DANNY KENNEDY

ROOFTOP REVOLUTION

How Solar Power Can Save Our Economy—and Our Planet—from Dirty Energy

An Excerpt From

Rooftop Revolution: How Solar Power Can Save Our Economy—and Our Planet—from Dirty Energy

by Danny Kennedy
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Foreword

by General Wesley Clark, US Army (ret.)

The United States today faces a historic opportunity—an opportunity every bit as wonderful as Henry Ford's development of mass production or Thomas Edison's invention of the light bulb. These economic achievements led to mass literacy, an acceleration of learning, the creation of the vast American middle class, and ultimately the suburbanization of the United States.

Today's opportunity is in the field of clean energy, using the modern technologies developed since the first energy crisis in the 1970s to create an America awash in a new prosperity, with an economy bursting with the most plentiful, accessible, and least expensive power source in the world. Properly applied, this energy could spell untold new manufacturing, informational, and transportation technologies. High-tech industries and entrepreneurs from all over the world would locate here, sparking an economic and educational renaissance for the United States that would catapult us firmly as a role model and an unquestioned future leader into the twenty-first century.

Danny Kennedy's book, *Rooftop Revolution,* is the story of the technologies surrounding one of these energy sources: solar power. He covers in illuminating depth and with jaunty prose the innovations, economics, and politics of the solar-energy

industry and in so doing provides some deep insight into the challenges and the opportunities facing the United States today.

The challenge of energy is not just a matter of economics, though economics is certainly a part of it. As the nation moved from electric lighting to electric-powered heavy industry and then into the Information Age, and from sweltering summers to ever-present air-conditioning, electricity went from being a luxury to a necessity to a vital foundation for the future. But the nation's supply has not kept pace with either demand or the opportunities ahead.

The utility industry is for the most part heavily regulated, fragmented, and obsolescent in structure and performance. Reliant largely on fossil-fueled steam generation from mammoth plants and a patchwork of wiring called "the grid," the system—if it can even be called that—is inefficient, expensive, stubbornly resistant to modernization, and almost always on the brink of overload and failure. Consumers demand low rates; utility companies, protected usually by public service commissions, fight investments and change; and politicians cater to electoral forces.

Enter the new solar technology—the fastest-developing energy technology today, whose price has fallen dramatically and which promises continued reduction, beyond the point where it will likely be cheaper to add rooftop solar to homes, schools, and factories than to supply them with centrally generated electric power. Indeed it is likely that new generation will be most efficiently managed on a distributed basis and sold into the grid, rather than bought from the grid.

But there are formidable political, regulatory, and bureaucratic obstacles to this vision. And these too are part of Kennedy's story.

On the larger scene, the United States has a dismal legacy of more than 40 years of failure in hammering out a sensible energy strategy, not only for electricity but for liquid fuels as well. Dependent for decades on between 9 million and 12 million barrels of imported fuel, the United States has squandered lives, treasure, and legacy in grasping for foreign-sourced petroleum while sitting on the most abundant energy resources and intellectual and entrepreneurial capital in the world.

Three wars, some 7,000 US military deaths, and several trillion dollars spent on conflict, military presence, and fuel imports attest to our failure. Companies that once employed proud and stalwart US citizens are now funnels channeling US fuel expenditures to foreign dictators and others whose governments benefit in direct proportion to America's economic pain. And in the process, they are agents of distortion of US strategy and policy, conveying a false sense of the real challenges and opportunities facing us in the future and reinforcing their own commercial interests with the most powerful accumulation of wealth in the world.

In less than two presidential terms, with scarcely any expenditure of US government monies, the United States could be energy independent. The "gold rush" in North Dakota today, as thousands of workers pour into the state seeking lucrative jobs in the new oil sector, powered by private investment, indicates the hunger for energy and the drive to satiate it.

