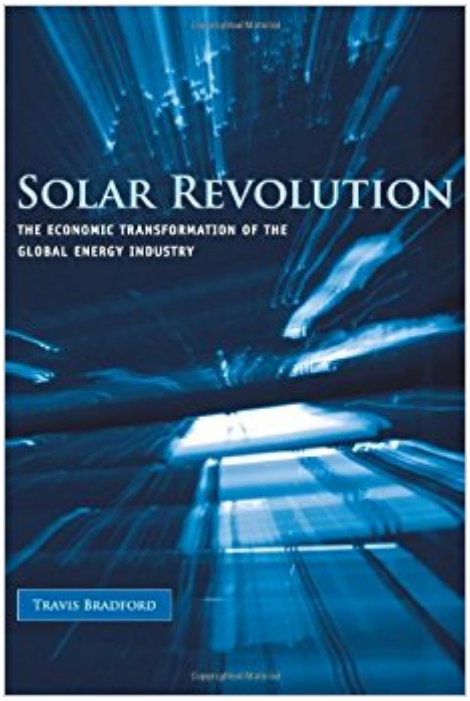
Solar Revolution: The Economic Transformation Of The Global Energy Industry (MIT Press)



Synopsis

In Solar Revolution, fund manager and former corporate buyout specialist Travis Bradford argues -- on the basis of standard business and economic forecasting models -- that over the next two decades solar energy will increasingly become the best and cheapest choice for most electricity and energy applications. Solar Revolution outlines the path by which the transition to solar technology and sustainable energy practices will occur.Developments in the photovoltaic (PV) industry over the last ten years have made direct electricity generation from PV cells a cost-effective and feasible energy solution, despite the common view that PV technology appeals only to a premium niche market. Bradford shows that PV electricity today has become the choice of hundreds of thousands of mainstream homeowners and businesses in many markets worldwide, including Japan, Germany, and the American Southwest. Solar energy will eventually be the cheapest source of energy in nearly all markets and locations because PV can bypass the aging and fragile electricity grid and deliver its power directly to the end user, fundamentally changing the underlying economics of energy. As the scale of PV production increases and costs continue to decline at historic rates, demand for PV electricity will outpace supply of systems for years to come. Ultimately, the shift from fossil fuels to solar energy will take place not because solar energy is better for the environment or energy security, or because of future government subsidies or as yet undeveloped technology. The solar revolution is already occurring through decisions made by self-interested energy users. The shift to solar energy is inevitable and will be as transformative as the last century's revolutions in information and communication technologies.

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Customer Reviews

Everyone who wants to understand the permanent energy answer that can reverse climate change, eliminate oil shocks, and avoid future Chernobyls should read this book. Bradford builds a compelling business case that solar energy is the most disruptive technology in history. (Denis Hayes, Former Director, U.S. National Renewable Energy Laboratory)This is a timely and much-needed book. The solar industry is evolving with dramatic speed, both technologically and economically. With a business perspective and a wealth of knowledge about the solar industry and the wider energy economy, TRavis Bradford provides an excellent account of solar energy today. (Dan Kammen, Professor and Founding Director of the Renewable and Appropriate Energy Laboratory, University of California)This book challenges the energy debate: it shows in a convincing way that atomic and fossil energies are dispensable and could be replaced totally by renewables within some decades. (Hermann Scheer, General Chairman, World Council for Renewable Energy, and member of the German Parliament)This book is a rigorous but intensely practical analysis of how the world's energy future should evolve. It will be valuable not only for scholars dealing with the technological and policy aspects of energy, but also for the concerned citizen who may have no specialized knowledge of the issues. Solar Revolution should receive worldwide attention for exploring the pathways that can guide the world towards a renewable energy future. (R.K. Pachauri, Director-General, The Energy and Resources Institute, New Delhi, and Chair of the Intergovernmental Panel on Climate Change)Deeply researched...hopeful. (Bill McKibben New York Review of Books)Every American who pays or knows someone who pays an electric bill should read Solar Revolution. (Cecil Johnson, "Business Bookshelf" Fort Worth Star-Telegram)While the book is a bit technical, even a solar-novice can learn plenty about the past and present of solar energy, and what may be in store for the future. (E-The Environmental Magazine) Solar Revolution makes a powerful case for a disruptive shift in the energy marketplace -- ushering in a post-fossil-fuel age. Where others despair in the face of 'peak oil' and out-of-control climate change, Travis Bradford sees a unique opportunity to create a clean new energy economy. (Christopher Flavin, President, Worldwatch Institute) Solar Revolution is an essential read because it analyzes the transformation of the global energy economy. The market will drive the new energy economy, and solar is already a growing and influential player. This is a positive vision of a sensible, practical, sustainable energy future. (Bill Richardson, Governor of New Mexico and former U.S.

