastern crude oil. Smil begins with an overview of the twentieth century's long-term trends and achievements in energy production. He then discusses energy prices, the real cost of energy, and "energy linkages"—the effect energy issues have on the economy, on quality of life, on the environment, and in wartime. He discusses the pitfalls of forecasting, giving many examples of failed predictions and showing that unexpected events can disprove complex models. And he examines the pros and cons not only of fossil fuels but also of alternative fuels such as hydroenergy, biomass energy, wind power, and solar power. Finally, he considers the future, focusing on what really matters, what works, what is realistic, and which outcomes are most desirable.

Abundant Earth-Eileen Crist 2019-01-11 In *Abundant Earth*, Eileen Crist not only documents the rising tide of biodiversity loss, but also lays out the drivers of this wholesale destruction and how we can push past them. Looking beyond the familiar litany of causes—a large and growing human population, rising livestock numbers, expanding economies and international trade, and spreading infrastructures and incursions upon wildlands—she asks the key question: if we know human expansionism is to blame for this ecological crisis, why are we not taking the needed steps to halt our expansionism? Crist argues that to do so would require a two-pronged approach. Scaling down calls upon us to lower the global human population while working within a human-rights framework, to deindustrialize food production, and to localize economies and contract global trade. Pulling back calls upon us to free, restore, reconnect, and rewild vast terrestrial and marine ecosystems. However, the pervasive worldview of

human supremacy—the conviction that humans are superior to all other life-forms and entitled to use these life-forms and their habitats—normalizes and promotes humanity's ongoing expansion, undermining our ability to enact these linked strategies and preempt the mounting suffering and dislocation of both humans and nonhumans. *Abundant Earth* urges us to confront the reality that humanity will not advance by entrenching its domination over the biosphere. On the contrary, we will stagnate in the identity of nature-colonizer and decline into conflict as we vie for natural resources. Instead, we must chart another course, choosing to live in fellowship within the vibrant ecologies of our wild and domestic cohorts, and enfolding human inhabitation within the rich expanse of a biodiverse, living planet.

Prime Movers of Globalization-Vaclav Smil 2013 The story of how diesel engines and gas turbines, used to power cargo ships and jet airplanes, made today's globally integrated economy possible. The many books on globalization published over the past few years range from claims that the world is flat to an unlikely rehabilitation of Genghis Khan as a pioneer of global commerce. Missing from these accounts is a consideration of the technologies behind the creation of the globalized economy. What makes it possible for us to move billions of tons of raw materials and manufactured goods from continent to continent? Why are we able to fly almost anywhere on the planet within twenty-four hours? In *Prime Movers of Globalization*, Vaclav Smil offers a history of two key technical developments that have driven globalization: the high-compression non-sparking internal combustion engines invented by Rudolf Diesel in the 1890s and the gas turbines designed by Frank Whittle and Hans-Joachim Pabst von Ohain in the 1930s. The massive diesel engines that power cargo ships and the gas turbines that propel jet engines, Smil argues, are more important to the global economy than any corporate structure or international trade agreement. Smil compares the efficiency and scale of these two technologies to prime movers of the past, including the sail and the steam engine. The lengthy processes of development, commercialization, and diffusion that the diesel engine and the gas turbine went through, he argues, provide perfect examples of gradual technical advances that receive little attention but have resulted in epochal shifts in global

affairs and the global economy.

Fully Grown-Dietrich Vollrath 2020-01-13 Most economists would agree that a thriving economy is synonymous with GDP growth. The more we produce and consume, the higher our living standard and the more resources available to the public. This means that our current era, in which growth has slowed substantially from its postwar highs, has raised alarm bells. But should it? Is growth actually the best way to measure economic success—and does our slowdown indicate economic problems? The counterintuitive answer Dietrich Vollrath offers is: No. Looking at the same facts as other economists, he offers a radically different interpretation. Rather than a sign of economic failure, he argues, our current slowdown is, in fact, a sign of our widespread economic success. Our powerful economy has already supplied so much of the necessary stuff of modern life, brought us so much comfort, security, and luxury, that we have turned to new forms of production and consumption that increase our well-being but do not contribute to growth in GDP. In *Fully Grown*, Vollrath offers a powerful case to support that argument. He explores a number of important trends in the US economy: including a decrease in the number of workers relative to the population, a shift from a goods-driven economy to a services-driven one, and a decline in geographic mobility. In each case, he shows how their economic effects could be read as a sign of success, even though they each act as a brake of GDP growth. He also reveals what growth measurement can and cannot tell us—which factors are rightly correlated with economic success, which tell us nothing about significant changes in the economy, and which fall into a conspicuously gray area. Sure to be controversial, *Fully Grown* will reset the terms of economic debate and help us think anew about what a successful economy looks like.