But we also must take seriously the rising carbon content in the atmosphere and the even more dangerous buildup of other greenhouse gases like methane. So, while using energy independence as a rallying cry to jump-start the economy, we have to simultaneously transition away from fossil fuels—no easy task with a trillion-dollar inventory of liquid-fueled private

automobiles. And the electricity that powers them must be renewably generated rather than drawn from fossilized carbon. But, again, we have the technology to do this.

An Energy Primer

> Let there be light.
>
> —GENESIS 1:3

We live in electricity like a fish lives in water. Until a big storm knocks out our power or we blow a fuse by using the microwave and the blender at the same time, most of us don't think a whole lot about the electricity that surrounds us and powers our modern lives. We pay a monthly bill—usually while grumbling about its expense—and our lights stay lit, our toast gets toasted, and our web extends worldwide. Beyond that? Well, we may have a notion that Benjamin Franklin discovered electricity while flying a kite in a storm (that's a myth, actually—Franklin may have never flown that kite, though he did do important research into how electricity is conducted). We may have an idea that a few big—and not necessarily benevolent—corporations have a monopoly on our power supply. And we've likely heard that the way we currently supply our homes with precious electricity is damaging our environment and endangering our nation's security.

Yet we haven't heard much about viable alternatives to this status quo, so we keep paying that monthly bill. We get on-demand light, heat, refrigeration, entertainment, information,

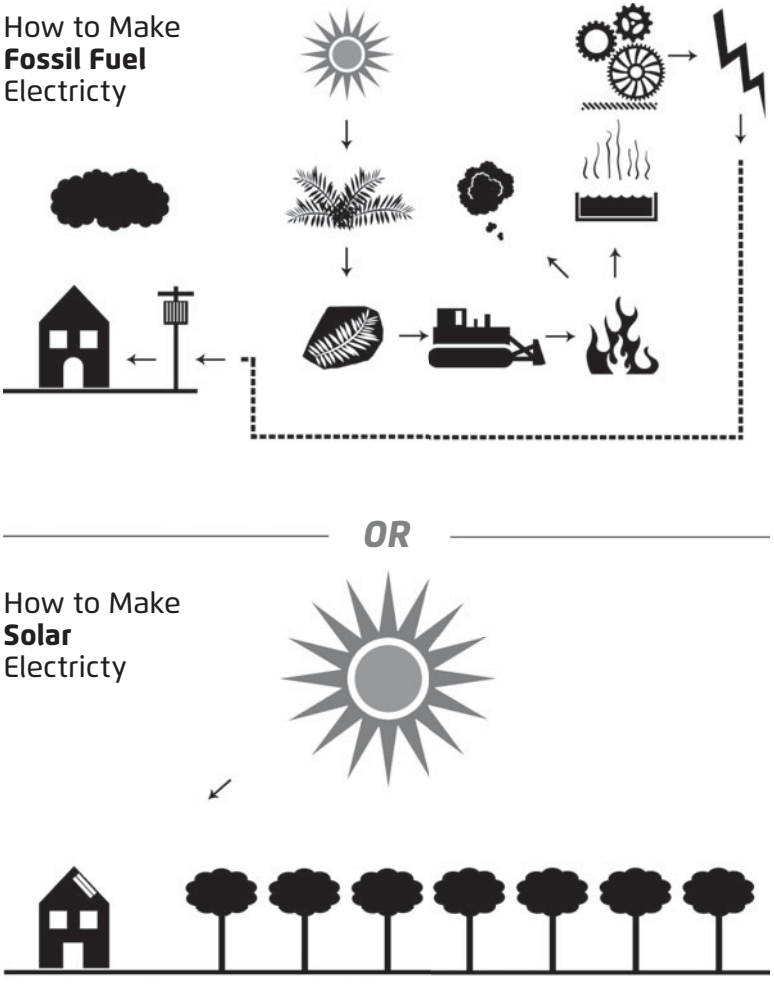
blended margaritas, and microwaved pizza. And those corporations keep lining their pockets while our nation and our world are put in an ever-more-precarious situation.