Secretary of Energy)

Travis Bradford is President and Founder of the Prometheus Institute for Sustainable Development, a nonprofit organization in Cambridge, Massachusetts, focused on using the power of the business and financial sectors to deploy cost-effective and sustainable technologies.

This should have been a magazine article in the Economist, not a book. As other reviewers have explained, this is about photovoltaics and only photovoltaics (PV) and even at that it's limited. True, other energy sources are mentioned, such as hydrogen fuel cells, but they get about half a page.It would be better titled "The Estimated Economics of Photovoltaics." But even at that it's weak. Photovoltaics come in many forms from rigid structures to concentrators to flexible fabrics. Only round numbers are used, such as, "In the case of photovoltaic modules, the cost to produce them in the late 1970s was around $25 per watt but has since dropped to less than $3.50 per kW,..." (p, 109) But there's no mention of the applicable configuration.Some things are footnoted, like "Various forms of solar energy have been used since prehistoric times." But others, like Figure 7.2 where today's PV costs are shown at $6 per watt are not. And the $6 per watt in Figure 7.2 hardly correlates with the $3.50 quoted above for production costs. Yes, I know one is production cost, the other presumably installed cost, but even that isn't clear and an installed cost that's 1700 times production cost deserves some explanation.I couldn't find one reference to actual PV conversion efficiency, yet there are statements such as "Even at today's efficiency of PV cells, the land required would be 10 million acres, or 0.4 percent of the total land area of the United States." Perhaps the efficiency assumption is buried in the primary documents but it should be shown here since it's pivotal. I didn't notice any reference to the fact that today's PV's degrade over time. PV efficiency and life is fundamental to PV economics.There are few diagrams, all economics and order of magnitude.It is clear that a lot of work went into preparing and documenting the book, but in the end you can't do much with what's here. If you wanted, for example, to crudely estimate say the cost of a megawatt of photovoltaic power so you could compare it to say Nevada Solar One, the solar concentrator facility outside Boulder, NV, you only have the $6 per watt from the chart quoted earlier and that gets you to $6 million/megawatt. But you don't know what PV efficiency that's based on. (Solar One's cost is about $4 million/megawatt)From this book you'd think PV's were the future. But the Europeans are moving ahead with solar thermal at the bulk stage. Do PV's make sense for example on say roof tops and solar thermal makes more sense at the utility level? From this book, you can't even begin to answer that question, or know if a breakthrough in PV efficiency would

make a difference.I liked one of the reviews on the back cover..."deeply researched and hopeful." Says it all, and says nothing.Wish I could refer you to a better book, but haven't found one yet. There's material on the net. Scientific American's September 2006 and March 2009 issues cover the technologies briefly, but are weak on the economics. There's an absence of clear economic data on solar energy sources.

I'm trying to do my part in promoting clean energy by investing in green stocks including companies like First Solar, Vestas, Suntech and General Electric so what I wanted to get from this book was some information on whether or not I'm making a wise investment. More specifically I wanted to know what is currently holding back solar energy and the possible timetable for a worldwide energy revolution. The author answered most of my questions but new ones arose. Make no mistake the author is a solar power proponent so there is little to no criticism of it as an emerging energy source.After getting through a history of energy and comparison of new alternative solutions the author finally gets down to the nuts and bolts. The benefits of solar power include its ability to be deployed quickly and in a piecemeal manner. Solar power can start generating energy in months rather than the years that it takes to build a traditional power plant and additional panels can be brought online as needed. Countries like Japan and Germany that are leading the world in solar power deployment are creating their solar infrastructure in a distributed manner. Individuals can generate there own electricity with panels installed on their homes and then send the excess into a 'smart' grid. Unlike wind power, which is considered by some to be an eyesore, solar panels can be created as "roofing materials, architectural glass, and potentially paint and plastic casing"The author writes, "The amount of sunlight that falls on the earth every day is equivalent to the total energy that is used by the earth's current population in twenty seven years" What is holding solar power back as a viable alternative to fossil fuel energy is simply cost per watt and the barrier is shrinking every day. The lowest cost for a PV system was $5 per watt in 2005 but First Solar has set a goal of 65 cents by 2012. In one chart the author shows solar power costing between 15 and 27 cents per kWh while other forms of energy ranging from 3 to 15 cents per kWh so there is a gap to close. Mr. Bradford points out that the gap is even smaller than it appears because in addition to the apparent cost we pay for energy, taxpayers pay billions in hidden costs including military costs and the environmental price of using dirty fuels. Once solar power approaches parity with fossil fuels we will likely see a positive feedback loop as increased usage cause prices to drop creating increased usage. As the world's appetite for energy grows solar energy is the perfect solution in that the regions of the world most in need of energy are the same regions that are flush with sunlight and in those areas solar