Energies-Vaclav Smil 2000 Accurate, balanced AND imaginative. Jesse H. Anusubel, Director, Program for the Human Environment, The Rockefeller University

The Largest Art-Brent D. Ryan 2017-10-20 Unitary architecture, plural cities -- Five dimensions of plural urbanism -- Three pluralist projects -- Three plural urbanists -- Designing

pluralist urbanism : urban design scenarios for three places -- Principals and potentials of plural urbanism

Humankind-Rutger Bregman 2020-06-02 From New York Times bestselling author of *Utopia for Realists* comes a "bold" (Daniel H. Pink) and "extraordinary" (Susan Cain) argument that humans thrive in a crisis and that our innate kindness and cooperation have been the greatest factors in our long-term success on the planet. If there is one belief that has united the left and the right, psychologists and philosophers, ancient thinkers and modern ones, it is the tacit assumption that humans are bad. It's a notion that drives newspaper headlines and guides the laws that shape our lives. From Machiavelli to Hobbes, Freud to Pinker, the roots of this belief have sunk deep into Western thought. Human beings, we're taught, are by nature selfish and governed primarily by self-interest. But what if it isn't true? International bestseller Rutger Bregman provides new perspective on the past 200,000 years of human history, setting out to prove that we are hardwired for kindness, geared toward cooperation rather than competition, and more inclined to trust rather than distrust one another. In fact this instinct has a firm evolutionary basis going back to the beginning of *Homo sapiens*. From the real-life Lord of the Flies to the solidarity in the aftermath of the Blitz, the hidden flaws in the Stanford prison experiment to the true story of twin brothers on opposite sides who helped Mandela end apartheid, Bregman shows us that believing in human generosity and collaboration isn't merely optimistic—it's realistic. Moreover, it has huge implications for how society functions. When we think the worst of people, it brings out the worst in our politics and economics. But if we believe in the reality of humanity's kindness and altruism, it will form the foundation for achieving true change in society, a case that Bregman makes convincingly with his signature wit, refreshing frankness, and memorable storytelling. Instant New York Times Bestseller. "The Sapiens of 2020." —The Guardian "Humankind made me see humanity from a fresh perspective." —Yuval Noah Harari, author of the #1 bestseller *Sapiens* Longlisted for the 2021 Andrew Carnegie Medal for Excellence in Nonfiction One of the Washington Post's 50 Notable Nonfiction Works in 2020

Why America Is Not a New Rome-Vaclav Smil

2010-01-29 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.

2040: A Handbook for the Regeneration

Damon Gameau 2019-04-23 'The future can't be predicted but it can be envisioned and brought lovingly into being.' Donella Meadows Like most of us, Damon Gameau has spent most of his adult years overwhelmed into inaction by the problem of climate change and its devastating effects on the planet. But when Damon became a father, he knew he couldn't continue to look away. So he decided to do what he does best, and tell a story. And the story became an imagining of what the world could look like in 2040, if we all decided to start doing things differently, right now. The result is the era-defining documentary *2040* - a meticulously researched plea for the adoption of community-building, energy-generating, connection-forging, forest-renewing, ocean-replenishing measures that science tells us will reset our planet's health, drive our economies and improve lives across the globe. *2040: A Handbook for the Regeneration* shows us how we can stitch this magnificent vision into everyday life by engaging in activities such as cooking,

shopping, gardening, sharing, working and teaching our kids. It shows us that climate change is a practical problem that can be tackled by each of us, one small step at a time, and that we can make a genuine difference - if we know what to do. Brimming with practical wisdom and even 50 delicious recipes, *2040: A Handbook for the Regeneration* empowers you to become the change you want to see in the world. This is a specially formatted fixed-layout ebook that retains the look and feel of the print book. PRAISE FOR THE 2040 DOCUMENTARY '2040 is the Australian documentary everyone's going to be talking about' Mamamia 'even better than That Sugar Film!' Tom Tilley of Triple J's Hack 'In 2040, Gameau defaults to the position of inspiring people rather than alarming or overwhelming them. You leave the film wanting more, not less, of these sorts of productions.' Guardian 'a real glimpse of a greener future' Sydney Morning Herald

The Future of Capitalism-Paul Collier

2018-12-04 From world-renowned economist Paul Collier, a candid diagnosis of the failures of capitalism and a pragmatic and realistic vision for how we can repair it. Deep new rifts are tearing apart the fabric of the United States and other Western societies: thriving cities versus rural counties, the highly skilled elite versus the less educated, wealthy versus developing countries. As these divides deepen, we have lost the sense of ethical obligation to others that was crucial to the rise of post-war social democracy. So far these rifts have been answered only by the revivalist ideologies of populism and socialism, leading to the seismic upheavals of Trump, Brexit, and the return of the far-right in Germany. We have heard many critiques of capitalism but no one has laid out a realistic way to fix it, until now. In a passionate and polemical book, celebrated economist Paul Collier outlines brilliantly original and ethical ways of healing these rifts—economic, social and cultural—with the cool head of pragmatism, rather than the fervor of ideological revivalism. He reveals how he has personally lived across these three divides, moving from working-class Sheffield to hyper-competitive Oxford, and working between Britain and Africa, and acknowledges some of the failings of his profession. Drawing on his own solutions as well as ideas from some of the world's most distinguished social scientists, he shows us how to save capitalism from itself—and free ourselves from the intellectual baggage of

the twentieth century.