What if I told you that there *is* a viable alternative—despite what Dirty Energy propagandists would have you believe? There's a way to power your home that saves you money, that can free our nation from dependence on foreign energy sources, and that's completely renewable. It's ready and available right now.

It's an American invention called solar power. And the ascent of solar—following a Rooftop Revolution—is set to remake our world. To be certain, it's fighting against some monumental institutions and deeply ingrained behaviors and mind-sets. (If you're thinking, *Oh, solar—it's just a fantasy some radicals had in the 1970s,* the Dirty Energy public relations [PR] machine has gotten into your head!) But recent advances of ingenuity based on solar power's brilliance have unleashed the creativity of entrepreneurs and capital. These advances are supported by serious social movements—committed activists who seek to break the corporate power of Big Oil and Big Coal and to reduce pollution and corruption. In this book I explain the early history of the Rooftop Revolution as well as what needs to happen next and how you can join the fight.

Electricity 101

We *already* get our energy from the sun—we just do it in the most laughably inefficient way imaginable. In short, fossil fuels—that is, coal, oil, and natural gas—*are* the sun's energy, stored in the form of 200-million-year-old plants and extracted today by dangerous, costly, environment-destroying methods.



Solar power, by contrast, comes directly from the source. There are no mines and no rigs—a solar panel just sits in the sun, takes in sunlight, and turns that light into electricity right at the point of use. There's no costly and unsightly transportation, no danger of explosion or mine collapse, no mountaintop

removal, no Fukushima or Deepwater Horizon, and no spilling or killing required. Just clean, cheap energy.

You don't have to be an energy expert to see how strong the case for solar power is. I've spent my adult life fighting on the front lines of the Rooftop Revolution, working around, with, and often in spite of the energy industry, yet I have no formal training as an electrical engineer. So I can tell you, in layperson's terms, what you need to know before joining this fight.

How did electricity become ubiquitous and affordable for most Americans?

The machines that make the electricity became standardized, and the businesses that delivered them scaled. The machine most commonly used to make electricity in the United States and elsewhere is the steam turbine, developed by a British engineer in the 1880s, which extracts thermal energy from pressurized steam. That pressurized steam is created by boiling water, which is heated by burning various forms of fossil fuels. We get those fossil fuels in a variety of ways: open pit mines, shaft mines, drilling rigs on land and sea, and "fracking"—or geologic fracturing—which is the propagation of fractures in a rock layer by pumping high-pressure liquid down a hole to release natural gas locked in the sediments and fissures.

All of these aforementioned fuels store energy in chemical bonds; the energy is released when they're burned. The energy got there hundreds of millions of years ago, when these fuels were plants, through the process of photosynthesis: the sun put that energy there. Most of the world's coal, for instance, comes from the fossilized remains of dinosaur-era plants, hence the term *fossil fuel.*

See what I mean about a "laughably inefficient way" to get power from the sun?

Coal is mined from holes in the ground—often from shafts but increasingly, due to the use of machinery, from open pits. Humans have been extracting coal from shaft mines for nearly a millennium—and it's a hugely dangerous enterprise, as you often hear about in the news. Every year thousands die in mine disasters, especially in China, as that country slakes its thirst for low-cost coal. Aside from the human costs, mining has well-known environmental repercussions, such as water pollution, mountain-top removal, and forest clear cutting.

Sucking oil and gas—fossil fuels in liquid or gaseous form—from beneath the ground is a similarly invasive process. While the hole in the ground isn't usually as large as the holes caused by mines, the cumulative impact of a drilling field can be quite extensive. I spent a year documenting one such project in Papua New Guinea for an academic thesis in human geography, and it took me the better part of two months just to walk around the drill sites that fed one pipeline in the mountains near Lake Kutubu, the second-largest high-altitude lake in the world. I saw firsthand the spills, helicopter accidents, invasive logging, and other ecological effects that made this "best in breed" oil project pretty high impact. Offshore rigs are similarly dangerous, as we recently saw in BP's devastating oil spill in the Gulf of Mexico.