energy doesn’t need to compete with an already existing fossil fuel energy grid.One major problem with this book is that the breakneck speed of technology has left it woefully out of date having been published in 2006. The author writes that the "current" six percent efficiency ceiling of PV panels may reach 30 percent in three to five years. However, in late 2006 a solar cell broke the 40 percent efficiency barrier so the author’s prediction was too conservative and the book is already outdated. The author’s confidence in efficiency improvements was in response to new solar cells that could generate electricity from light rays outside the visible spectrum which leads to one of the questions I had that the author didn’t answer. If electricity can be generated using rays outside the visible spectrum does this mean that electrical energy could be generated even on a cloudy day in winter? This is important for someone like myself who lives in northern Ohio.I’m 100% sold on solar power but I would like to know what the feasibility and environmental impact is of manufacturing millions of solar panels. I mean that is a lot of material. That’s one subject never addressed in the book. My belief is that if solar energy is not adopted soon my portfolio value may well be irrelevant given climate change and other problems related to having a fossil fuel based energy policy so I might as well place my bet. I found this book informative however even at a slender 200 pages it still seemed to have quite a bit of filler and as mentioned previously its numbers are out of date.

I feel the basic assumptions in the book are reasonable. For example, one key point that he makes is with the issue of peak energy cost and how solar fits in nicely with satisfying this need. This itself will be a key driver for alternative, and specifically solar growth. Peak energy is about 30% of the total power requirement in many nations. Considering that solar currently only contributes around 0.01% of the world’s total electricity needs, it is clear that it has a lot of room to grow.Less convincing his is argument that local production and consumption will reduce distribution costs. I dont think this is a given as there may be large distances between production and consumption. This is after all how the feed in tarrif system is supposed to work. The only way distribution will be reduced significantly is if the bulk of the energy is consumed locally - and this will only take place if there is an efficient mechanism to store the surplus energy locally. Currently, there is none.What I also found lacking was the derivation of costs (per watt hour or peak watts). He introduces these terms and presents various cost curves, but does not go into the details of how they are determined. In the end, it is all about costs and he should have spent more time on this topic.

Concise, prescient book. I read this about 6 years ago & it prepared me well to see the qualitative changes coming in the energy industry - & exploit the opportunity as a writer, businessperson, and

grad student in History at UNLV (solar focus). I'm re-skimming it as I finish my first book, "The Case of the Cleantech Con Artist: A True Vegas Tale."

excellent book

Great read

Solar Revolution: The Economic Transformation of the Global Energy Industry (MIT Press) Solar Power: The Ultimate Guide to Solar Power Energy and Lower Bills: (Off Grid Solar Power Systems, Home Solar Power System) (Living Off Grid, Wind And Solar Power Systems) Solar Electricity Handbook: 2017 Edition: A simple, practical guide to solar energy ? designing and installing solar photovoltaic systems. Solar Electricity Handbook - 2015 Edition: A simple, practical guide to solar energy - designing and installing solar PV systems. Solar Electricity Handbook - 2013 Edition: A Simple Practical Guide to Solar Energy - Designing and Installing Photovoltaic Solar Electric Systems Solar Electricity Handbook - 2014 Edition: A Simple Practical Guide to Solar Energy - Designing and Installing Photovoltaic Solar Electric Systems Solar Electricity Handbook - 2012 Edition: A Simple Practical Guide to Solar Energy - Designing and Installing Photovoltaic Solar Electric Systems Building A Brilliant Tomorrow: The Transformation of Inovateus Solar and the Energy Revolution Solar Cooking: Different Types of Solar Cookers: The Pros and Cons of Different Types of Solar Cookers and What Will Work Best For You DIY: How to make solar cell panels easily with no experience!: Master Making Solar Panels Faster! (Master Solar Faster Book 1) Renewable Energy Made Easy: Free Energy from Solar, Wind, Hydropower, and Other Alternative Energy Sources Energy Harvesting: Solar, Wind, and Ocean Energy Conversion Systems (Energy, Power Electronics, and Machines) Off-Grid Living: How To Build Wind Turbine, Solar Panels And Micro Hydroelectric Generator To Power Up Your House: (Wind Power, Hydropower, Solar Energy, Power Generation) Solar Energy for Beginners: The Complete Guide to Solar Power Systems, Panels & Cells Solar PV Off-Grid Power: How to Build Solar PV Energy Systems for Stand Alone LED Lighting, Cameras, Electronics, Communication, and Remote Site Home Power Systems The Passive Solar Energy Book: A Complete Guide to Passive Solar Home, Greenhouse and Building Design Reiki: The Healing Energy of Reiki - BeginnerÃ¢â ¬â„¢s Guide for Reiki Energy and Spiritual Healing: Reiki: Easy and Simple Energy Healing Techniques Using the ... Energy Healing for Beginners Book 1) Solar Energy, Photovoltaics, and Domestic Hot Water: A Technical and Economic Guide for Project Planners, Builders, and Property Owners Confidence Games: Lawyers,

Accountants, and the Tax Shelter Industry (MIT Press) Contending Economic Theories: Neoclassical, Keynesian, and Marxian (MIT Press)