Twenty Minutes in Manhattan-Michael Sorkin
2013-03-12 Every morning, the architect and writer Michael Sorkin walks downtown from his Greenwich Village apartment through Washington Square to his Tribeca office. Sorkin isn't in a hurry, and he never ignores his surroundings. Instead, he pays careful, close attention. And in *Twenty Minutes in Manhattan*, he explains what he sees, what he imagines, what he knows—giving us extraordinary access to the layers of history, the feats of engineering and artistry, and the intense social drama that take place along a simple twenty-minute walk.

Inventing Future Cities-Michael Batty
2018-12-11 How we can invent—but not predict—the future of cities. We cannot predict future cities, but we can invent them. Cities are largely unpredictable because they are complex systems that are more like organisms than machines. Neither the laws of economics nor the laws of mechanics apply; cities are the product of countless individual and collective decisions that do not conform to any grand plan. They are the product of our inventions; they evolve. In *Inventing Future Cities*, Michael Batty explores what we need to understand about cities in order to invent their future. Batty outlines certain themes—principles—that apply to all cities. He investigates not the invention of artifacts but inventive processes. Today form is becoming ever more divorced from function; information networks now shape the traditional functions of cities as places of exchange and innovation. By the end of this century, most of the world's population will live in cities, large or small, sometimes contiguous, and always connected; in an urbanized world, it will be increasingly difficult to define a city by its physical boundaries. Batty discusses the coming great transition from a world with few cities to a world of all cities; argues that future cities will be defined as clusters in a hierarchy; describes the future “high-frequency,” real-time streaming city; considers urban sprawl and urban renewal; and maps the waves of technological change, which grow ever more intense and lead to continuous innovation—an unending process of creative destruction out of which future cities will emerge.

Good Economics for Hard Times-Abhijit V. Banerjee
2019-11-12 The winners of the Nobel Prize show how economics, when done right, can help us solve the thorniest social and political problems of our day. Figuring out how to deal with today's critical economic problems is perhaps the great challenge of our time. Much greater than space travel or perhaps even the next revolutionary medical breakthrough, what is at stake is the whole idea of the good life as we have known it. Immigration and inequality, globalization and technological disruption, slowing growth and accelerating climate change—these are sources of great anxiety across the world, from New Delhi and Dakar to Paris and Washington, DC. The resources to address these challenges are there—what we lack are ideas that will help us jump the wall of disagreement and distrust that divides us. If we succeed, history will remember our era with gratitude; if we fail, the potential losses are incalculable. In this revolutionary book, renowned MIT economists Abhijit V. Banerjee and Esther Duflo take on this challenge, building on cutting-edge research in economics explained with lucidity and grace. Original, provocative, and urgent, *Good Economics for Hard Times* makes a persuasive case for an intelligent interventionism and a society built on compassion and respect. It is an extraordinary achievement, one that shines a light to help us appreciate and understand our precariously balanced world.

How to Build a Habitable Planet-Charles H. Langmuir
2012-08-13 Since its first publication more than twenty-five years ago, *How to Build a Habitable Planet* has established a legendary reputation as an accessible yet scientifically impeccable introduction to the origin and evolution of Earth, from the Big Bang through the rise of human civilization. This classic account of how our habitable planet was assembled from the stuff of stars introduced readers to planetary, Earth, and climate science by way of a fascinating narrative. Now this great book has been made even better. Harvard geochemist Charles Langmuir has worked closely with the original author, Wally Broecker, one of the world's leading Earth scientists, to revise and expand the book for a new generation of readers for whom active planetary stewardship is becoming imperative. Interweaving physics, astronomy, chemistry, geology, and biology, this sweeping account tells Earth's complete story, from the synthesis of chemical elements in stars,

to the formation of the Solar System, to the evolution of a habitable climate on Earth, to the origin of life and humankind. The book also addresses the search for other habitable worlds in the Milky Way and contemplates whether Earth will remain habitable as our influence on global climate grows. It concludes by considering the ways in which humankind can sustain Earth's habitability and perhaps even participate in further planetary evolution. Like no other book, *How to Build a Habitable Planet* provides an understanding of Earth in its broadest context, as well as a greater appreciation of its possibly rare ability to sustain life over geologic time. Leading schools that have ordered, recommended for reading, or adopted this book for course use: Arizona State University Brooklyn College CUNY Columbia University Cornell University ETH Zurich Georgia Institute of Technology Harvard University Johns Hopkins University Luther College Northwestern University Ohio State

University Oxford Brookes University Pan American University Rutgers University State University of New York at Binghamton Texas A&M University Trinity College Dublin University of Bristol University of California-Los Angeles University of Cambridge University Of Chicago University of Colorado at Boulder University of Glasgow University of Leicester University of Maine, Farmington University of Michigan University of North Carolina at Chapel Hill University of North Georgia University of Nottingham University of Oregon University of Oxford University of Portsmouth University of Southampton University of Ulster University of Victoria University of Wyoming Western Kentucky University Yale University