Gas drilling is a little different. It requires a large industrial infrastructure nearby to liquefy or pressurize the gas for transport in some form. A new gas project off Australia's northwest coast has so far cost $40 billion just to get up and running. In the United States and elsewhere, getting to natural gas increasingly requires fracking, which is quite controversial because the liquids used are frequently toxic and because the volumes of fluids injected underground are causing groundwater contamination and even earthquakes. We all know that mining

and drilling are pretty ugly, but we rarely make the connection between this ugliness and that little light that comes on every time we open the fridge.

Perhaps the biggest problem that we inadvertently exacerbate when we use electricity is climate change (or global warming, as it's also called): when fossil fuels release the energy locked in chemical-based bonds from plants that once captured carbon dioxide, they also release some of that carbon dioxide into the atmosphere. The way we currently create and process energy releases much of this carbon dioxide pollution. Many books have been written about the subject of climate change, and this is not one of them. Every relevant, reputable scientist in the field has shown that the way we currently create and process energy is a cause of climate change. If we don't slow the steady rise of global warming, our planet will be beset by more drought, more floods, more hunger, more disease, and more-extreme weather as time progresses. Even if we could clean up all the pollution or accept all the other impacts of the fossil-fuel-extraction industry, we can't afford to accept the worsening of climate change that burning these fuels causes.

Then there are nukes. A nuclear power plant uses radiation from uranium, instead of fossil fuels, to boil water and create the steam for its steam turbines. The problems with nukes are many, from uranium mining to nuclear waste, which can kill many things living nearby for generations—think of the Chernobyl and Fukushima nuclear disasters—and because of these risks, new nuclear plants are virtually uninsurable (that is, expensive)!

It's worth noting that turbines can be powered by forces other than steam, the most common being hydroelectric turbines, which capture and transmit the kinetic energy of

falling water. Similarly, wind turbines use the power of naturally occurring wind to create energy, which is also sneakily due to the sun's heating parts of the atmosphere, changing pressure, and causing wind. Like solar, wind is a wonderfully clean and renewable energy source.

The Grid

The system of wires between these electricity-generating machines and the users of that electricity is known as "the grid." There are basically two types of wires in the grid. Electricity begins its journey at the types of generators we've just discussed (which are usually far from high-population areas). It's carried on high-voltage transmission wires to "demand centers," where transformers reduce the electricity's voltage and send it out via distribution lines to consumers.

Electricity is a vital commodity service that powers our economy. We're the end users in our homes and offices, and we pay the full retail rate for dirty electricity. A big commercial user—like a factory, a store, or a university—may pay a lower rate, and some industrial users negotiate to buy electricity almost at wholesale prices. This pricing pyramid of lower-cost bulk buying and higher-cost structures for residential and other users has been applied in the United States and many other countries for much of the past century. In China, however, it's different: to create efficiency in bulk use, China's utilities charge higher prices, but they ask retail users to pay less because they aim to spread the benefits of electricity to more citizens.

The grid's complexity has grown over time. The fundamental structure is often described as "hub and spoke"—central-station generators being surrounded by wires out to users—but it's more like a hub and spaghetti and meatballs, with more

and more generators also on the rim and a crisscross of wires around the network.

Managing the grid is challenging. The technology supporting it is one matter, but then consider the interests of the businesses generating the power and maintaining the grid, and then think of the rights of consumers, who are represented by politically appointed regulators of those businesses—and you start to see how the grid is actually a very tangled web!

Nonetheless creating the grid—and thereby providing the service of electricity to a nation of consumers—was one of the great achievements of the twentieth century in the United States. Although nearly 90 percent of urban dwellers had electricity by the 1930s, only 10 percent of rural dwellers did. Private energy companies argued that providing electricity to rural farmers was too expensive (and they charged farmers up to four times more than they charged city dwellers). As part of the New Deal, the Rural Electrification Administration brought the productivity and the personal improvements afforded by electricity to the many farmers who were going without.

Today countries are still judged by their ability to deliver electricity service to more and more people, although a lot of people are still off the grid. At least 1 billion people can't take electricity for granted; in fact, they've probably never experienced it, but they're likely to in the coming decade as new, more-localized ways of making electricity become commonplace. Their governments—in India and some African countries, for example—are trying to not re-create the brittle twentieth-century model but rather have a more flexible set of resources to serve their communities with electricity. This is actually more reliable and secure; here in the United States, our grid is at risk of breakdown (if a tree falls on a power line, it can trigger the

collapse of a whole network as much of the Northeast experienced in 2003) and attack (the grid's many linkages make it an easy target for terrorists).

One of the resources being deployed in these countries without extensive grids, as they seek to leapfrog the era of dirty-electricity supply built around the expensive and insecure central-station model, is solar power. Places like Germany, India, Japan, and California have also been in the forefront of the Rooftop Revolution as they have connected solar panels to their grids to augment their power supplies; we'll visit some of these places in later chapters.

Shining a Light on Solar

Solar power is harnessed in a number of ways, including some solar-thermal solutions that concentrate sunlight directly onto water-filled vessels—to boil water, generate steam, and spin a turbine much like the fossil-fuel-based electricity technologies. There are also straight solar hot-water systems, which heat our water only for direct use—not to create electricity—and are very efficient ways to create hot-water service.

But the solar power that I most want to focus on—because it's the real game changer—is what's known as *photovoltaics,* a method of generating electric power by converting solar radiation (*photo*) into direct-current electricity (*voltaic*) using semiconductors. When people talk about solar panels, they're talking about this technology, though the systems range in size, from one small cell (for instance, to power a single light in Zambia) to 10 panels (to power a home in California) to 400,000 panels (to power a city in Crimea).

Solar panels are often called *modules* because they can be customized to serve any size electricity demand. This alone

makes them a remarkably disruptive technology to the electricity industry. Better yet, they don't require fuel or produce pollution. The *production* of the panels may cause some pollution, as the production of any manufactured goods does, but it's minuscule compared with the production of fossil fuels, and it can be contained in a closed production process. Plus, solar-panel components are completely recyclable—something fossil-fuel industries can't claim about their products—and they pay back the energy put into them in the first few years of operation.

A solar panel at work is like magic in the sense Arthur C. Clarke meant when he said, "Any sufficiently advanced technology is indistinguishable from magic." Here we have light shining on the surface of the silicon cells, creating an electric current; it's a tiny amount, but sometimes that's enough. For instance, there's my wristwatch, which I've had for nearly a decade and have never had to wind or replace a battery. It has a tiny amount of photovoltaic silicon on its face, and that provides the power for the mechanism day in and day out. The minuscule current of electricity that this cell makes can be joined with currents from a series of silicon cells that make up a solar panel, which in turn can be strung together to form an even bigger flow of electricity.

When you hear energy experts talk about "loads," they're referring to electricity usage. Solar panels can be quite close to loads and sized appropriately. This is different from steam-based technologies, which tend to be far from loads and oversized, so they're sure to meet demand. Solar power is not only clean but also local. And now it's the most cost-effective.

Before we proceed, I should explain how we measure power and energy: "Power" is what we can directly use, like the water we pour into our mouths. "Energy" is like all the water stored up in the clouds; it has the potential to come down to us, but until

and unless it does we may go thirsty. That is to say, we can have energy but not necessarily usable power. Power is measured in *kilowatts,* and electricity comes in *kilowatt-hours* because we're measuring how long a source can provide an amount of power. Your electricity bill charges you per kilowatt-hour.

The energy potential in 20 days of sunshine falling on Earth is the same as that of all the coal, oil, and natural gas known to humans. We may find more fossil fuels at some point, but solar power is effectively infinite, unlike fossil fuels, which someday, especially at the rate we're using them, *will* run out. They are governed by the reality of scarcity and become more expensive the more you use them. Sunshine as fuel renews every day. It is abundant and becomes cheaper the more you use it. I admit that there's an assumption here—that the sun will rise and shine on us—but the day it doesn't, we'll have bigger issues to deal with than whether the toaster's working!

So if you understand the significant potential of solar energy, you're going to be excited about the reality of solar panels to tap it. They take 15 percent of sunlight's energy and convert it into useable power. And solar panels are more affordable and more powerful each year. These 2-by-3-foot framed modules of glass and aluminum, sandwiching some slices of silicon arrayed in a 60- or 72-cell format, and the economy that will emerge as part and parcel of them have the potential to completely negate the entire grid infrastructure built around steam turbines since the end of the nineteenth century.

The grid, as it exists now, consists of large generators that convert the energy stored in fossil fuels into electricity that's then sent over cables and wires into our homes and businesses. We're dumb recipients down a one-way line. The growing demand for electricity, plus constraints on transmission systems

and the environmental costs of fossil fuels, has resulted in many concerns about the limits to this approach among politicians and others hoping to keep the lights on. Solar technology allows individuals to become producers of power, too, and to engage in the creation of the electricity they use.

This shift has been described as enabling electricity users to become "prosumers"—producer-consumers—on a smart grid, a bit like the Internet has allowed individuals to not simply consume media content but also create and share it. It need not be a frightening transition to be more involved in energy production while we consume it. Society just needs businesses that make doing so seamless and simple—and maybe a little sexy. The economics can already make it worth our while.

I call this change from dirty-energy dependency to a portfolio of clean, distributed energy solutions the *Solar Ascent* because solar will be the primary source of power. This transition will be triggered by this decade's Rooftop Revolution, in which many millions take part in the Solar Ascent by producing their own power on their own places. In other words, the longer-term evolution will be driven by mass adoption of solar panels on our rooftops in a historic burst of resistance to the powers that be.

The previous big energy revolution was the Industrial Revolution. Coal combined with the power of steam engines created new opportunities in our economy and changed the world. Replacing our agricultural society (before the steam engine, most work was fueled by eating plants with their more freshly stored sunlight) with an industrial society unleashed a boom in productivity and innovation that has lasted for centuries. The Rooftop Revolution will launch similarly world-changing outcomes if it succeeds. If it doesn't, we'll be stuck

with the impacts of the dirty-energy sources that steam power bequeathed to us.

Join the Revolution

Making solar power easier to access, demonstrating solar's power by adopting it into your life, becoming involved in spreading sunshine into other people's lives with electricity cost savings and a reduction in pollution, voting for positive energy policies (or those that break the grip of fossil fuels and support the emergence of solar and other local, clean energy)—all are things we must accomplish now. Speaking truth to power, in the form of government and corporate bureaucrats beholden to what I've learned to call "King CONG" (the four-headed monster of coal, oil, nukes, and gas) is also critical.

So get involved. Use this book as a resource and a how-to guide, not just to putting solar on your roof but also to being part of the fight against Dirty Energy. (Of course, if you're ready to put solar on your roof, do that too!) Right now it's important that everyone know the truth about solar's power and how we should be making energy. Our future—our safety, our prosperity, and our environment—depends on the success of the Rooftop Revolution.

In each chapter of this book is a section called "What You Can Do as a Rooftop Revolutionary" (in the short term and in the long term) and where you can learn more.

The Rooftop Revolution has begun. The time to fight is now. S*emper ad lucem*—always toward the light!

What You Can Do as a Rooftop Revolutionary

- You have taken the first step to join the Rooftop Revolution by reading this prologue and educating yourself about how electricity is produced. Now take that knowledge a step further: read your electricity bill thoroughly and gain a strong understanding of the charges.
- Ask your friends and colleagues if they understand how electricity is produced. If they don't have a good grasp, fill in the blanks for them.

CHAPTER 1

Sunny Side Up

> Now, here, you see, it takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that!
>
> —LEWIS CARROLL, FROM *THROUGH THE LOOKING GLASS*

SOLAR IS DEAD—AT LEAST THAT'S WHAT ITS DETRACTORS want you to believe. Dead in the water, they say, dead as disco and dinosaurs, a hippie-dippy pipe dream gone up in smoke. But these solar-energy opponents, many of whom hail from the coal, oil, nuke, and gas lobbies (ol' King CONG), have recently been pointing to just one example in their efforts to prove their point: Solyndra, the erstwhile solar-industry poster child, which, in 2011, made headlines and drew nationwide derision when it went bankrupt after receiving a $500 million loan from the US government.

But here's the truth King CONG doesn't want you to know: The downfall of Solyndra actually proved that solar power is fast becoming the most cost-effective and efficient form of electricity on Earth. The company's failure was largely due to competition in a market that's been growing at an amazing rate, and Solyndra's idea for a lower-cost solar module (which had a daft cylindrical design that was too fragile and too expensive

to make) simply couldn't compete with less-expensive, mass-produced silicon-based solar panels, the cheapest of which largely come from China—not an uncommon practice as new products become more common and affordable.

Solar-panel manufacturing is relatively simple (it's less complex than, say, making a car), and a lot of it can be done using automated methods or low-skilled labor, of which China has plenty.

Let's look at Apple Inc. for a moment. Here's a company that designs its devices in California and then sells them through clever online and physical retail stores around the world, but it manufactures these products in Chinese factories. The world loves Apple products, and Wall Street loves the company, which in 2012 surpassed Exxon as the most valuable in the world. It currently has more cash than the US government! There are problems aplenty with this model of manufacturing, and I'm not naïve about the issues—such as labor conditions for the factory workers and environmental impacts like the pollution caused by poor regulation—but let's be realistic: Apple is traveling a well-worn path, following such companies as Dell and General Electric. That path leads to great opportunity in ancillary businesses—the benefits created by Apple in creativity, publishing, recording, telephony, and sales of its various devices are legend—and the greater good, which is the availability of Apple's amazing products.

The truth is, we should be glad that China is making solar panels cheaply—it makes these products more affordable for Americans and the billion-plus people on the planet who don't currently get electricity and would otherwise turn to dirty planet-cooking coal, oil, or gas to get it. Though domestic manufacturing of solar panels and solar-panel parts is gaining

strength in America over the first decade of the twenty-first century, the real jobs and margins right now are elsewhere in the industry—in sales, marketing, finance, and the installation of these products. Most of the jobs are downstream.

So Solyndra went bust, which is sad for the people who worked there, but its demise in no way marks the end of an entire industry. Nevertheless many people who had turned a blind eye to government pork for bad ideas and bankruptcies waiting to happen, and those who had sought federal funding for all sorts of less-worthy ventures, like a bridge in Alaska that went nowhere, had a field day. There was a frenzy of media coverage fed by political hearings and witch hunts that made this one company's fate one of the biggest stories of the year. Indeed, the hysteria surrounding Solyndra's bankruptcy reminds me of the people who thought that the fall of the web browser Netscape marked the end of the Internet. More column inches were devoted to the Solyndra story in most outlets than to Japan's Fukushima nuclear-power-plant disaster, which wrote down the Tokyo Electric Power Company's value by $13 billion and required a $9 billion bailout by the people of Japan.

But why has the so-called demise of solar energy and the solar industry been so widely reported? Because the rise of solar power is a direct threat to the rich and powerful corporations that create electricity through dirty, unsustainable, and harmful fossil fuel.

The Battle for America's Head and Heart

There's an epic struggle afoot for the head and the heart of America. And the fat cats in Dirty Energy who feed off our addiction to fossil fuel have an obvious motivation—profits—to keep us in denial about our bad habit. They don't want us to

dwell on our energy addiction and the damage it does to ourselves, our planet, and our children's future. So Dirty Energy dips into its very deep pockets to tout its brand of power in the news and keep America in the dark about cleaner, smarter, more-affordable options out there. But as a growing number of Americans are finding out, they do have options.

Although change is difficult and requires traction, it's easier when someone shines a light on the path ahead, and this is what the solar-power movement is doing: providing a solution, an alternative to business as usual, while the coal, oil, nuke, and gas giants continue their fight for the status quo. Not to be too highfalutin, but when the colonial Americans were frustrated by heavy taxation without government representation, it wasn't until they saw a new direction—inspired by the French Republic's demand for liberty—that forces of change pushed them to have their own revolution.

It's time for a new revolution, an energy revolution, *our* revolution—a Rooftop Revolution. The movement worldwide to go solar—to usurp the powers that be in our existing electricity grids and put power in the hands of those in the developing world who don't have it—is creating a space for as profound a change. Breaking up monopolies, spreading benefits to the poorest, making consumers producers, and getting polluters to pay and thus using market forces to get them to participate in building a clean economy—this is what the Rooftop Revolution is all about. And that's why it's not surprising that King CONG is fighting back.

In 2012 oil barons such as the Koch brothers will spend many millions on TV ad campaigns to tar President Barack Obama with the same brush they used on Solyndra. Those who have the most to lose, the opponents of solar, will come

out with fists flying—as the US Chamber of Commerce did in the 2010 election cycle. The massive business lobby outspent the Republican and Democratic National Committees combined to further its official policy of digging up every last ounce of fuel in the ground and burning it as soon as possible.

We need to urge our politicians to refuse money from energy companies and their lobbies so that our representatives can make decisions about energy policy without being beholden to paymasters and without ignoring the public demand for clean, local energy. And public opinion is clear: according to the SCHOTT Solar Barometer, when voters were asked to select an energy source they would financially support if they were in charge of US energy policy, 39 percent said they would choose solar power while a measly 3 percent chose coal—almost the inverse ratio of our representatives in Congress.

Mark my words, we'll have to battle a lot more of this malarkey in the near future. Case in point: the viral campaign that the American Petroleum Institute (API), the powerful oil and natural-gas trade association, launched in January 2012. Dubbed "Vote 4 Energy," it was scripted by industry executives in a big election year to dupe viewers into believing that the tired and traditional use of dirty energy would somehow lead our country back to prosperity. Greenpeace, the environmental advocacy organization, released a parody video that exposed the reality that the API campaign wasn't divulging—that these energy sources are damaging and unsustainable and that the jobs the corporations claim to create are only temporary. But which ads do you think more Americans see—ads funded by incredibly rich oil corporations or those of a nonprofit? The API campaign included radio, television, and print advertising in election-year swing states, including Ohio, Pennsylvania, and

Virginia—fertile ground for political theater in which energy is a key issue.

As the API's spokesman said when launching Vote 4 Energy, "It's not about candidates, it's not about political parties, it's not even about political philosophy. Energy should not be a partisan issue. . . . We believe a vote for energy will elevate the energy conversation." I wholeheartedly agree with the API that energy isn't, or shouldn't be, attached to a political party or philosophy. We know, however, that these politicized battles are not always elevated into some erudite discourse but rather end up in the gutter of half-truths and name-calling. (You know we've reached a new low when "Drill, baby, drill" is the apex of political rhetoric.) We know that the incumbent industries present our energy options subjectively, as the Vote 4 Energy campaign shows, and that the clean-energy industry is coming to this gunfight armed with a couple of slingshots.

The Public Demand for Clean, Local Energy

Whether Americans will see through King CONG's smoke and mirrors and clever communications is another question. We have to take this battle seriously because CONG and its industry associations could hamper our momentum in bringing what our country needs and what an ever-growing number of our citizens want: clean, local energy. CONG intends its long and sustained campaign to frame solar as at best some "future technology" and at worst a total failure. Nothing could be further from the truth: solar power is ready right now. It's what all the satellites in space use to operate, beaming bits and bytes of data down to Earth for our communications and entertainment. And there are new advances in solar technology every day.

this material has been excerpted from

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For more information, or to purchase the book,
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